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Black & Veatch Corp.
6800 W. 115th St., Suite 2292
Overland Park, KS 66211
(913) 458-6909

Date: **July 22, 2019**
Rebecca Klein
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	20840
	Carrier Site Name:	Weston CT
Crown Castle Designation:	**Crown Castle BU Number:**	829046
	Crown Castle Site Name:	Weston/ Rt-57/ Norfield R
	Crown Castle JDE Job Number:	582614
	Crown Castle Work Order Number:	1765202
	Crown Castle Order Number:	499102 Rev. 0
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	400087
Site Data:	**56 Norfield Rd. (Town Hall), Weston, Fairfield County, CT** **Latitude *41° 12' 8.4"*, Longitude *-73° 22' 46.6"*** **190 Foot - Monopole Tower**	

Dear Rebecca Klein,

Black & Veatch Corp. 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 - 79.4%**

This analysis utilizes an ultimate 3-second gust wind speed of 120 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: Aishwarya Mahapatra / Anup Chitale

Respectfully submitted by:

Joshua J. Riley, P.E.

Professional Engineer

STATE OF CONNECTICUT
JOSHUA J. RILEY
33208
LICENSED
PROFESSIONAL ENGINEER
07/22/2019

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1) INTRODUCTION

This tower is a 190 ft Monopole tower designed by Pirod, Inc. and mapped by Tower Engineering Professionals,

The tower has been modified multiple times in the past to accommodate additional loading.

The tower has been modified per reinforcement drawings prepared by Tower Engineering Professionals and Sabre Tower & Poles, in January of 2012. Reinforcement consists of addition of reinforcement plates at elevation 0.83' – 51' and 57.5' – 112.5' and additional (8) anchor rods. Refer to Post Modification Inspection Report by Sabre Tower & Poles in November of 2012. This modification has been considered effective in this analysis.

The tower was later modified per reinforcement drawings prepared by Paul J. Ford and Company, in April of 2013. Reinforcement consisted of addition of jump plates at elevation 20', 40', 60' and 80', reinforcing plates at 80.25' to 87.25' and additional (4) transition stiffeners. Refer to Modification Inspection Report by Tower Engineering Professionals in November of 2014. This modification has been considered effective in this analysis.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	120 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)
150.0	150.0	2	antel	LPA-80080/6CF w/ Mount Pipe	7	1 5/8
		1	cci tower mounts	Platform Mount [LP 403-1]		
		4	decibel	DB846F65ZAXY w/ Mount Pipe		
		6	quintel technology	QS6656-5D w/ Mount Pipe		
		1	rfs celwave	DB-C1-12C-24AB-0Z		
		3	samsung telecommunications	RFV01U-D1A		
		3	samsung telecommunications	RFV01U-D2A		

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)
188.0	193.0	1	rfs celwave	PD201-7	4 1 1 1	1 1/4 5/16 5/8 7/8
	190.0	3	alcatel lucent	TD-RRH8x20-25		
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVTM14-ALU-I20 w/ Mount Pipe		
	188.0	1	cci tower mounts	Platform Mount [LP 403-1]		
	187.0	1	radio waves	SP2-5.8		
185.0	188.0	3	alcatel lucent	1900MHz RRH	-	-
		3	alcatel lucent	800MHZ RRH		
	185.0	1	cci tower mounts	Side Arm Mount [SO 102-3]		
184.0	184.0	1	cci tower mounts	Side Arm Mount [SO 701-1]	-	-
179.0	185.0	2	rfs celwave	458-2D	2	7/8
	179.0	1	cci tower mounts	Platform Mount [LP 403-1]		
		2	cci tower mounts	Side Arm Mount [SO 301-1]		
170.0	170.0	1	cci tower mounts	Platform Mount [LP 405-1]	10	1 5/8
		3	ericsson	AIR 32 B2A/B66AA w/ Mount Pipe		
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe		
		3	ericsson	KRY 112 144/1		
		3	ericsson	RADIO 4449 B12/B71		
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
162.0	163.0	3	cci antennas	OPA-65R-LCUU-H6 w/ Mount Pipe	12 2 4 2 1 1	1 5/8 7/8 3/4 3/8 5/8 2 Conduit
		3	ericsson	RRUS 11		
		3	ericsson	RRUS 32		
		3	ericsson	RRUS 32 B2		
		3	ericsson	RRUS 4478 B14		
		3	kathrein	80010965 w/ Mount Pipe		
		6	powerwave technologies	7020.00		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
		1	raycap	DC6-48-60-18-8C		
		1	raycap	DC6-48-60-18-8F		
	162.0	1	site pro1	HRK-14 Handrail Kit [NA 510-1]		
		6	unknown	L1-1/2"x2-1/2"x1/4"x1'-2"		
		3	site pro1	PRK-SFS-L		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
				Reinforcement Kit		
		2	cci tower mounts	Platform Mount [LP 403-1]		
	160.0	6	powerwave technologies	LGP21401		
125.0	130.0	1	rfs celwave	PD128-1	1	7/8
		1	rfs celwave	PD201-1	1	1/2
	125.0	2	cci tower mounts	Side Arm Mount [SO 901-1]		
110.0	115.0	2	rfs celwave	PD128-1	2	1/2
	110.0	2	cci tower mounts	Side Arm Mount [SO 901-1]		
100.0	101.0	1	gps	GPS_A	1	1/2
	100.0	1	cci tower mounts	Side Arm Mount [SO 901-1]		
95.0	100.0	2	rfs celwave	PD128-1	2	1/2
	95.0	2	cci tower mounts	Side Arm Mount [SO 901-1]		
80.0	85.0	1	decibel	DB222	2	1/2
		1	rfs celwave	PD128-1		
	80.0	2	cci tower mounts	Side Arm Mount [SO 901-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Arcnet architects, Inc.	3529916	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Pirod, Inc.	3755295	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Pirod, Inc. & Tower Engineering Professionals (mapped)	7340070	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Sabre Tower & Poles	3667108	CCISITES
4-POST-MODIFICATION INSPECTION	Sabre Tower & Poles	3673725	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	Paul J. Ford and Company	3801440	CCISITES
4-POST-MODIFICATION INSPECTION	Tower Engineering Professionals	5392198	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.5.0), 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.

tnxTower was used to determine the loads on the modified structure. Additional calculations were performed to determine the stresses in the pole and in the reinforcing elements. These calculations are presented in Appendix C

3.2) Assumptions

1) Tower and structures were built and maintained in accordance with the manufacturer's specification.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
3) The existing base plate grout is not considered in this analysis.
4) The wind loading EPA of the panel antennas has been analyzed and determined by the tower owner. Verification of its accuracy is outside the scope of this structural analysis. Black & Veatch does not assume any responsibility for its accuracy.
5) This analysis was performed under the assumption that all information provided to Black & Veatch is current and correct. This is to include site data, appurtenance loading, tower/foundation details, and geotechnical data. The loading on the structure is based on CAD level drawings and carrier orders provided by the owner. If any of this information is not current and correct, this report should be considered obsolete and further analysis will be required.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary) (Monopole Tower)

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
190 - 185	Pole	TP30x30x0.375	Pole	1.3%	Pass
185 - 180	Pole	TP30x30x0.375	Pole	3.5%	Pass
180 - 175	Pole	TP36x36x0.375	Pole	4.9%	Pass
175 - 170	Pole	TP36x36x0.375	Pole	7.2%	Pass
170 - 165	Pole	TP36x36x0.375	Pole	11.4%	Pass
165 - 160	Pole	TP36x36x0.375	Pole	16.6%	Pass
160 - 155	Pole	TP42x42x0.375	Pole	16.9%	Pass
155 - 150	Pole	TP42x42x0.375	Pole	21.4%	Pass
150 - 145	Pole	TP42x42x0.375	Pole	27.5%	Pass
145 - 140	Pole	TP42x42x0.375	Pole	33.5%	Pass
140 - 135	Pole	TP48x48x0.375	Pole	30.9%	Pass
135 - 130	Pole	TP48x48x0.375	Pole	35.8%	Pass
130 - 125	Pole	TP48x48x0.375	Pole	40.8%	Pass
125 - 120	Pole	TP48x48x0.375	Pole	46.0%	Pass
120 - 115	Pole	TP54x54x0.375	Pole	41.1%	Pass
115 - 112.67	Pole	TP54x54x0.375	Pole	43.1%	Pass
112.67 - 112.42	Pole + Reinf.	TP54x54x0.4875	Pole	33.1%	Pass
112.42 - 107.42	Pole + Reinf.	TP54x54x0.4875	Pole	36.5%	Pass

107.42 - 103.33	Pole + Reinf.	TP54x54x0.4875	Pole	39.3%	Pass
103.33 - 103.08	Pole + Reinf.	TP54x54x0.4875	Pole	39.5%	Pass
103.08 - 100	Pole + Reinf.	TP54x54x0.4875	Pole	41.6%	Pass
100 - 95	Pole + Reinf.	TP60x60x0.475	Pole	37.9%	Pass
95 - 90	Pole + Reinf.	TP60x60x0.475	Pole	41.0%	Pass
90 - 89.5	Pole + Reinf.	TP60x60x0.475	Pole	41.3%	Pass
89.5 - 89.25	Pole + Reinf.	TP60x60x0.5563	Pole	35.8%	Pass
89.25 - 85.5	Pole + Reinf.	TP60x60x0.5563	Pole	37.8%	Pass
85.5 - 85.25	Pole + Reinf.	TP60x60x0.6375	Pole	33.3%	Pass
85.25 - 84	Pole + Reinf.	TP60x60x0.6375	Pole	34.0%	Pass
84 - 83.75	Pole + Reinf.	TP60x60x0.525	Pole	40.7%	Pass
83.75 - 82.5	Pole + Reinf.	TP60x60x0.525	Pole	41.4%	Pass
82.5 - 82.25	Pole + Reinf.	TP60x60x0.45	Pole	48.6%	Pass
82.25 - 80	Pole + Reinf.	TP60x60x0.45	Pole	50.2%	Pass
80 - 75	Pole + Reinf.	TP60x60x0.575	Reinf. 3 Compression	41.3%	Pass
75 - 70	Pole + Reinf.	TP60x60x0.575	Reinf. 3 Compression	44.1%	Pass
70 - 65	Pole + Reinf.	TP60x60x0.575	Reinf. 3 Compression	47.0%	Pass
65 - 60	Pole + Reinf.	TP60x60x0.575	Reinf. 3 Compression	49.9%	Pass
60 - 58.5	Pole + Reinf.	TP60x60x0.7	Reinf. 3 Compression	42.0%	Pass
58.5 - 58.25	Pole	TP60x60x0.625	Pole	45.9%	Pass
58.25 - 53.25	Pole	TP60x60x0.625	Pole	48.7%	Pass
53.25 - 48.25	Pole	TP60x60x0.625	Pole	51.5%	Pass
48.25 - 48	Pole + Reinf.	TP60x60x0.775	Pole	42.1%	Pass
48 - 43	Pole + Reinf.	TP60x60x0.775	Pole	44.4%	Pass
43 - 40	Pole + Reinf.	TP60x60x0.775	Pole	45.9%	Pass
40 - 35	Pole + Reinf.	TP60x60x0.775	Pole	48.3%	Pass
35 - 32.08	Pole + Reinf.	TP60x60x0.775	Pole	49.8%	Pass
32.08 - 31.83	Pole + Reinf.	TP60x60x0.9625	Pole	40.2%	Pass
31.83 - 28.75	Pole + Reinf.	TP60x60x0.9625	Pole	41.5%	Pass
28.75 - 28.5	Pole + Reinf.	TP60x60x0.8125	Pole	48.8%	Pass
28.5 - 23.5	Pole + Reinf.	TP60x60x0.8125	Pole	51.2%	Pass
23.5 - 18.5	Pole + Reinf.	TP60x60x0.95	Pole	45.6%	Pass
18.5 - 13.5	Pole + Reinf.	TP60x60x0.95	Pole	47.7%	Pass
13.5 - 8.5	Pole + Reinf.	TP60x60x0.95	Pole	49.9%	Pass
8.5 - 3.5	Pole + Reinf.	TP60x60x0.95	Pole	52.2%	Pass
3.5 - 0	Pole + Reinf.	TP60x60x0.95	Pole	53.7%	Pass
				Summary	
			Pole	53.7%	Pass
			Reinforcement	49.9%	Pass

			Overall	53.7%	Pass

Table 5 - Tower Component Stresses vs. Capacity (Monopole Tower) – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Flange Bolts	180	3.0	Pass
	Flange Plate		3.0	Pass
1,2	Flange Bolts	160	15.4	Pass
	Flange Plate		15.4	Pass
1,2	Flange Bolts	140	33.5	Pass
	Flange Plate		33.5	Pass
1,2	Flange Bolts	120	47.6	Pass
	Flange Plate		47.6	Pass
1,2	Flange Bolts	100	47.6	Pass
	Flange Plate		47.6	Pass
1,2	Flange Bolts	80	34.3	Pass
	Flange Plate		34.3	Pass
	Jump Plates		68.5	Pass
1,2	Flange Bolts	60	38.2	Pass
	Flange Plate		38.2	Pass
	Jump Plates		61.7	Pass
1,2	Flange Bolts	40	41.7	Pass
	Flange Plate		41.7	Pass
	Jump Plates		69.5	Pass
1,2	Flange Bolts	20	44.9	Pass
	Flange Plate		44.9	Pass
	Jump Plates		72.6	Pass
1,2	Anchor Rods (Original)	0	45.5	Pass
	Anchor Rods (Existing Modification)		45.5	Pass
	Base Plate		45.5	Pass
1,3	Base Foundation (Compared w/ Design Loads)	0	79.4	Pass

Structure Rating (max from all components) =	**79.4%**

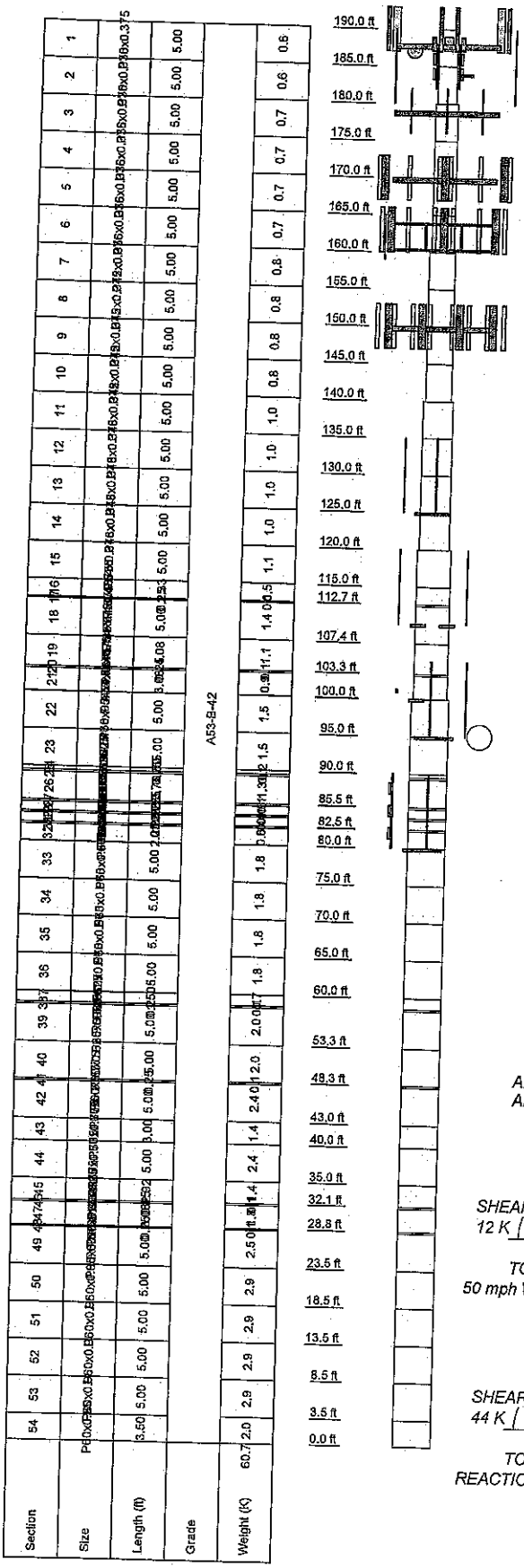
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed. TIA-22-H Section 15.5.
2) Base/Flange plates have the same capacity as their respective splice bolts or shaft
3) Foundation capacity determined by comparing analysis reactions to original design reactions.

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



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 120 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. TIA-222-H Annex S

ALL REACTIONS ARE FACTORED

AXIAL 161 K

SHEAR 12 K — *MOMENT 1489 kip-ft*

TORQUE 1 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 108 K

SHEAR 44 K — *MOMENT 5180 kip-ft*

TORQUE 2 kip-ft
REACTIONS - 120 mph WIND

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Job: *Weston/Rt-57/Norfield (BU# 829046)*		
Project: *400087 (829046.1765202)*		
Client: Crown Castle	Drawn by: Aishwarya Mahapatra	App'd:
Code: TIA-222-H	Date: 07/22/19	Scale: NTS
Path:		Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

1. Tower is located in Fairfield County, Connecticut.
2. Tower base elevation above sea level: 322.00 ft.
3. Basic wind speed of 120 mph.
4. Risk Category II.
5. Exposure Category B.
6. Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7. Topographic Category: 1.
8. Crest Height: 0.00 ft.
9. Nominal ice thickness of 1.5000 in.
10. Ice thickness is considered to increase with height.
11. Ice density of 56 pcf.
12. A wind speed of 50 mph is used in combination with ice.
13. Temperature drop of 50 °F.
14. Deflections calculated using a wind speed of 60 mph.
15. A non-linear (P-delta) analysis was used.
16. Pressures are calculated at each section.
17. Stress ratio used in pole design is 1.05.
18. Tower analysis based on target reliabilities in accordance with Annex S.
19. Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
20. Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
Use Code Stress Ratios
Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile

Include Bolts In Member Capacity

Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.

Autocalc Torque Arm Areas

Add IBC .6D+W Combination
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs

Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-H Bracing Resist. Exemption
Use TIA-222-H Tension Splice Exemption

Poles

√ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	190.00-185.00	5.00	P30x0.375	A53-B-42 (42 ksi)	
L2	185.00-180.00	5.00	P30x0.375	A53-B-42 (42 ksi)	
L3	180.00-175.00	5.00	P36x0.375	A53-B-42 (42 ksi)	
L4	175.00-170.00	5.00	P36x0.375	A53-B-42 (42 ksi)	
L5	170.00-165.00	5.00	P36x0.375	A53-B-42 (42 ksi)	
L6	165.00-160.00	5.00	P36x0.375	A53-B-42 (42 ksi)	
L7	160.00-155.00	5.00	P42x0.375	A53-B-42 (42 ksi)	
L8	155.00-150.00	5.00	P42x0.375	A53-B-42 (42 ksi)	
L9	150.00-145.00	5.00	P42x0.375	A53-B-42 (42 ksi)	
L10	145.00-140.00	5.00	P42x0.375	A53-B-42 (42 ksi)	
L11	140.00-135.00	5.00	P48x0.375	A53-B-42 (42 ksi)	
L12	135.00-130.00	5.00	P48x0.375	A53-B-42 (42 ksi)	
L13	130.00-125.00	5.00	P48x0.375	A53-B-42 (42 ksi)	
L14	125.00-120.00	5.00	P48x0.375	A53-B-42 (42 ksi)	
L15	120.00-115.00	5.00	P54x0.375	A53-B-42 (42 ksi)	
L16	115.00-112.67	2.33	P54x0.375	A53-B-42 (42 ksi)	
L17	112.67-112.42	0.25	P54x0.4875	A53-B-42 (42 ksi)	
L18	112.42-107.42	5.00	P54x0.4875	A53-B-42 (42 ksi)	
L19	107.42-103.33	4.08	P54x0.4875	A53-B-42 (42 ksi)	
L20	103.33-103.08	0.25	P54x0.4875	A53-B-42 (42 ksi)	
L21	103.08-100.00	3.08	P54x0.4875	A53-B-42 (42 ksi)	
L22	100.00-95.00	5.00	P60x0.475	A53-B-42 (42 ksi)	
L23	95.00-90.00	5.00	P60x0.475	A53-B-42 (42 ksi)	
L24	90.00-89.50	0.50	P60x0.475	A53-B-42 (42 ksi)	
L25	89.50-89.25	0.25	P60x0.55625	A53-B-42 (42 ksi)	
L26	89.25-85.50	3.75	P60x0.55625	A53-B-42 (42 ksi)	
L27	85.50-85.25	0.25	P60x0.6375	A53-B-42 (42 ksi)	
L28	85.25-84.00	1.25	P60x0.6375	A53-B-42 (42 ksi)	
L29	84.00-83.75	0.25	P60x0.525	A53-B-42 (42 ksi)	
L30	83.75-82.50	1.25	P60x0.525	A53-B-42 (42 ksi)	
L31	82.50-82.25	0.25	P60x0.45	A53-B-42 (42 ksi)	
L32	82.25-80.00	2.25	P60x0.45	A53-B-42 (42 ksi)	
L33	80.00-75.00	5.00	P60x0.575	A53-B-42 (42 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L34	75.00-70.00	5.00	P60x0.575	(42 ksi) A53-B-42 (42 ksi)	
L35	70.00-65.00	5.00	P60x0.575	(42 ksi) A53-B-42 (42 ksi)	
L36	65.00-60.00	5.00	P60x0.575	(42 ksi) A53-B-42 (42 ksi)	
L37	60.00-58.50	1.50	P60x0.7	(42 ksi) A53-B-42 (42 ksi)	
L38	58.50-58.25	0.25	P60x0.625	(42 ksi) A53-B-42 (42 ksi)	
L39	58.25-53.25	5.00	P60x0.625	(42 ksi) A53-B-42 (42 ksi)	
L40	53.25-48.25	5.00	P60x0.625	(42 ksi) A53-B-42 (42 ksi)	
L41	48.25-48.00	0.25	P60x0.775	(42 ksi) A53-B-42 (42 ksi)	
L42	48.00-43.00	5.00	P60x0.775	(42 ksi) A53-B-42 (42 ksi)	
L43	43.00-40.00	3.00	P60x0.775	(42 ksi) A53-B-42 (42 ksi)	
L44	40.00-35.00	5.00	P60x0.775	(42 ksi) A53-B-42 (42 ksi)	
L45	35.00-32.08	2.92	P60x0.775	(42 ksi) A53-B-42 (42 ksi)	
L46	32.08-31.83	0.25	P60x0.9625	(42 ksi) A53-B-42 (42 ksi)	
L47	31.83-28.75	3.08	P60x0.9625	(42 ksi) A53-B-42 (42 ksi)	
L48	28.75-28.50	0.25	P60x0.8125	(42 ksi) A53-B-42 (42 ksi)	
L49	28.50-23.50	5.00	P60x0.8125	(42 ksi) A53-B-42 (42 ksi)	
L50	23.50-18.50	5.00	P60x0.95	(42 ksi) A53-B-42 (42 ksi)	
L51	18.50-13.50	5.00	P60x0.95	(42 ksi) A53-B-42 (42 ksi)	
L52	13.50-8.50	5.00	P60x0.95	(42 ksi) A53-B-42 (42 ksi)	
L53	8.50-3.50	5.00	P60x0.95	(42 ksi) A53-B-42 (42 ksi)	
L54	3.50-0.00	3.50	P60x0.95	(42 ksi) A53-B-42 (42 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 190.00-185.00				1	1	1			
L2 185.00-180.00				1	1	1			
L3 180.00-175.00				1	1	1			
L4 175.00-170.00				1	1	1			
L5 170.00-165.00				1	1	1			
L6 165.00-160.00				1	1	1			
L7 160.00-155.00				1	1	1			
L8 155.00-150.00				1	1	1			
L9 150.00-145.00				1	1	1			

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L10 145.00-140.00				1	1	1			
L11 140.00-135.00				1	1	1			
L12 135.00-130.00				1	1	1			
L13 130.00-125.00				1	1	1			
L14 125.00-120.00				1	1	1			
L15 120.00-115.00				1	1	1			
L16 115.00-112.67				1	1	1			
L17 112.67-112.42				1	1	0.990478			
L18 112.42-107.42				1	1	0.990478			
L19 107.42-103.33				1	1	0.990478			
L20 103.33-103.08				1	1	0.990478			
L21 103.08-100.00				1	1	0.990478			
L22 100.00-95.00				1	1	0.993442			
L23 95.00-90.00				1	1	0.993442			
L24 90.00-89.50				1	1	0.993442			
L25 89.50-89.25				1	1	0.979451			
L26 89.25-85.50				1	1	0.979451			
L27 85.50-85.25				1	1	0.96934			
L28 85.25-84.00				1	1	0.96934			
L29 84.00-83.75				1	1	0.991333			
L30 83.75-82.50				1	1	0.991333			
L31 82.50-82.25				1	1	0.99474			
L32 82.25-80.00				1	1	0.99474			
L33 80.00-75.00				1	1	0.996424			
L34 75.00-70.00				1	1	0.996424			
L35 70.00-65.00				1	1	0.996424			
L36 65.00-60.00				1	1	0.996424			
L37 60.00-58.50				1	1	0.997508			
L38 58.50-58.25				1	1	1			
L39 58.25-53.25				1	1	1			
L40 53.25-48.25				1	1	1			
L41 48.25-48.00				1	1	0.977534			
L42 48.00-43.00				1	1	0.977534			
L43 43.00-				1	1	0.977534			

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
40.00									
L44 40.00-35.00				1	1	0.977534			
L45 35.00-32.08				1	1	0.977534			
L46 32.08-31.83				1	1	0.96816			
L47 31.83-28.75				1	1	0.96816			
L48 28.75-28.50				1	1	0.98265			
L49 28.50-23.50				1	1	0.98265			
L50 23.50-18.50				1	1	0.973014			
L51 18.50-13.50				1	1	0.973014			
L52 13.50-8.50				1	1	0.973014			
L53 8.50-3.50				1	1	0.973014			
L54 3.50-0.00				1	1	0.973014			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	C	No	Surface Ar (CaAa)	190.00 - 10.00	1	1	0.490 0.500	0.3750		0.22
Climbing Rungs ***188***	C	No	Surface Ar (CaAa)	190.00 - 10.00	1	1	0.000 0.000	0.8000		7.90
(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4) ***170***	B	No	Surface Ar (CaAa)	188.00 - 6.00	3	3	0.032 0.131	1.5400		1.22
(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8) ***160***	B	No	Surface Ar (CaAa)	170.00 - 8.00	10	10	-0.380 0.032	1.9800		0.82
(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	A	No	Surface Ar (CaAa)	162.00 - 11.00	6	3	0.443 0.491	0.7950		0.58
LDF7-50A(1-5/8) **********	A	No	Surface Ar (CaAa)	162.00 - 11.00	12	6	0.200 0.443	1.9800		0.82
***MOD 2012 ***										
8.5" x 1.25" Flat Plate	A	No	Surface Af (CaAa)	35.83 - 0.83	1	1	0.000 0.000	8.5000	19.5000	0.00
8.5" x 1.25" Flat Plate	B	No	Surface Af (CaAa)	35.83 - 0.83	1	1	0.000 0.000	8.5000	19.5000	0.00
8.5" x 1.25" Flat Plate *	C	No	Surface Af (CaAa)	35.83 - 0.83	1	1	0.000 0.000	8.5000	19.5000	0.00
6.5" x 1.25" Flat Plate	A	No	Surface Af (CaAa)	51.00 - 26.00	1	1	0.000 0.000	6.5000	15.5000	0.00
6.5" x 1.25" Flat Plate	B	No	Surface Af (CaAa)	51.00 - 26.00	1	1	0.000 0.000	6.5000	15.5000	0.00
6.5" x 1.25" Flat Plate	C	No	Surface Af	51.00 -	1	1	0.000	6.5000	15.5000	0.00

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
*			(CaAa)	26.00			0.000			
4.5" x 1" Flat Plate	A	No	Surface Af (CaAa)	87.00 - 57.00	1	1	0.000 0.000	4.5000	11.0000	0.00
4.5" x 1" Flat Plate	B	No	Surface Af (CaAa)	87.00 - 57.00	1	1	0.000 0.000	4.5000	11.0000	0.00
4.5" x 1" Flat Plate	C	No	Surface Af (CaAa)	87.00 - 57.00	1	1	0.000 0.000	4.5000	11.0000	0.00
*										
6" x 1" Flat Plate	A	No	Surface Af (CaAa)	105.33 - 82.00	1	1	0.000 0.000	6.0000	14.0000	0.00
6" x 1" Flat Plate	B	No	Surface Af (CaAa)	105.33 - 82.00	1	1	0.000 0.000	6.0000	14.0000	0.00
6" x 1" Flat Plate	C	No	Surface Af (CaAa)	105.33 - 82.00	1	1	0.000 0.000	6.0000	14.0000	0.00
*										
6" x 1" Flat Plate	A	No	Surface Af (CaAa)	114.67 - 101.33	1	1	0.000 0.000	6.0000	14.0000	0.00
6" x 1" Flat Plate	B	No	Surface Af (CaAa)	114.67 - 101.33	1	1	0.000 0.000	6.0000	14.0000	0.00
6" x 1" Flat Plate	C	No	Surface Af (CaAa)	114.67 - 101.33	1	1	0.000 0.000	6.0000	14.0000	0.00
MOD 2013										
4.5" x 1" Flat Plate	A	No	Surface Af (CaAa)	91.00 - 81.00	1	1	0.000 0.000	4.5000	11.0000	0.00
4.5" x 1" Flat Plate	B	No	Surface Af (CaAa)	91.00 - 81.00	1	1	0.000 0.000	4.5000	11.0000	0.00
4.5" x 1" Flat Plate	C	No	Surface Af (CaAa)	91.00 - 81.00	1	1	0.000 0.000	4.5000	11.0000	0.00
**********										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
TYPE I(1-1/4)	C	No	No	Inside Pole	188.00 - 0.00	1	No Ice	0.00	0.63
							1/2" Ice	0.00	0.63
							1" Ice	0.00	0.63
							2" Ice	0.00	0.63
ATCB-B01(5/16)	C	No	No	Inside Pole	188.00 - 0.00	1	No Ice	0.00	0.07
							1/2" Ice	0.00	0.07
							1" Ice	0.00	0.07
							2" Ice	0.00	0.07
LDF4.5-50(5/8)	C	No	No	Inside Pole	188.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
LDF5-50A(7/8)	C	No	No	Inside Pole	188.00 - 0.00	1	No Ice	0.00	0.33
							1/2" Ice	0.00	0.33
							1" Ice	0.00	0.33
							2" Ice	0.00	0.33
179									
LDF5-50A(7/8)	C	No	No	Inside Pole	179.00 - 0.00	2	No Ice	0.00	0.33
							1/2" Ice	0.00	0.33
							1" Ice	0.00	0.33
							2" Ice	0.00	0.33
2" innerduct conduit	C	No	No	Inside Pole	162.00 - 0.00	1	No Ice	0.00	0.20
							1/2" Ice	0.00	0.20
							1" Ice	0.00	0.20
							2" Ice	0.00	0.20
9776(5/8)	C	No	No	Inside Pole	162.00 - 0.00	1	No Ice	0.00	0.28
							1/2" Ice	0.00	0.28
							1" Ice	0.00	0.28

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
							2" Ice	0.00	0.28
LDF5-50A(7/8)	C	No	No	Inside Pole	162.00 - 0.00	2	No Ice	0.00	0.33
							1/2" Ice	0.00	0.33
							1" Ice	0.00	0.33
							2" Ice	0.00	0.33
150									
HB158-1-13U6-S6F18(1-5/8)	C	No	No	Inside Pole	150.00 - 0.00	1	No Ice	0.00	1.90
							1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90
							2" Ice	0.00	1.90
LDF7-50A(1-5/8)	C	No	No	Inside Pole	150.00 - 0.00	6	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
125									
LDF4-50A(1/2)	C	No	No	Inside Pole	125.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
LDF5-50A(7/8)	C	No	No	Inside Pole	125.00 - 0.00	1	No Ice	0.00	0.33
							1/2" Ice	0.00	0.33
							1" Ice	0.00	0.33
							2" Ice	0.00	0.33
110									
LDF4-50A(1/2)	C	No	No	Inside Pole	110.00 - 0.00	2	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
100									
LDF4-50A(1/2)	C	No	No	Inside Pole	100.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
95									
LDF4-50A(1/2)	C	No	No	Inside Pole	95.00 - 0.00	2	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
80									
LDF4-50A(1/2)	C	No	No	Inside Pole	80.00 - 0.00	2	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
**********									
**********									

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	190.00-185.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	1.386	0.000	0.01
		C	0.000	0.000	0.588	0.000	0.04
L2	185.00-180.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	2.310	0.000	0.02
		C	0.000	0.000	0.588	0.000	0.05
L3	180.00-175.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	2.310	0.000	0.02
		C	0.000	0.000	0.588	0.000	0.05
L4	175.00-170.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	2.310	0.000	0.02
		C	0.000	0.000	0.588	0.000	0.05
L5	170.00-165.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	12.210	0.000	0.06

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
		C	0.000	0.000	0.588	0.000	0.05
L6	165.00-160.00	A	0.000	0.000	2.853	0.000	0.03
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.05
L7	160.00-155.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.06
L8	155.00-150.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.06
L9	150.00-145.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.09
L10	145.00-140.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.09
L11	140.00-135.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.09
L12	135.00-130.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.09
L13	130.00-125.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.09
L14	125.00-120.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.09
L15	120.00-115.00	A	0.000	0.000	7.132	0.000	0.07
		B	0.000	0.000	12.210	0.000	0.06
		C	0.000	0.000	0.588	0.000	0.09
L16	115.00-112.67	A	0.000	0.000	5.329	0.000	0.03
		B	0.000	0.000	7.700	0.000	0.03
		C	0.000	0.000	2.274	0.000	0.04
L17	112.67-112.42	A	0.000	0.000	0.607	0.000	0.00
		B	0.000	0.000	0.861	0.000	0.00
		C	0.000	0.000	0.279	0.000	0.00
L18	112.42-107.42	A	0.000	0.000	12.133	0.000	0.07
		B	0.000	0.000	17.210	0.000	0.06
		C	0.000	0.000	5.588	0.000	0.09
L19	107.42-103.33	A	0.000	0.000	11.907	0.000	0.05
		B	0.000	0.000	16.054	0.000	0.05
		C	0.000	0.000	6.563	0.000	0.08
L20	103.33-103.08	A	0.000	0.000	0.857	0.000	0.00
		B	0.000	0.000	1.111	0.000	0.00
		C	0.000	0.000	0.529	0.000	0.00
L21	103.08-100.00	A	0.000	0.000	9.231	0.000	0.04
		B	0.000	0.000	12.362	0.000	0.04
		C	0.000	0.000	5.195	0.000	0.06
L22	100.00-95.00	A	0.000	0.000	12.133	0.000	0.07
		B	0.000	0.000	17.210	0.000	0.06
		C	0.000	0.000	5.588	0.000	0.09
L23	95.00-90.00	A	0.000	0.000	12.883	0.000	0.07
		B	0.000	0.000	17.960	0.000	0.06
		C	0.000	0.000	6.338	0.000	0.10
L24	90.00-89.50	A	0.000	0.000	1.588	0.000	0.01
		B	0.000	0.000	2.096	0.000	0.01
		C	0.000	0.000	0.934	0.000	0.01
L25	89.50-89.25	A	0.000	0.000	0.794	0.000	0.00
		B	0.000	0.000	1.048	0.000	0.00
		C	0.000	0.000	0.467	0.000	0.00
L26	89.25-85.50	A	0.000	0.000	13.037	0.000	0.05
		B	0.000	0.000	16.845	0.000	0.04
		C	0.000	0.000	8.128	0.000	0.07
L27	85.50-85.25	A	0.000	0.000	0.982	0.000	0.00
		B	0.000	0.000	1.236	0.000	0.00
		C	0.000	0.000	0.654	0.000	0.00
L28	85.25-84.00	A	0.000	0.000	4.908	0.000	0.02
		B	0.000	0.000	6.178	0.000	0.01

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C	0.000	0.000	3.272	0.000	0.02
L29	84.00-83.75	A	0.000	0.000	0.982	0.000	0.00
		B	0.000	0.000	1.236	0.000	0.00
		C	0.000	0.000	0.654	0.000	0.00
L30	83.75-82.50	A	0.000	0.000	4.908	0.000	0.02
		B	0.000	0.000	6.178	0.000	0.01
		C	0.000	0.000	3.272	0.000	0.02
L31	82.50-82.25	A	0.000	0.000	0.982	0.000	0.00
		B	0.000	0.000	1.236	0.000	0.00
		C	0.000	0.000	0.654	0.000	0.00
L32	82.25-80.00	A	0.000	0.000	6.085	0.000	0.03
		B	0.000	0.000	8.370	0.000	0.03
		C	0.000	0.000	3.139	0.000	0.04
L33	80.00-75.00	A	0.000	0.000	10.883	0.000	0.07
		B	0.000	0.000	15.960	0.000	0.06
		C	0.000	0.000	4.338	0.000	0.10
L34	75.00-70.00	A	0.000	0.000	10.883	0.000	0.07
		B	0.000	0.000	15.960	0.000	0.06
		C	0.000	0.000	4.338	0.000	0.10
L35	70.00-65.00	A	0.000	0.000	10.883	0.000	0.07
		B	0.000	0.000	15.960	0.000	0.06
		C	0.000	0.000	4.338	0.000	0.10
L36	65.00-60.00	A	0.000	0.000	10.883	0.000	0.07
		B	0.000	0.000	15.960	0.000	0.06
		C	0.000	0.000	4.338	0.000	0.10
L37	60.00-58.50	A	0.000	0.000	3.265	0.000	0.02
		B	0.000	0.000	4.788	0.000	0.02
		C	0.000	0.000	1.301	0.000	0.03
L38	58.50-58.25	A	0.000	0.000	0.544	0.000	0.00
		B	0.000	0.000	0.798	0.000	0.00
		C	0.000	0.000	0.217	0.000	0.00
L39	58.25-53.25	A	0.000	0.000	8.070	0.000	0.07
		B	0.000	0.000	13.148	0.000	0.06
		C	0.000	0.000	1.525	0.000	0.10
L40	53.25-48.25	A	0.000	0.000	10.112	0.000	0.07
		B	0.000	0.000	15.189	0.000	0.06
		C	0.000	0.000	3.567	0.000	0.10
L41	48.25-48.00	A	0.000	0.000	0.627	0.000	0.00
		B	0.000	0.000	0.881	0.000	0.00
		C	0.000	0.000	0.300	0.000	0.00
L42	48.00-43.00	A	0.000	0.000	12.549	0.000	0.07
		B	0.000	0.000	17.627	0.000	0.06
		C	0.000	0.000	6.004	0.000	0.10
L43	43.00-40.00	A	0.000	0.000	7.530	0.000	0.04
		B	0.000	0.000	10.576	0.000	0.04
		C	0.000	0.000	3.603	0.000	0.06
L44	40.00-35.00	A	0.000	0.000	13.729	0.000	0.07
		B	0.000	0.000	18.807	0.000	0.06
		C	0.000	0.000	7.184	0.000	0.10
L45	35.00-32.08	A	0.000	0.000	11.465	0.000	0.04
		B	0.000	0.000	14.431	0.000	0.03
		C	0.000	0.000	7.643	0.000	0.06
L46	32.08-31.83	A	0.000	0.000	0.982	0.000	0.00
		B	0.000	0.000	1.236	0.000	0.00
		C	0.000	0.000	0.654	0.000	0.00
L47	31.83-28.75	A	0.000	0.000	12.094	0.000	0.04
		B	0.000	0.000	15.221	0.000	0.04
		C	0.000	0.000	8.062	0.000	0.06
L48	28.75-28.50	A	0.000	0.000	0.982	0.000	0.00
		B	0.000	0.000	1.236	0.000	0.00
		C	0.000	0.000	0.654	0.000	0.00
L49	28.50-23.50	A	0.000	0.000	16.924	0.000	0.07
		B	0.000	0.000	22.002	0.000	0.06
		C	0.000	0.000	10.379	0.000	0.10
L50	23.50-18.50	A	0.000	0.000	14.216	0.000	0.07
		B	0.000	0.000	19.293	0.000	0.06
		C	0.000	0.000	7.671	0.000	0.10
L51	18.50-13.50	A	0.000	0.000	14.216	0.000	0.07
		B	0.000	0.000	19.293	0.000	0.06

Tower Sectio n	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C	0.000	0.000	7.671	0.000	0.10
L52	13.50-8.50	A	0.000	0.000	10.650	0.000	0.03
		B	0.000	0.000	19.293	0.000	0.06
		C	0.000	0.000	7.495	0.000	0.09
L53	8.50-3.50	A	0.000	0.000	7.083	0.000	0.00
		B	0.000	0.000	9.228	0.000	0.01
		C	0.000	0.000	7.083	0.000	0.06
L54	3.50-0.00	A	0.000	0.000	3.778	0.000	0.00
		B	0.000	0.000	3.778	0.000	0.00
		C	0.000	0.000	3.778	0.000	0.04

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Sectio n	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
L1	190.00-185.00	A	1.517	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	2.870	0.000	0.04
		C		0.000	0.000	3.621	0.000	0.08
L2	185.00-180.00	A	1.513	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	4.779	0.000	0.07
		C		0.000	0.000	3.613	0.000	0.09
L3	180.00-175.00	A	1.509	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	4.773	0.000	0.07
		C		0.000	0.000	3.605	0.000	0.09
L4	175.00-170.00	A	1.504	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	4.768	0.000	0.07
		C		0.000	0.000	3.596	0.000	0.09
L5	170.00-165.00	A	1.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	19.012	0.000	0.26
		C		0.000	0.000	3.587	0.000	0.09
L6	165.00-160.00	A	1.495	0.000	0.000	5.062	0.000	0.09
		B		0.000	0.000	19.001	0.000	0.26
		C		0.000	0.000	3.578	0.000	0.09
L7	160.00-155.00	A	1.491	0.000	0.000	12.642	0.000	0.22
		B		0.000	0.000	18.989	0.000	0.26
		C		0.000	0.000	3.569	0.000	0.09
L8	155.00-150.00	A	1.486	0.000	0.000	12.630	0.000	0.22
		B		0.000	0.000	18.977	0.000	0.26
		C		0.000	0.000	3.559	0.000	0.09
L9	150.00-145.00	A	1.481	0.000	0.000	12.618	0.000	0.22
		B		0.000	0.000	18.965	0.000	0.26
		C		0.000	0.000	3.549	0.000	0.13
L10	145.00-140.00	A	1.476	0.000	0.000	12.605	0.000	0.22
		B		0.000	0.000	18.952	0.000	0.25
		C		0.000	0.000	3.539	0.000	0.13
L11	140.00-135.00	A	1.471	0.000	0.000	12.592	0.000	0.22
		B		0.000	0.000	18.939	0.000	0.25
		C		0.000	0.000	3.529	0.000	0.13
L12	135.00-130.00	A	1.465	0.000	0.000	12.578	0.000	0.22
		B		0.000	0.000	18.925	0.000	0.25
		C		0.000	0.000	3.518	0.000	0.13
L13	130.00-125.00	A	1.460	0.000	0.000	12.564	0.000	0.22
		B		0.000	0.000	18.911	0.000	0.25
		C		0.000	0.000	3.507	0.000	0.13
L14	125.00-120.00	A	1.454	0.000	0.000	12.550	0.000	0.22
		B		0.000	0.000	18.897	0.000	0.25
		C		0.000	0.000	3.495	0.000	0.13
L15	120.00-115.00	A	1.448	0.000	0.000	12.535	0.000	0.22
		B		0.000	0.000	18.882	0.000	0.25
		C		0.000	0.000	3.483	0.000	0.13
L16	115.00-112.67	A	1.443	0.000	0.000	8.191	0.000	0.12
		B		0.000	0.000	11.153	0.000	0.14
		C		0.000	0.000	3.966	0.000	0.08
L17	112.67-112.42	A	1.441	0.000	0.000	0.919	0.000	0.01
		B		0.000	0.000	1.236	0.000	0.02

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C		0.000	0.000	0.467	0.000	0.01
L18	112.42-107.42	A	1.438	0.000	0.000	18.370	0.000	0.27
		B		0.000	0.000	24.717	0.000	0.30
		C		0.000	0.000	9.323	0.000	0.18
L19	107.42-103.33	A	1.432	0.000	0.000	17.559	0.000	0.24
		B		0.000	0.000	22.742	0.000	0.27
		C		0.000	0.000	10.174	0.000	0.17
L20	103.33-103.08	A	1.429	0.000	0.000	1.239	0.000	0.02
		B		0.000	0.000	1.556	0.000	0.02
		C		0.000	0.000	0.786	0.000	0.01
L21	103.08-100.00	A	1.427	0.000	0.000	13.708	0.000	0.18
		B		0.000	0.000	17.622	0.000	0.20
		C		0.000	0.000	8.133	0.000	0.13
L22	100.00-95.00	A	1.421	0.000	0.000	18.889	0.000	0.27
		B		0.000	0.000	25.236	0.000	0.30
		C		0.000	0.000	9.850	0.000	0.18
L23	95.00-90.00	A	1.413	0.000	0.000	19.773	0.000	0.27
		B		0.000	0.000	26.120	0.000	0.31
		C		0.000	0.000	10.738	0.000	0.19
L24	90.00-89.50	A	1.409	0.000	0.000	2.340	0.000	0.03
		B		0.000	0.000	2.974	0.000	0.03
		C		0.000	0.000	1.436	0.000	0.02
L25	89.50-89.25	A	1.409	0.000	0.000	1.170	0.000	0.02
		B		0.000	0.000	1.487	0.000	0.02
		C		0.000	0.000	0.718	0.000	0.01
L26	89.25-85.50	A	1.405	0.000	0.000	19.083	0.000	0.25
		B		0.000	0.000	23.843	0.000	0.27
		C		0.000	0.000	12.310	0.000	0.18
L27	85.50-85.25	A	1.402	0.000	0.000	1.426	0.000	0.02
		B		0.000	0.000	1.743	0.000	0.02
		C		0.000	0.000	0.975	0.000	0.01
L28	85.25-84.00	A	1.401	0.000	0.000	7.129	0.000	0.09
		B		0.000	0.000	8.716	0.000	0.10
		C		0.000	0.000	4.872	0.000	0.07
L29	84.00-83.75	A	1.400	0.000	0.000	1.425	0.000	0.02
		B		0.000	0.000	1.743	0.000	0.02
		C		0.000	0.000	0.974	0.000	0.01
L30	83.75-82.50	A	1.398	0.000	0.000	7.126	0.000	0.09
		B		0.000	0.000	8.712	0.000	0.10
		C		0.000	0.000	4.869	0.000	0.07
L31	82.50-82.25	A	1.397	0.000	0.000	1.425	0.000	0.02
		B		0.000	0.000	1.742	0.000	0.02
		C		0.000	0.000	0.973	0.000	0.01
L32	82.25-80.00	A	1.395	0.000	0.000	9.352	0.000	0.13
		B		0.000	0.000	12.208	0.000	0.14
		C		0.000	0.000	5.291	0.000	0.09
L33	80.00-75.00	A	1.389	0.000	0.000	17.526	0.000	0.25
		B		0.000	0.000	23.873	0.000	0.29
		C		0.000	0.000	8.503	0.000	0.17
L34	75.00-70.00	A	1.379	0.000	0.000	17.494	0.000	0.25
		B		0.000	0.000	23.840	0.000	0.28
		C		0.000	0.000	8.476	0.000	0.17
L35	70.00-65.00	A	1.370	0.000	0.000	17.459	0.000	0.25
		B		0.000	0.000	23.806	0.000	0.28
		C		0.000	0.000	8.446	0.000	0.17
L36	65.00-60.00	A	1.359	0.000	0.000	17.422	0.000	0.25
		B		0.000	0.000	23.769	0.000	0.28
		C		0.000	0.000	8.415	0.000	0.17
L37	60.00-58.50	A	1.352	0.000	0.000	5.219	0.000	0.07
		B		0.000	0.000	7.123	0.000	0.08
		C		0.000	0.000	2.518	0.000	0.05
L38	58.50-58.25	A	1.350	0.000	0.000	0.870	0.000	0.01
		B		0.000	0.000	1.187	0.000	0.01
		C		0.000	0.000	0.419	0.000	0.01
L39	58.25-53.25	A	1.344	0.000	0.000	13.548	0.000	0.22
		B		0.000	0.000	19.895	0.000	0.25
		C		0.000	0.000	4.548	0.000	0.14
L40	53.25-48.25	A	1.331	0.000	0.000	15.955	0.000	0.23
		B		0.000	0.000	22.301	0.000	0.26

Tower Sectio n	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		C		0.000	0.000	6.961	0.000	0.16
L41	48.25-48.00	A	1.324	0.000	0.000	0.948	0.000	0.01
		B		0.000	0.000	1.266	0.000	0.01
		C		0.000	0.000	0.499	0.000	0.01
L42	48.00-43.00	A	1.317	0.000	0.000	18.940	0.000	0.26
		B		0.000	0.000	25.287	0.000	0.28
		C		0.000	0.000	9.954	0.000	0.18
L43	43.00-40.00	A	1.305	0.000	0.000	11.339	0.000	0.15
		B		0.000	0.000	15.147	0.000	0.17
		C		0.000	0.000	5.951	0.000	0.11
L44	40.00-35.00	A	1.291	0.000	0.000	20.247	0.000	0.26
		B		0.000	0.000	26.594	0.000	0.29
		C		0.000	0.000	11.274	0.000	0.19
L45	35.00-32.08	A	1.277	0.000	0.000	15.863	0.000	0.18
		B		0.000	0.000	19.569	0.000	0.20
		C		0.000	0.000	10.626	0.000	0.14
L46	32.08-31.83	A	1.271	0.000	0.000	1.357	0.000	0.02
		B		0.000	0.000	1.674	0.000	0.02
		C		0.000	0.000	0.909	0.000	0.01
L47	31.83-28.75	A	1.264	0.000	0.000	16.696	0.000	0.19
		B		0.000	0.000	20.606	0.000	0.21
		C		0.000	0.000	11.177	0.000	0.15
L48	28.75-28.50	A	1.257	0.000	0.000	1.354	0.000	0.02
		B		0.000	0.000	1.671	0.000	0.02
		C		0.000	0.000	0.906	0.000	0.01
L49	28.50-23.50	A	1.245	0.000	0.000	23.687	0.000	0.28
		B		0.000	0.000	30.034	0.000	0.31
		C		0.000	0.000	14.737	0.000	0.21
L50	23.50-18.50	A	1.219	0.000	0.000	20.264	0.000	0.25
		B		0.000	0.000	26.611	0.000	0.28
		C		0.000	0.000	11.327	0.000	0.18
L51	18.50-13.50	A	1.186	0.000	0.000	20.150	0.000	0.24
		B		0.000	0.000	26.497	0.000	0.27
		C		0.000	0.000	11.229	0.000	0.18
L52	13.50-8.50	A	1.142	0.000	0.000	14.111	0.000	0.15
		B		0.000	0.000	26.344	0.000	0.26
		C		0.000	0.000	10.236	0.000	0.15
L53	8.50-3.50	A	1.075	0.000	0.000	8.158	0.000	0.05
		B		0.000	0.000	11.646	0.000	0.09
		C		0.000	0.000	8.158	0.000	0.11
L54	3.50-0.00	A	0.951	0.000	0.000	4.285	0.000	0.02
		B		0.000	0.000	4.285	0.000	0.02
		C		0.000	0.000	4.285	0.000	0.06

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	190.00-185.00	1.9055	0.0038	0.8161	1.0926
L2	185.00-180.00	3.0508	-0.4822	1.7458	0.5941
L3	180.00-175.00	3.1719	-0.4983	1.8706	0.6434
L4	175.00-170.00	3.1719	-0.4983	1.8711	0.6412
L5	170.00-165.00	7.1696	-6.9662	4.7465	-3.9631
L6	165.00-160.00	5.6109	-8.3154	3.6023	-5.1529
L7	160.00-155.00	4.2504	-10.8051	2.6170	-7.1208
L8	155.00-150.00	4.2504	-10.8051	2.6186	-7.1236
L9	150.00-145.00	4.2504	-10.8051	2.6201	-7.1265
L10	145.00-140.00	4.2504	-10.8051	2.6217	-7.1295
L11	140.00-135.00	4.6140	-11.6794	2.8627	-7.7493
L12	135.00-130.00	4.6140	-11.6794	2.8645	-7.7524
L13	130.00-125.00	4.6140	-11.6794	2.8663	-7.7557
L14	125.00-120.00	4.6140	-11.6794	2.8682	-7.7591
L15	120.00-115.00	4.9449	-12.4752	3.0904	-8.3295
L16	115.00-112.67	3.5716	-9.0107	2.5715	-6.9296

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L17	112.67-112.42	3.4133	-8.6113	2.5015	-6.7407
L18	112.42-107.42	3.4133	-8.6113	2.5023	-6.7419
L19	107.42-103.33	2.9637	-7.4769	2.2701	-6.1149
L20	103.33-103.08	2.1436	-5.4079	2.0660	-5.5645
L21	103.08-100.00	2.9030	-7.3237	2.2220	-5.9840
L22	100.00-95.00	3.6710	-9.2363	2.6428	-7.0959
L23	95.00-90.00	3.5127	-8.8380	2.5718	-6.9032
L24	90.00-89.50	2.9959	-7.5379	2.3172	-6.2189
L25	89.50-89.25	2.9959	-7.5379	2.3173	-6.2190
L26	89.25-85.50	2.2705	-5.7127	2.1935	-5.8859
L27	85.50-85.25	2.0853	-5.2466	2.0246	-5.4320
L28	85.25-84.00	2.0853	-5.2466	2.0248	-5.4324
L29	84.00-83.75	2.0853	-5.2466	2.0251	-5.4328
L30	83.75-82.50	2.0853	-5.2466	2.0253	-5.4331
L31	82.50-82.25	2.0853	-5.2466	2.0255	-5.4335
L32	82.25-80.00	3.3882	-8.5249	2.4948	-6.6919
L33	80.00-75.00	3.9691	-9.9863	2.7590	-7.3987
L34	75.00-70.00	3.9691	-9.9863	2.7617	-7.4032
L35	70.00-65.00	3.9691	-9.9863	2.7646	-7.4080
L36	65.00-60.00	3.9691	-9.9863	2.7677	-7.4132
L37	60.00-58.50	3.9691	-9.9863	2.7698	-7.4168
L38	58.50-58.25	3.9691	-9.9863	2.7704	-7.4178
L39	58.25-53.25	4.8564	-12.2188	3.1695	-8.4842
L40	53.25-48.25	4.1783	-10.5127	2.9069	-7.7774
L41	48.25-48.00	3.5813	-9.0107	2.6336	-7.0442
L42	48.00-43.00	3.5813	-9.0107	2.6355	-7.0472
L43	43.00-40.00	3.5813	-9.0107	2.6387	-7.0522
L44	40.00-35.00	3.3496	-8.4277	2.5313	-6.7617
L45	35.00-32.08	2.0853	-5.2466	2.0865	-5.5704
L46	32.08-31.83	2.0853	-5.2466	2.0877	-5.5720
L47	31.83-28.75	2.0853	-5.2466	2.0889	-5.5739
L48	28.75-28.50	2.0853	-5.2466	2.0902	-5.5758
L49	28.50-23.50	2.8503	-7.1716	2.2921	-6.1113
L50	23.50-18.50	3.2626	-8.2088	2.5276	-6.7319
L51	18.50-13.50	3.2626	-8.2088	2.5352	-6.7432
L52	13.50-8.50	4.2095	-6.8454	3.5348	-5.6902
L53	8.50-3.50	1.3721	-0.9409	1.4537	-0.9191
L54	3.50-0.00	0.0000	0.0000	0.0000	0.0000

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	1	Safety Line 3/8	185.00 - 190.00	1.0000	1.0000
L1	2	Climbing Rungs	185.00 - 190.00	1.0000	1.0000
L1	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	185.00 - 188.00	1.0000	1.0000
L2	1	Safety Line 3/8	180.00 - 185.00	1.0000	1.0000
L2	2	Climbing Rungs	180.00 - 185.00	1.0000	1.0000
L2	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	180.00 - 185.00	1.0000	1.0000
L3	1	Safety Line 3/8	175.00 - 180.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L3	2	Climbing Rungs	175.00 - 180.00	1.0000	1.0000
L3	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	175.00 - 180.00	1.0000	1.0000
L4	1	Safety Line 3/8	170.00 - 175.00	1.0000	1.0000
L4	2	Climbing Rungs	170.00 - 175.00	1.0000	1.0000
L4	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	170.00 - 175.00	1.0000	1.0000
L5	1	Safety Line 3/8	165.00 - 170.00	1.0000	1.0000
L5	2	Climbing Rungs	165.00 - 170.00	1.0000	1.0000
L5	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	165.00 - 170.00	1.0000	1.0000
L5	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	165.00 - 170.00	1.0000	1.0000
L6	1	Safety Line 3/8	160.00 - 165.00	1.0000	1.0000
L6	2	Climbing Rungs	160.00 - 165.00	1.0000	1.0000
L6	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	160.00 - 165.00	1.0000	1.0000
L6	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	160.00 - 165.00	1.0000	1.0000
L6	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	160.00 - 162.00	1.0000	1.0000
L6	25	LDF7-50A(1-5/8)	160.00 - 162.00	1.0000	1.0000
L7	1	Safety Line 3/8	155.00 - 160.00	1.0000	1.0000
L7	2	Climbing Rungs	155.00 - 160.00	1.0000	1.0000
L7	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	155.00 - 160.00	1.0000	1.0000
L7	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	155.00 - 160.00	1.0000	1.0000
L7	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	155.00 - 160.00	1.0000	1.0000
L7	25	LDF7-50A(1-5/8)	155.00 - 160.00	1.0000	1.0000
L8	1	Safety Line 3/8	150.00 - 155.00	1.0000	1.0000
L8	2	Climbing Rungs	150.00 - 155.00	1.0000	1.0000
L8	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	150.00 - 155.00	1.0000	1.0000
L8	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-	150.00 - 155.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		5/8)			
L8	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	150.00 - 155.00	1.0000	1.0000
L8	25	LDF7-50A(1-5/8)	150.00 - 155.00	1.0000	1.0000
L9	1	Safety Line 3/8	145.00 - 150.00	1.0000	1.0000
L9	2	Climbing Rungs	145.00 - 150.00	1.0000	1.0000
L9	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	145.00 - 150.00	1.0000	1.0000
L9	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	145.00 - 150.00	1.0000	1.0000
L9	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	145.00 - 150.00	1.0000	1.0000
L9	25	LDF7-50A(1-5/8)	145.00 - 150.00	1.0000	1.0000
L10	1	Safety Line 3/8	140.00 - 145.00	1.0000	1.0000
L10	2	Climbing Rungs	140.00 - 145.00	1.0000	1.0000
L10	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	140.00 - 145.00	1.0000	1.0000
L10	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	140.00 - 145.00	1.0000	1.0000
L10	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	140.00 - 145.00	1.0000	1.0000
L10	25	LDF7-50A(1-5/8)	140.00 - 145.00	1.0000	1.0000
L11	1	Safety Line 3/8	135.00 - 140.00	1.0000	1.0000
L11	2	Climbing Rungs	135.00 - 140.00	1.0000	1.0000
L11	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	135.00 - 140.00	1.0000	1.0000
L11	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	135.00 - 140.00	1.0000	1.0000
L11	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	135.00 - 140.00	1.0000	1.0000
L11	25	LDF7-50A(1-5/8)	135.00 - 140.00	1.0000	1.0000
L12	1	Safety Line 3/8	130.00 - 135.00	1.0000	1.0000
L12	2	Climbing Rungs	130.00 - 135.00	1.0000	1.0000
L12	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	130.00 - 135.00	1.0000	1.0000
L12	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	130.00 - 135.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L12	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	130.00 - 135.00	1.0000	1.0000
L12	25	LDF7-50A(1-5/8)	130.00 - 135.00	1.0000	1.0000
L13	1	Safety Line 3/8	125.00 - 130.00	1.0000	1.0000
L13	2	Climbing Rungs	125.00 - 130.00	1.0000	1.0000
L13	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	125.00 - 130.00	1.0000	1.0000
L13	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	125.00 - 130.00	1.0000	1.0000
L13	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	125.00 - 130.00	1.0000	1.0000
L13	25	LDF7-50A(1-5/8)	125.00 - 130.00	1.0000	1.0000
L14	1	Safety Line 3/8	120.00 - 125.00	1.0000	1.0000
L14	2	Climbing Rungs	120.00 - 125.00	1.0000	1.0000
L14	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	120.00 - 125.00	1.0000	1.0000
L14	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	120.00 - 125.00	1.0000	1.0000
L14	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	120.00 - 125.00	1.0000	1.0000
L14	25	LDF7-50A(1-5/8)	120.00 - 125.00	1.0000	1.0000
L15	1	Safety Line 3/8	115.00 - 120.00	1.0000	1.0000
L15	2	Climbing Rungs	115.00 - 120.00	1.0000	1.0000
L15	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	115.00 - 120.00	1.0000	1.0000
L15	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	115.00 - 120.00	1.0000	1.0000
L15	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	115.00 - 120.00	1.0000	1.0000
L15	25	LDF7-50A(1-5/8)	115.00 - 120.00	1.0000	1.0000
L16	1	Safety Line 3/8	112.67 - 115.00	1.0000	1.0000
L16	2	Climbing Rungs	112.67 - 115.00	1.0000	1.0000
L16	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	112.67 - 115.00	1.0000	1.0000
L16	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	112.67 - 115.00	1.0000	1.0000
L16	19	(4) WR-VG86ST-BRD(3/4)	112.67 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		+ (2) FB-L98B-034-XXX(3/8)	115.00		
L16	25	LDF7-50A(1-5/8)	112.67 - 115.00	1.0000	1.0000
L16	59	6" x 1" Flat Plate	112.67 - 114.67	1.0000	1.0000
L16	60	6" x 1" Flat Plate	112.67 - 114.67	1.0000	1.0000
L16	61	6" x 1" Flat Plate	112.67 - 114.67	1.0000	1.0000
L17	1	Safety Line 3/8	112.42 - 112.67	1.0000	1.0000
L17	2	Climbing Rungs	112.42 - 112.67	1.0000	1.0000
L17	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	112.42 - 112.67	1.0000	1.0000
L17	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	112.42 - 112.67	1.0000	1.0000
L17	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	112.42 - 112.67	1.0000	1.0000
L17	25	LDF7-50A(1-5/8)	112.42 - 112.67	1.0000	1.0000
L17	59	6" x 1" Flat Plate	112.42 - 112.67	1.0000	1.0000
L17	60	6" x 1" Flat Plate	112.42 - 112.67	1.0000	1.0000
L17	61	6" x 1" Flat Plate	112.42 - 112.67	1.0000	1.0000
L18	1	Safety Line 3/8	107.42 - 112.42	1.0000	1.0000
L18	2	Climbing Rungs	107.42 - 112.42	1.0000	1.0000
L18	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	107.42 - 112.42	1.0000	1.0000
L18	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	107.42 - 112.42	1.0000	1.0000
L18	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	107.42 - 112.42	1.0000	1.0000
L18	25	LDF7-50A(1-5/8)	107.42 - 112.42	1.0000	1.0000
L18	59	6" x 1" Flat Plate	107.42 - 112.42	1.0000	1.0000
L18	60	6" x 1" Flat Plate	107.42 - 112.42	1.0000	1.0000
L18	61	6" x 1" Flat Plate	107.42 - 112.42	1.0000	1.0000
L19	1	Safety Line 3/8	103.33 - 107.42	1.0000	1.0000
L19	2	Climbing Rungs	103.33 - 107.42	1.0000	1.0000
L19	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	103.33 - 107.42	1.0000	1.0000
L19	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	103.33 - 107.42	1.0000	1.0000
L19	19	(4) WR-VG86ST-BRD(3/4)	103.33 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		+ (2) FB-L98B-034-XXX(3/8)	107.42		
L19	25	LDF7-50A(1-5/8)	103.33 - 107.42	1.0000	1.0000
L19	55	6" x 1" Flat Plate	103.33 - 105.33	1.0000	1.0000
L19	56	6" x 1" Flat Plate	103.33 - 105.33	1.0000	1.0000
L19	57	6" x 1" Flat Plate	103.33 - 105.33	1.0000	1.0000
L19	59	6" x 1" Flat Plate	103.33 - 107.42	1.0000	1.0000
L19	60	6" x 1" Flat Plate	103.33 - 107.42	1.0000	1.0000
L19	61	6" x 1" Flat Plate	103.33 - 107.42	1.0000	1.0000
L20	1	Safety Line 3/8	103.08 - 103.33	1.0000	1.0000
L20	2	Climbing Rungs	103.08 - 103.33	1.0000	1.0000
L20	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	103.08 - 103.33	1.0000	1.0000
L20	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	103.08 - 103.33	1.0000	1.0000
L20	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	103.08 - 103.33	1.0000	1.0000
L20	25	LDF7-50A(1-5/8)	103.08 - 103.33	1.0000	1.0000
L20	55	6" x 1" Flat Plate	103.08 - 103.33	1.0000	1.0000
L20	56	6" x 1" Flat Plate	103.08 - 103.33	1.0000	1.0000
L20	57	6" x 1" Flat Plate	103.08 - 103.33	1.0000	1.0000
L20	59	6" x 1" Flat Plate	103.08 - 103.33	1.0000	1.0000
L20	60	6" x 1" Flat Plate	103.08 - 103.33	1.0000	1.0000
L20	61	6" x 1" Flat Plate	103.08 - 103.33	1.0000	1.0000
L21	1	Safety Line 3/8	100.00 - 103.08	1.0000	1.0000
L21	2	Climbing Rungs	100.00 - 103.08	1.0000	1.0000
L21	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	100.00 - 103.08	1.0000	1.0000
L21	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	100.00 - 103.08	1.0000	1.0000
L21	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	100.00 - 103.08	1.0000	1.0000
L21	25	LDF7-50A(1-5/8)	100.00 - 103.08	1.0000	1.0000
L21	55	6" x 1" Flat Plate	100.00 - 103.08	1.0000	1.0000
L21	56	6" x 1" Flat Plate	100.00 - 103.08	1.0000	1.0000
L21	57	6" x 1" Flat Plate	100.00 - 103.08	1.0000	1.0000
L21	59	6" x 1" Flat Plate	101.33 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L21	60	6" x 1" Flat Plate	103.08 101.33 - 103.08	1.0000	1.0000
L21	61	6" x 1" Flat Plate	101.33 - 103.08	1.0000	1.0000
L22	1	Safety Line 3/8	95.00 - 100.00	1.0000	1.0000
L22	2	Climbing Rungs	95.00 - 100.00	1.0000	1.0000
L22	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	95.00 - 100.00	1.0000	1.0000
L22	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	95.00 - 100.00	1.0000	1.0000
L22	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	95.00 - 100.00	1.0000	1.0000
L22	25	LDF7-50A(1-5/8)	95.00 - 100.00	1.0000	1.0000
L22	55	6" x 1" Flat Plate	95.00 - 100.00	1.0000	1.0000
L22	56	6" x 1" Flat Plate	95.00 - 100.00	1.0000	1.0000
L22	57	6" x 1" Flat Plate	95.00 - 100.00	1.0000	1.0000
L23	1	Safety Line 3/8	90.00 - 95.00	1.0000	1.0000
L23	2	Climbing Rungs	90.00 - 95.00	1.0000	1.0000
L23	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	90.00 - 95.00	1.0000	1.0000
L23	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	90.00 - 95.00	1.0000	1.0000
L23	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	90.00 - 95.00	1.0000	1.0000
L23	25	LDF7-50A(1-5/8)	90.00 - 95.00	1.0000	1.0000
L23	55	6" x 1" Flat Plate	90.00 - 95.00	1.0000	1.0000
L23	56	6" x 1" Flat Plate	90.00 - 95.00	1.0000	1.0000
L23	57	6" x 1" Flat Plate	90.00 - 95.00	1.0000	1.0000
L23	63	4.5" x 1" Flat Plate	90.00 - 91.00	1.0000	1.0000
L23	64	4.5" x 1" Flat Plate	90.00 - 91.00	1.0000	1.0000
L23	65	4.5" x 1" Flat Plate	90.00 - 91.00	1.0000	1.0000
L24	1	Safety Line 3/8	89.50 - 90.00	1.0000	1.0000
L24	2	Climbing Rungs	89.50 - 90.00	1.0000	1.0000
L24	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	89.50 - 90.00	1.0000	1.0000
L24	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	89.50 - 90.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L24	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	89.50 - 90.00	1.0000	1.0000
L24	25	LDF7-50A(1-5/8)	89.50 - 90.00	1.0000	1.0000
L24	55	6" x 1" Flat Plate	89.50 - 90.00	1.0000	1.0000
L24	56	6" x 1" Flat Plate	89.50 - 90.00	1.0000	1.0000
L24	57	6" x 1" Flat Plate	89.50 - 90.00	1.0000	1.0000
L24	63	4.5" x 1" Flat Plate	89.50 - 90.00	1.0000	1.0000
L24	64	4.5" x 1" Flat Plate	89.50 - 90.00	1.0000	1.0000
L24	65	4.5" x 1" Flat Plate	89.50 - 90.00	1.0000	1.0000
L25	1	Safety Line 3/8	89.25 - 89.50	1.0000	1.0000
L25	2	Climbing Rungs	89.25 - 89.50	1.0000	1.0000
L25	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	89.25 - 89.50	1.0000	1.0000
L25	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	89.25 - 89.50	1.0000	1.0000
L25	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	89.25 - 89.50	1.0000	1.0000
L25	25	LDF7-50A(1-5/8)	89.25 - 89.50	1.0000	1.0000
L25	55	6" x 1" Flat Plate	89.25 - 89.50	1.0000	1.0000
L25	56	6" x 1" Flat Plate	89.25 - 89.50	1.0000	1.0000
L25	57	6" x 1" Flat Plate	89.25 - 89.50	1.0000	1.0000
L25	63	4.5" x 1" Flat Plate	89.25 - 89.50	1.0000	1.0000
L25	64	4.5" x 1" Flat Plate	89.25 - 89.50	1.0000	1.0000
L25	65	4.5" x 1" Flat Plate	89.25 - 89.50	1.0000	1.0000
L26	1	Safety Line 3/8	85.50 - 89.25	1.0000	1.0000
L26	2	Climbing Rungs	85.50 - 89.25	1.0000	1.0000
L26	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	85.50 - 89.25	1.0000	1.0000
L26	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	85.50 - 89.25	1.0000	1.0000
L26	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	85.50 - 89.25	1.0000	1.0000
L26	25	LDF7-50A(1-5/8)	85.50 - 89.25	1.0000	1.0000
L26	51	4.5" x 1" Flat Plate	85.50 - 87.00	1.0000	1.0000
L26	52	4.5" x 1" Flat Plate	85.50 - 87.00	1.0000	1.0000
L26	53	4.5" x 1" Flat Plate	85.50 - 87.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L26	55	6" x 1" Flat Plate	85.50 - 89.25	1.0000	1.0000
L26	56	6" x 1" Flat Plate	85.50 - 89.25	1.0000	1.0000
L26	57	6" x 1" Flat Plate	85.50 - 89.25	1.0000	1.0000
L26	63	4.5" x 1" Flat Plate	85.50 - 89.25	1.0000	1.0000
L26	64	4.5" x 1" Flat Plate	85.50 - 89.25	1.0000	1.0000
L26	65	4.5" x 1" Flat Plate	85.50 - 89.25	1.0000	1.0000
L27	1	Safety Line 3/8	85.25 - 85.50	1.0000	1.0000
L27	2	Climbing Rungs	85.25 - 85.50	1.0000	1.0000
L27	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	85.25 - 85.50	1.0000	1.0000
L27	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	85.25 - 85.50	1.0000	1.0000
L27	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	85.25 - 85.50	1.0000	1.0000
L27	25	LDF7-50A(1-5/8)	85.25 - 85.50	1.0000	1.0000
L27	51	4.5" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L27	52	4.5" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L27	53	4.5" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L27	55	6" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L27	56	6" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L27	57	6" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L27	63	4.5" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L27	64	4.5" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L27	65	4.5" x 1" Flat Plate	85.25 - 85.50	1.0000	1.0000
L28	1	Safety Line 3/8	84.00 - 85.25	1.0000	1.0000
L28	2	Climbing Rungs	84.00 - 85.25	1.0000	1.0000
L28	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	84.00 - 85.25	1.0000	1.0000
L28	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	84.00 - 85.25	1.0000	1.0000
L28	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	84.00 - 85.25	1.0000	1.0000
L28	25	LDF7-50A(1-5/8)	84.00 - 85.25	1.0000	1.0000
L28	51	4.5" x 1" Flat Plate	84.00 - 85.25	1.0000	1.0000
L28	52	4.5" x 1" Flat Plate	84.00 - 85.25	1.0000	1.0000
L28	53	4.5" x 1" Flat Plate	84.00 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L28	55	6" x 1" Flat Plate	85.25 84.00 - 85.25	1.0000	1.0000
L28	56	6" x 1" Flat Plate	84.00 - 85.25	1.0000	1.0000
L28	57	6" x 1" Flat Plate	84.00 - 85.25	1.0000	1.0000
L28	63	4.5" x 1" Flat Plate	84.00 - 85.25	1.0000	1.0000
L28	64	4.5" x 1" Flat Plate	84.00 - 85.25	1.0000	1.0000
L28	65	4.5" x 1" Flat Plate	84.00 - 85.25	1.0000	1.0000
L29	1	Safety Line 3/8	83.75 - 84.00	1.0000	1.0000
L29	2	Climbing Rungs	83.75 - 84.00	1.0000	1.0000
L29	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	83.75 - 84.00	1.0000	1.0000
L29	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	83.75 - 84.00	1.0000	1.0000
L29	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	83.75 - 84.00	1.0000	1.0000
L29	25	LDF7-50A(1-5/8)	83.75 - 84.00	1.0000	1.0000
L29	51	4.5" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L29	52	4.5" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L29	53	4.5" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L29	55	6" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L29	56	6" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L29	57	6" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L29	63	4.5" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L29	64	4.5" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L29	65	4.5" x 1" Flat Plate	83.75 - 84.00	1.0000	1.0000
L30	1	Safety Line 3/8	82.50 - 83.75	1.0000	1.0000
L30	2	Climbing Rungs	82.50 - 83.75	1.0000	1.0000
L30	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	82.50 - 83.75	1.0000	1.0000
L30	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	82.50 - 83.75	1.0000	1.0000
L30	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	82.50 - 83.75	1.0000	1.0000
L30	25	LDF7-50A(1-5/8)	82.50 - 83.75	1.0000	1.0000
L30	51	4.5" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000
L30	52	4.5" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L30	53	4.5" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000
L30	55	6" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000
L30	56	6" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000
L30	57	6" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000
L30	63	4.5" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000
L30	64	4.5" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000
L30	65	4.5" x 1" Flat Plate	82.50 - 83.75	1.0000	1.0000
L31	1	Safety Line 3/8	82.25 - 82.50	1.0000	1.0000
L31	2	Climbing Rungs	82.25 - 82.50	1.0000	1.0000
L31	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	82.25 - 82.50	1.0000	1.0000
L31	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	82.25 - 82.50	1.0000	1.0000
L31	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	82.25 - 82.50	1.0000	1.0000
L31	25	LDF7-50A(1-5/8)	82.25 - 82.50	1.0000	1.0000
L31	51	4.5" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L31	52	4.5" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L31	53	4.5" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L31	55	6" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L31	56	6" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L31	57	6" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L31	63	4.5" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L31	64	4.5" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L31	65	4.5" x 1" Flat Plate	82.25 - 82.50	1.0000	1.0000
L32	1	Safety Line 3/8	80.00 - 82.25	1.0000	1.0000
L32	2	Climbing Rungs	80.00 - 82.25	1.0000	1.0000
L32	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	80.00 - 82.25	1.0000	1.0000
L32	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	80.00 - 82.25	1.0000	1.0000
L32	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	80.00 - 82.25	1.0000	1.0000
L32	25	LDF7-50A(1-5/8)	80.00 - 82.25	1.0000	1.0000
L32	51	4.5" x 1" Flat Plate	80.00 - 82.25	1.0000	1.0000
L32	52	4.5" x 1" Flat Plate	80.00 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			82.25		
L32	53	4.5" x 1" Flat Plate	80.00 - 82.25	1.0000	1.0000
L32	55	6" x 1" Flat Plate	82.00 - 82.25	1.0000	1.0000
L32	56	6" x 1" Flat Plate	82.00 - 82.25	1.0000	1.0000
L32	57	6" x 1" Flat Plate	82.00 - 82.25	1.0000	1.0000
L32	63	4.5" x 1" Flat Plate	81.00 - 82.25	1.0000	1.0000
L32	64	4.5" x 1" Flat Plate	81.00 - 82.25	1.0000	1.0000
L32	65	4.5" x 1" Flat Plate	81.00 - 82.25	1.0000	1.0000
L33	1	Safety Line 3/8	75.00 - 80.00	1.0000	1.0000
L33	2	Climbing Rungs	75.00 - 80.00	1.0000	1.0000
L33	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	75.00 - 80.00	1.0000	1.0000
L33	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	75.00 - 80.00	1.0000	1.0000
L33	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	75.00 - 80.00	1.0000	1.0000
L33	25	LDF7-50A(1-5/8)	75.00 - 80.00	1.0000	1.0000
L33	51	4.5" x 1" Flat Plate	75.00 - 80.00	1.0000	1.0000
L33	52	4.5" x 1" Flat Plate	75.00 - 80.00	1.0000	1.0000
L33	53	4.5" x 1" Flat Plate	75.00 - 80.00	1.0000	1.0000
L34	1	Safety Line 3/8	70.00 - 75.00	1.0000	1.0000
L34	2	Climbing Rungs	70.00 - 75.00	1.0000	1.0000
L34	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	70.00 - 75.00	1.0000	1.0000
L34	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	70.00 - 75.00	1.0000	1.0000
L34	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	70.00 - 75.00	1.0000	1.0000
L34	25	LDF7-50A(1-5/8)	70.00 - 75.00	1.0000	1.0000
L34	51	4.5" x 1" Flat Plate	70.00 - 75.00	1.0000	1.0000
L34	52	4.5" x 1" Flat Plate	70.00 - 75.00	1.0000	1.0000
L34	53	4.5" x 1" Flat Plate	70.00 - 75.00	1.0000	1.0000
L35	1	Safety Line 3/8	65.00 - 70.00	1.0000	1.0000
L35	2	Climbing Rungs	65.00 - 70.00	1.0000	1.0000
L35	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	65.00 - 70.00	1.0000	1.0000
L35	14	(6) LDF7-50A(1-5/8) + (3)	65.00 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	70.00		
L35	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	65.00 - 70.00	1.0000	1.0000
L35	25	LDF7-50A(1-5/8)	65.00 - 70.00	1.0000	1.0000
L35	51	4.5" x 1" Flat Plate	65.00 - 70.00	1.0000	1.0000
L35	52	4.5" x 1" Flat Plate	65.00 - 70.00	1.0000	1.0000
L35	53	4.5" x 1" Flat Plate	65.00 - 70.00	1.0000	1.0000
L36	1	Safety Line 3/8	60.00 - 65.00	1.0000	1.0000
L36	2	Climbing Rungs	60.00 - 65.00	1.0000	1.0000
L36	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	60.00 - 65.00	1.0000	1.0000
L36	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	60.00 - 65.00	1.0000	1.0000
L36	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	60.00 - 65.00	1.0000	1.0000
L36	25	LDF7-50A(1-5/8)	60.00 - 65.00	1.0000	1.0000
L36	51	4.5" x 1" Flat Plate	60.00 - 65.00	1.0000	1.0000
L36	52	4.5" x 1" Flat Plate	60.00 - 65.00	1.0000	1.0000
L36	53	4.5" x 1" Flat Plate	60.00 - 65.00	1.0000	1.0000
L37	1	Safety Line 3/8	58.50 - 60.00	1.0000	1.0000
L37	2	Climbing Rungs	58.50 - 60.00	1.0000	1.0000
L37	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	58.50 - 60.00	1.0000	1.0000
L37	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	58.50 - 60.00	1.0000	1.0000
L37	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	58.50 - 60.00	1.0000	1.0000
L37	25	LDF7-50A(1-5/8)	58.50 - 60.00	1.0000	1.0000
L37	51	4.5" x 1" Flat Plate	58.50 - 60.00	1.0000	1.0000
L37	52	4.5" x 1" Flat Plate	58.50 - 60.00	1.0000	1.0000
L37	53	4.5" x 1" Flat Plate	58.50 - 60.00	1.0000	1.0000
L38	1	Safety Line 3/8	58.25 - 58.50	1.0000	1.0000
L38	2	Climbing Rungs	58.25 - 58.50	1.0000	1.0000
L38	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	58.25 - 58.50	1.0000	1.0000
L38	14	(6) LDF7-50A(1-5/8) + (3)	58.25 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	58.50		
L38	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	58.25 - 58.50	1.0000	1.0000
L38	25	LDF7-50A(1-5/8)	58.25 - 58.50	1.0000	1.0000
L38	51	4.5" x 1" Flat Plate	58.25 - 58.50	1.0000	1.0000
L38	52	4.5" x 1" Flat Plate	58.25 - 58.50	1.0000	1.0000
L38	53	4.5" x 1" Flat Plate	58.25 - 58.50	1.0000	1.0000
L39	1	Safety Line 3/8	53.25 - 58.25	1.0000	1.0000
L39	2	Climbing Rungs	53.25 - 58.25	1.0000	1.0000
L39	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	53.25 - 58.25	1.0000	1.0000
L39	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	53.25 - 58.25	1.0000	1.0000
L39	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	53.25 - 58.25	1.0000	1.0000
L39	25	LDF7-50A(1-5/8)	53.25 - 58.25	1.0000	1.0000
L39	51	4.5" x 1" Flat Plate	57.00 - 58.25	1.0000	1.0000
L39	52	4.5" x 1" Flat Plate	57.00 - 58.25	1.0000	1.0000
L39	53	4.5" x 1" Flat Plate	57.00 - 58.25	1.0000	1.0000
L40	1	Safety Line 3/8	48.25 - 53.25	1.0000	1.0000
L40	2	Climbing Rungs	48.25 - 53.25	1.0000	1.0000
L40	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	48.25 - 53.25	1.0000	1.0000
L40	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	48.25 - 53.25	1.0000	1.0000
L40	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	48.25 - 53.25	1.0000	1.0000
L40	25	LDF7-50A(1-5/8)	48.25 - 53.25	1.0000	1.0000
L40	47	6.5" x 1.25" Flat Plate	48.25 - 51.00	1.0000	1.0000
L40	48	6.5" x 1.25" Flat Plate	48.25 - 51.00	1.0000	1.0000
L40	49	6.5" x 1.25" Flat Plate	48.25 - 51.00	1.0000	1.0000
L41	1	Safety Line 3/8	48.00 - 48.25	1.0000	1.0000
L41	2	Climbing Rungs	48.00 - 48.25	1.0000	1.0000
L41	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	48.00 - 48.25	1.0000	1.0000
L41	14	(6) LDF7-50A(1-5/8) + (3)	48.00 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_e No Ice	K_a Ice
		HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	48.25		
L41	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	48.00 - 48.25	1.0000	1.0000
L41	25	LDF7-50A(1-5/8)	48.00 - 48.25	1.0000	1.0000
L41	47	6.5" x 1.25" Flat Plate	48.00 - 48.25	1.0000	1.0000
L41	48	6.5" x 1.25" Flat Plate	48.00 - 48.25	1.0000	1.0000
L41	49	6.5" x 1.25" Flat Plate	48.00 - 48.25	1.0000	1.0000
L42	1	Safety Line 3/8	43.00 - 48.00	1.0000	1.0000
L42	2	Climbing Rungs	43.00 - 48.00	1.0000	1.0000
L42	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	43.00 - 48.00	1.0000	1.0000
L42	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	43.00 - 48.00	1.0000	1.0000
L42	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	43.00 - 48.00	1.0000	1.0000
L42	25	LDF7-50A(1-5/8)	43.00 - 48.00	1.0000	1.0000
L42	47	6.5" x 1.25" Flat Plate	43.00 - 48.00	1.0000	1.0000
L42	48	6.5" x 1.25" Flat Plate	43.00 - 48.00	1.0000	1.0000
L42	49	6.5" x 1.25" Flat Plate	43.00 - 48.00	1.0000	1.0000
L43	1	Safety Line 3/8	40.00 - 43.00	1.0000	1.0000
L43	2	Climbing Rungs	40.00 - 43.00	1.0000	1.0000
L43	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	40.00 - 43.00	1.0000	1.0000
L43	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	40.00 - 43.00	1.0000	1.0000
L43	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	40.00 - 43.00	1.0000	1.0000
L43	25	LDF7-50A(1-5/8)	40.00 - 43.00	1.0000	1.0000
L43	47	6.5" x 1.25" Flat Plate	40.00 - 43.00	1.0000	1.0000
L43	48	6.5" x 1.25" Flat Plate	40.00 - 43.00	1.0000	1.0000
L43	49	6.5" x 1.25" Flat Plate	40.00 - 43.00	1.0000	1.0000
L44	1	Safety Line 3/8	35.00 - 40.00	1.0000	1.0000
L44	2	Climbing Rungs	35.00 - 40.00	1.0000	1.0000
L44	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	35.00 - 40.00	1.0000	1.0000
L44	14	(6) LDF7-50A(1-5/8) + (3)	35.00 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	40.00		
L44	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	35.00 - 40.00	1.0000	1.0000
L44	25	LDF7-50A(1-5/8)	35.00 - 40.00	1.0000	1.0000
L44	43	8.5" x 1.25" Flat Plate	35.00 - 35.83	1.0000	1.0000
L44	44	8.5" x 1.25" Flat Plate	35.00 - 35.83	1.0000	1.0000
L44	45	8.5" x 1.25" Flat Plate	35.00 - 35.83	1.0000	1.0000
L44	47	6.5" x 1.25" Flat Plate	35.00 - 40.00	1.0000	1.0000
L44	48	6.5" x 1.25" Flat Plate	35.00 - 40.00	1.0000	1.0000
L44	49	6.5" x 1.25" Flat Plate	35.00 - 40.00	1.0000	1.0000
L45	1	Safety Line 3/8	32.08 - 35.00	1.0000	1.0000
L45	2	Climbing Rungs	32.08 - 35.00	1.0000	1.0000
L45	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	32.08 - 35.00	1.0000	1.0000
L45	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	32.08 - 35.00	1.0000	1.0000
L45	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	32.08 - 35.00	1.0000	1.0000
L45	25	LDF7-50A(1-5/8)	32.08 - 35.00	1.0000	1.0000
L45	43	8.5" x 1.25" Flat Plate	32.08 - 35.00	1.0000	1.0000
L45	44	8.5" x 1.25" Flat Plate	32.08 - 35.00	1.0000	1.0000
L45	45	8.5" x 1.25" Flat Plate	32.08 - 35.00	1.0000	1.0000
L45	47	6.5" x 1.25" Flat Plate	32.08 - 35.00	1.0000	1.0000
L45	48	6.5" x 1.25" Flat Plate	32.08 - 35.00	1.0000	1.0000
L45	49	6.5" x 1.25" Flat Plate	32.08 - 35.00	1.0000	1.0000
L46	1	Safety Line 3/8	31.83 - 32.08	1.0000	1.0000
L46	2	Climbing Rungs	31.83 - 32.08	1.0000	1.0000
L46	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	31.83 - 32.08	1.0000	1.0000
L46	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	31.83 - 32.08	1.0000	1.0000
L46	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	31.83 - 32.08	1.0000	1.0000
L46	25	LDF7-50A(1-5/8)	31.83 - 32.08	1.0000	1.0000
L46	43	8.5" x 1.25" Flat Plate	31.83 - 32.08	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L46	44	8.5" x 1.25" Flat Plate	31.83 - 32.08	1.0000	1.0000
L46	45	8.5" x 1.25" Flat Plate	31.83 - 32.08	1.0000	1.0000
L46	47	6.5" x 1.25" Flat Plate	31.83 - 32.08	1.0000	1.0000
L46	48	6.5" x 1.25" Flat Plate	31.83 - 32.08	1.0000	1.0000
L46	49	6.5" x 1.25" Flat Plate	31.83 - 32.08	1.0000	1.0000
L47	1	Safety Line 3/8	28.75 - 31.83	1.0000	1.0000
L47	2	Climbing Rungs	28.75 - 31.83	1.0000	1.0000
L47	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	28.75 - 31.83	1.0000	1.0000
L47	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	28.75 - 31.83	1.0000	1.0000
L47	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	28.75 - 31.83	1.0000	1.0000
L47	25	LDF7-50A(1-5/8)	28.75 - 31.83	1.0000	1.0000
L47	43	8.5" x 1.25" Flat Plate	28.75 - 31.83	1.0000	1.0000
L47	44	8.5" x 1.25" Flat Plate	28.75 - 31.83	1.0000	1.0000
L47	45	8.5" x 1.25" Flat Plate	28.75 - 31.83	1.0000	1.0000
L47	47	6.5" x 1.25" Flat Plate	28.75 - 31.83	1.0000	1.0000
L47	48	6.5" x 1.25" Flat Plate	28.75 - 31.83	1.0000	1.0000
L47	49	6.5" x 1.25" Flat Plate	28.75 - 31.83	1.0000	1.0000
L48	1	Safety Line 3/8	28.50 - 28.75	1.0000	1.0000
L48	2	Climbing Rungs	28.50 - 28.75	1.0000	1.0000
L48	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	28.50 - 28.75	1.0000	1.0000
L48	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	28.50 - 28.75	1.0000	1.0000
L48	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	28.50 - 28.75	1.0000	1.0000
L48	25	LDF7-50A(1-5/8)	28.50 - 28.75	1.0000	1.0000
L48	43	8.5" x 1.25" Flat Plate	28.50 - 28.75	1.0000	1.0000
L48	44	8.5" x 1.25" Flat Plate	28.50 - 28.75	1.0000	1.0000
L48	45	8.5" x 1.25" Flat Plate	28.50 - 28.75	1.0000	1.0000
L48	47	6.5" x 1.25" Flat Plate	28.50 - 28.75	1.0000	1.0000
L48	48	6.5" x 1.25" Flat Plate	28.50 - 28.75	1.0000	1.0000
L48	49	6.5" x 1.25" Flat Plate	28.50 - 28.75	1.0000	1.0000
L49	1	Safety Line 3/8	23.50 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			28.50		
L49	2	Climbing Rungs	23.50 - 28.50	1.0000	1.0000
L49	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	23.50 - 28.50	1.0000	1.0000
L49	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	23.50 - 28.50	1.0000	1.0000
L49	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	23.50 - 28.50	1.0000	1.0000
L49	25	LDF7-50A(1-5/8)	23.50 - 28.50	1.0000	1.0000
L49	43	8.5" x 1.25" Flat Plate	23.50 - 28.50	1.0000	1.0000
L49	44	8.5" x 1.25" Flat Plate	23.50 - 28.50	1.0000	1.0000
L49	45	8.5" x 1.25" Flat Plate	23.50 - 28.50	1.0000	1.0000
L49	47	6.5" x 1.25" Flat Plate	26.00 - 28.50	1.0000	1.0000
L49	48	6.5" x 1.25" Flat Plate	26.00 - 28.50	1.0000	1.0000
L49	49	6.5" x 1.25" Flat Plate	26.00 - 28.50	1.0000	1.0000
L50	1	Safety Line 3/8	18.50 - 23.50	1.0000	1.0000
L50	2	Climbing Rungs	18.50 - 23.50	1.0000	1.0000
L50	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	18.50 - 23.50	1.0000	1.0000
L50	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	18.50 - 23.50	1.0000	1.0000
L50	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	18.50 - 23.50	1.0000	1.0000
L50	25	LDF7-50A(1-5/8)	18.50 - 23.50	1.0000	1.0000
L50	43	8.5" x 1.25" Flat Plate	18.50 - 23.50	1.0000	1.0000
L50	44	8.5" x 1.25" Flat Plate	18.50 - 23.50	1.0000	1.0000
L50	45	8.5" x 1.25" Flat Plate	18.50 - 23.50	1.0000	1.0000
L51	1	Safety Line 3/8	13.50 - 18.50	1.0000	1.0000
L51	2	Climbing Rungs	13.50 - 18.50	1.0000	1.0000
L51	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	13.50 - 18.50	1.0000	1.0000
L51	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	13.50 - 18.50	1.0000	1.0000
L51	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	13.50 - 18.50	1.0000	1.0000
L51	25	LDF7-50A(1-5/8)	13.50 - 18.50	1.0000	1.0000
L51	43	8.5" x 1.25" Flat Plate	13.50 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_e No Ice	K_a Ice
L51	44	8.5" x 1.25" Flat Plate	18.50 13.50 - 18.50	1.0000	1.0000
L51	45	8.5" x 1.25" Flat Plate	13.50 - 18.50	1.0000	1.0000
L52	1	Safety Line 3/8	10.00 - 13.50	1.0000	1.0000
L52	2	Climbing Rungs	10.00 - 13.50	1.0000	1.0000
L52	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	8.50 - 13.50	1.0000	1.0000
L52	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	8.50 - 13.50	1.0000	1.0000
L52	19	(4) WR-VG86ST-BRD(3/4) + (2) FB-L98B-034-XXX(3/8)	11.00 - 13.50	1.0000	1.0000
L52	25	LDF7-50A(1-5/8)	11.00 - 13.50	1.0000	1.0000
L52	43	8.5" x 1.25" Flat Plate	8.50 - 13.50	1.0000	1.0000
L52	44	8.5" x 1.25" Flat Plate	8.50 - 13.50	1.0000	1.0000
L52	45	8.5" x 1.25" Flat Plate	8.50 - 13.50	1.0000	1.0000
L53	4	(1) HB114-21U3M12-XXXF(1-1/4) + (2) TYPE I(1-1/4)	6.00 - 8.50	1.0000	1.0000
L53	14	(6) LDF7-50A(1-5/8) + (3) HCS 6X12 4AWG(1-5/8) + (1) MLE Hybrid 9Power/18Fiber RL 2(1-5/8)	8.00 - 8.50	1.0000	1.0000
L53	43	8.5" x 1.25" Flat Plate	3.50 - 8.50	1.0000	1.0000
L53	44	8.5" x 1.25" Flat Plate	3.50 - 8.50	1.0000	1.0000
L53	45	8.5" x 1.25" Flat Plate	3.50 - 8.50	1.0000	1.0000
L54	43	8.5" x 1.25" Flat Plate	0.83 - 3.50	1.0000	1.0000
L54	44	8.5" x 1.25" Flat Plate	0.83 - 3.50	1.0000	1.0000
L54	45	8.5" x 1.25" Flat Plate	0.83 - 3.50	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
188									
Platform Mount [LP 403-1]	C	None		0.0000	188.00	No Ice	18.85	18.85	1.50
						1/2" Ice	24.30	24.30	1.80
						1" Ice	29.75	29.75	2.09
						2" Ice	40.65	40.65	2.69
6'x2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	188.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
						2" Ice	3.06	3.06	0.09
6'x2" Mount Pipe	B	From Leg	4.00 0.00	0.0000	188.00	No Ice	1.43	1.43	0.02
						1/2"	1.92	1.92	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice			
6'x2" Mount Pipe	C	From Leg	4.00	0.0000	188.00	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			
APXVTM14-ALU-I20 w/ Mount Pipe	A	From Leg	4.00	0.0000	188.00	No Ice	4.09	2.86	0.08
			-7.00			1/2"	4.48	3.23	0.13
			2.00			Ice	4.88	3.61	0.19
						1" Ice	5.71	4.40	0.33
						2" Ice			
APXVTM14-ALU-I20 w/ Mount Pipe	B	From Leg	4.00	0.0000	188.00	No Ice	4.09	2.86	0.08
			-7.00			1/2"	4.48	3.23	0.13
			2.00			Ice	4.88	3.61	0.19
						1" Ice	5.71	4.40	0.33
						2" Ice			
APXVTM14-ALU-I20 w/ Mount Pipe	C	From Leg	4.00	0.0000	188.00	No Ice	4.09	2.86	0.08
			-7.00			1/2"	4.48	3.23	0.13
			2.00			Ice	4.88	3.61	0.19
						1" Ice	5.71	4.40	0.33
						2" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00	0.0000	188.00	No Ice	4.60	4.01	0.10
			7.00			1/2"	5.05	4.45	0.16
			2.00			Ice	5.50	4.89	0.23
						1" Ice	6.44	5.82	0.42
						2" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00	0.0000	188.00	No Ice	4.60	4.01	0.10
			7.00			1/2"	5.05	4.45	0.16
			2.00			Ice	5.50	4.89	0.23
						1" Ice	6.44	5.82	0.42
						2" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.00	0.0000	188.00	No Ice	4.60	4.01	0.10
			7.00			1/2"	5.05	4.45	0.16
			2.00			Ice	5.50	4.89	0.23
						1" Ice	6.44	5.82	0.42
						2" Ice			
PD201-7	A	From Leg	4.00	0.0000	188.00	No Ice	1.02	1.02	0.00
			0.00			1/2"	1.81	1.81	0.01
			5.00			Ice	2.62	2.62	0.03
						1" Ice	3.76	3.76	0.07
						2" Ice			
TD-RRH8x20-25	A	From Leg	4.00	0.0000	188.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			2.00			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
TD-RRH8x20-25	B	From Leg	4.00	0.0000	188.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			2.00			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
TD-RRH8x20-25	C	From Leg	4.00	0.0000	188.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			2.00			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
185									
Side Arm Mount [SO 102-3]	C	None		0.0000	185.00	No Ice	3.00	3.00	0.08
						1/2"	3.48	3.48	0.11
						Ice	3.96	3.96	0.14
						1" Ice	4.92	4.92	0.20
						2" Ice			
4'x2" Mount Pipe	A	From Leg	0.50	0.0000	185.00	No Ice	0.87	0.87	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	1.11	1.11	0.02
			0.00			Ice	1.36	1.36	0.03
						1" Ice	1.90	1.90	0.06
						2" Ice			
4'x2" Mount Pipe	B	From Leg	0.50	0.0000	185.00	No Ice	0.87	0.87	0.01
			0.00			1/2"	1.11	1.11	0.02
			0.00			Ice	1.36	1.36	0.03
						1" Ice	1.90	1.90	0.06
						2" Ice			
4'x2" Mount Pipe	C	From Leg	0.50	0.0000	185.00	No Ice	0.87	0.87	0.01
			0.00			1/2"	1.11	1.11	0.02
			0.00			Ice	1.36	1.36	0.03
						1" Ice	1.90	1.90	0.06
						2" Ice			
800MHZ RRH	A	From Leg	1.00	0.0000	185.00	No Ice	2.13	1.77	0.05
			0.00			1/2"	2.32	1.95	0.07
			3.00			Ice	2.51	2.13	0.10
						1" Ice	2.92	2.51	0.16
						2" Ice			
800MHZ RRH	B	From Leg	1.00	0.0000	185.00	No Ice	2.13	1.77	0.05
			0.00			1/2"	2.32	1.95	0.07
			3.00			Ice	2.51	2.13	0.10
						1" Ice	2.92	2.51	0.16
						2" Ice			
800MHZ RRH	C	From Leg	1.00	0.0000	185.00	No Ice	2.13	1.77	0.05
			0.00			1/2"	2.32	1.95	0.07
			3.00			Ice	2.51	2.13	0.10
						1" Ice	2.92	2.51	0.16
						2" Ice			
1900MHz RRH	A	From Leg	1.00	0.0000	185.00	No Ice	2.49	3.26	0.04
			0.00			1/2"	2.70	3.48	0.08
			3.00			Ice	2.91	3.72	0.11
						1" Ice	3.35	4.21	0.19
						2" Ice			
1900MHz RRH	B	From Leg	1.00	0.0000	185.00	No Ice	2.49	3.26	0.04
			0.00			1/2"	2.70	3.48	0.08
			3.00			Ice	2.91	3.72	0.11
						1" Ice	3.35	4.21	0.19
						2" Ice			
1900MHz RRH	C	From Leg	1.00	0.0000	185.00	No Ice	2.49	3.26	0.04
			0.00			1/2"	2.70	3.48	0.08
			3.00			Ice	2.91	3.72	0.11
						1" Ice	3.35	4.21	0.19
						2" Ice			
184									
Side Arm Mount [SO 701-1]	B	From Leg	1.50	0.0000	184.00	No Ice	0.85	1.67	0.07
			0.00			1/2"	1.14	2.34	0.08
			0.00			Ice	1.43	3.01	0.09
						1" Ice	2.01	4.35	0.12
						2" Ice			
4'x2" Mount Pipe	B	From Leg	3.00	0.0000	184.00	No Ice	0.87	0.87	0.01
			0.00			1/2"	1.11	1.11	0.02
			0.00			Ice	1.36	1.36	0.03
						1" Ice	1.90	1.90	0.06
						2" Ice			
179									
Platform Mount [LP 403-1]	C	None		0.0000	179.00	No Ice	18.85	18.85	1.50
						1/2"	24.30	24.30	1.80
						Ice	29.75	29.75	2.09
						1" Ice	40.65	40.65	2.69
						2" Ice			
Side Arm Mount [SO 301-1]	B	From Face	4.00	0.0000	179.00	No Ice	1.00	0.90	0.02
			7.00			1/2"	1.39	1.42	0.03
			0.00			Ice	1.78	1.94	0.04
						1" Ice	2.56	2.98	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Side Arm Mount [SO 301-1]	C	From Face	4.00 7.00 0.00	0.0000	179.00	2" Ice No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.39 1.78 2.56	0.90 1.42 1.94 2.98	0.02 0.03 0.04 0.06
(4) 6' x 2" Mount Pipe	A	From Face	4.00 0.00 0.00	0.0000	179.00	No Ice 1/2" Ice 1" Ice 2" 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
(4) 6' x 2" Mount Pipe	B	From Face	4.00 0.00 0.00	0.0000	179.00	No Ice 1/2" Ice 1" Ice 2" 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
(4) 6' x 2" Mount Pipe	C	From Face	4.00 0.00 0.00	0.0000	179.00	No Ice 1/2" Ice 1" Ice 2" 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
458-2D	B	From Face	5.00 7.00 6.00	0.0000	179.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.67 5.03 6.41 9.10	3.67 5.03 6.41 9.10	0.02 0.05 0.08 0.18
458-2D	C	From Face	5.00 7.00 6.00	0.0000	179.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.67 5.03 6.41 9.10	3.67 5.03 6.41 9.10	0.02 0.05 0.08 0.18
170 Platform Mount [LP 405-1]	C	None		0.0000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.80 28.10 35.40 50.00	20.80 28.10 35.40 50.00	1.80 2.07 2.33 2.86
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Face	4.00 -8.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Face	4.00 -8.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Face	4.00 -8.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Face	4.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.69 15.46 16.23 17.82	6.87 7.55 8.25 9.67	0.19 0.31 0.46 0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Face	4.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.69 15.46 16.23 17.82	6.87 7.55 8.25 9.67	0.19 0.31 0.46 0.79
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Face	4.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	14.69 15.46 16.23	6.87 7.55 8.25	0.19 0.31 0.46

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	17.82	9.67	0.79
						2" Ice			
AIR 32 B2A/B66AA w/ Mount Pipe	A	From Face	4.00	0.0000	170.00	No Ice	6.75	6.07	0.15
			8.00			1/2"	7.20	6.87	0.21
			0.00			Ice	7.65	7.58	0.28
						1" Ice	8.57	9.06	0.44
						2" Ice			
AIR 32 B2A/B66AA w/ Mount Pipe	B	From Face	4.00	0.0000	170.00	No Ice	6.75	6.07	0.15
			8.00			1/2"	7.20	6.87	0.21
			0.00			Ice	7.65	7.58	0.28
						1" Ice	8.57	9.06	0.44
						2" Ice			
AIR 32 B2A/B66AA w/ Mount Pipe	C	From Face	4.00	0.0000	170.00	No Ice	6.75	6.07	0.15
			8.00			1/2"	7.20	6.87	0.21
			0.00			Ice	7.65	7.58	0.28
						1" Ice	8.57	9.06	0.44
						2" Ice			
KRY 112 144/1	A	From Face	4.00	0.0000	170.00	No Ice	0.35	0.17	0.01
			0.00			1/2"	0.43	0.23	0.01
			0.00			Ice	0.51	0.30	0.02
						1" Ice	0.70	0.46	0.03
						2" Ice			
KRY 112 144/1	B	From Face	4.00	0.0000	170.00	No Ice	0.35	0.17	0.01
			0.00			1/2"	0.43	0.23	0.01
			0.00			Ice	0.51	0.30	0.02
						1" Ice	0.70	0.46	0.03
						2" Ice			
KRY 112 144/1	C	From Face	4.00	0.0000	170.00	No Ice	0.35	0.17	0.01
			0.00			1/2"	0.43	0.23	0.01
			0.00			Ice	0.51	0.30	0.02
						1" Ice	0.70	0.46	0.03
						2" Ice			
RADIO 4449 B12/B71	A	From Face	4.00	0.0000	170.00	No Ice	1.65	1.30	0.08
			0.00			1/2"	1.81	1.44	0.09
			0.00			Ice	1.98	1.60	0.11
						1" Ice	2.34	1.92	0.16
						2" Ice			
RADIO 4449 B12/B71	B	From Face	4.00	0.0000	170.00	No Ice	1.65	1.30	0.08
			0.00			1/2"	1.81	1.44	0.09
			0.00			Ice	1.98	1.60	0.11
						1" Ice	2.34	1.92	0.16
						2" Ice			
RADIO 4449 B12/B71	C	From Face	4.00	0.0000	170.00	No Ice	1.65	1.30	0.08
			0.00			1/2"	1.81	1.44	0.09
			0.00			Ice	1.98	1.60	0.11
						1" Ice	2.34	1.92	0.16
						2" Ice			
160									
Platform Mount [LP 403-1]	C	None		0.0000	162.00	No Ice	18.85	18.85	1.50
						1/2"	24.30	24.30	1.80
						Ice	29.75	29.75	2.09
						1" Ice	40.65	40.65	2.69
						2" Ice			
HRK-14 Handrail Kit [NA 510-1]	C	None		0.0000	162.00	No Ice	6.00	6.00	0.30
						1/2"	8.50	8.50	0.40
						Ice	11.00	11.00	0.50
						1" Ice	16.00	16.00	0.70
						2" Ice			
PRK-SFS-L Reinforcement Kit	A	From Face	0.00	0.0000	162.00	No Ice	1.97	0.06	0.08
			0.00			1/2"	2.54	0.10	0.96
			0.00			Ice	3.13	0.14	0.13
						1" Ice	4.35	0.26	0.22
						2" Ice			
PRK-SFS-L Reinforcement Kit	B	From Face	0.00	0.0000	162.00	No Ice	1.97	0.06	0.08
			0.00			1/2"	2.54	0.10	0.96

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
-			ft ft ft	°	ft		ft^2	ft^2	K
			0.00			Ice	3.13	0.14	0.13
						1" Ice	4.35	0.26	0.22
						2" Ice			
PRK-SFS-L Reinforcement Kit	C	From Face	0.00	0.0000	162.00	No Ice	1.97	0.06	0.08
			0.00			1/2"	2.54	0.10	0.96
			0.00			Ice	3.13	0.14	0.13
						1" Ice	4.35	0.26	0.22
						2" Ice			
(2) L1-1/2"x2-1/2"x1/4"x1'-2"	A	From Face	0.00	0.0000	162.00	No Ice	0.00	0.00	0.00
			0.00			1/2"	0.00	0.00	0.00
			0.00			Ice	0.00	0.00	0.00
						1" Ice	0.00	0.00	0.00
						2" Ice			
(2) L1-1/2"x2-1/2"x1/4"x1'-2"	B	From Face	0.00	0.0000	162.00	No Ice	0.00	0.00	0.00
			0.00			1/2"	0.00	0.00	0.00
			0.00			Ice	0.00	0.00	0.00
						1" Ice	0.00	0.00	0.00
						2" Ice			
(2) L1-1/2"x2-1/2"x1/4"x1'-2"	C	From Face	0.00	0.0000	162.00	No Ice	0.00	0.00	0.00
			0.00			1/2"	0.00	0.00	0.00
			0.00			Ice	0.00	0.00	0.00
						1" Ice	0.00	0.00	0.00
						2" Ice			
6'x2" Mount Pipe	A	From Face	4.00	0.0000	162.00	No Ice	1.43	1.43	0.02
			-6.00			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			
7770.00 w/ Mount Pipe	A	From Face	4.00	0.0000	162.00	No Ice	5.75	4.25	0.06
			-7.00			1/2"	6.18	5.01	0.10
			1.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
7770.00 w/ Mount Pipe	B	From Face	4.00	0.0000	162.00	No Ice	5.75	4.25	0.06
			-7.00			1/2"	6.18	5.01	0.10
			1.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
7770.00 w/ Mount Pipe	C	From Face	4.00	0.0000	162.00	No Ice	5.75	4.25	0.06
			-7.00			1/2"	6.18	5.01	0.10
			1.00			Ice	6.61	5.71	0.16
						1" Ice	7.49	7.16	0.29
						2" Ice			
80010965 w/ Mount Pipe	A	From Face	4.00	0.0000	162.00	No Ice	12.26	5.79	0.14
			0.00			1/2"	13.03	6.47	0.23
			1.00			Ice	13.80	7.17	0.33
						1" Ice	15.41	8.60	0.57
						2" Ice			
80010965 w/ Mount Pipe	B	From Face	4.00	0.0000	162.00	No Ice	12.26	5.79	0.14
			0.00			1/2"	13.03	6.47	0.23
			1.00			Ice	13.80	7.17	0.33
						1" Ice	15.41	8.60	0.57
						2" Ice			
80010965 w/ Mount Pipe	C	From Face	4.00	0.0000	162.00	No Ice	12.26	5.79	0.14
			0.00			1/2"	13.03	6.47	0.23
			1.00			Ice	13.80	7.17	0.33
						1" Ice	15.41	8.60	0.57
						2" Ice			
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Face	4.00	0.0000	162.00	No Ice	9.90	7.18	0.10
			7.00			1/2"	10.47	8.36	0.18
			1.00			Ice	11.01	9.26	0.26
						1" Ice	12.11	11.09	0.46
						2" Ice			
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Face	4.00	0.0000	162.00	No Ice	9.90	7.18	0.10
			7.00			1/2"	10.47	8.36	0.18

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1.00			Ice	11.01	9.26	0.26
						1" Ice	12.11	11.09	0.46
						2" Ice			
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Face	4.00	0.0000	162.00	No Ice	9.90	7.18	0.10
			7.00			1/2"	10.47	8.36	0.18
			1.00			Ice	11.01	9.26	0.26
						1" Ice	12.11	11.09	0.46
						2" Ice			
RRUS 11	A	From Face	4.00	0.0000	162.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			1.00			Ice	3.21	1.49	0.10
						1" Ice	3.66	1.83	0.15
						2" Ice			
RRUS 11	B	From Face	4.00	0.0000	162.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			1.00			Ice	3.21	1.49	0.10
						1" Ice	3.66	1.83	0.15
						2" Ice			
RRUS 11	C	From Face	4.00	0.0000	162.00	No Ice	2.78	1.19	0.05
			0.00			1/2"	2.99	1.33	0.07
			1.00			Ice	3.21	1.49	0.10
						1" Ice	3.66	1.83	0.15
						2" Ice			
RRUS 32	A	From Face	4.00	0.0000	162.00	No Ice	2.86	1.78	0.06
			0.00			1/2"	3.08	1.97	0.08
			1.00			Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			
RRUS 32	B	From Face	4.00	0.0000	162.00	No Ice	2.86	1.78	0.06
			0.00			1/2"	3.08	1.97	0.08
			1.00			Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			
RRUS 32	C	From Face	4.00	0.0000	162.00	No Ice	2.86	1.78	0.06
			0.00			1/2"	3.08	1.97	0.08
			1.00			Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			
RRUS 32 B2	A	From Face	4.00	0.0000	162.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			1.00			Ice	3.18	2.05	0.10
						1" Ice	3.66	2.46	0.16
						2" Ice			
RRUS 32 B2	B	From Face	4.00	0.0000	162.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			1.00			Ice	3.18	2.05	0.10
						1" Ice	3.66	2.46	0.16
						2" Ice			
RRUS 32 B2	C	From Face	4.00	0.0000	162.00	No Ice	2.73	1.67	0.05
			0.00			1/2"	2.95	1.86	0.07
			1.00			Ice	3.18	2.05	0.10
						1" Ice	3.66	2.46	0.16
						2" Ice			
RRUS 4478 B14	A	From Face	4.00	0.0000	162.00	No Ice	1.84	1.06	0.06
			0.00			1/2"	2.01	1.20	0.08
			1.00			Ice	2.19	1.34	0.09
						1" Ice	2.57	1.66	0.14
						2" Ice			
RRUS 4478 B14	B	From Face	4.00	0.0000	162.00	No Ice	1.84	1.06	0.06
			0.00			1/2"	2.01	1.20	0.08
			1.00			Ice	2.19	1.34	0.09
						1" Ice	2.57	1.66	0.14
						2" Ice			
RRUS 4478 B14	C	From Face	4.00	0.0000	162.00	No Ice	1.84	1.06	0.06
			0.00			1/2"	2.01	1.20	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			1.00			Ice	2.19	1.34	0.09
						1" Ice	2.57	1.66	0.14
						2" Ice			
(2) 7020.00	A	From Face	4.00	0.0000	162.00	No Ice	0.10	0.17	0.00
			0.00			1/2"	0.15	0.24	0.01
			1.00			Ice	0.20	0.31	0.01
						1" Ice	0.33	0.48	0.02
						2" Ice			
(2) 7020.00	B	From Face	4.00	0.0000	162.00	No Ice	0.10	0.17	0.00
			0.00			1/2"	0.15	0.24	0.01
			1.00			Ice	0.20	0.31	0.01
						1" Ice	0.33	0.48	0.02
						2" Ice			
(2) 7020.00	C	From Face	4.00	0.0000	162.00	No Ice	0.10	0.17	0.00
			0.00			1/2"	0.15	0.24	0.01
			1.00			Ice	0.20	0.31	0.01
						1" Ice	0.33	0.48	0.02
						2" Ice			
(2) LGP21401	A	From Face	4.00	0.0000	162.00	No Ice	1.10	0.35	0.01
			0.00			1/2"	1.24	0.44	0.02
			-2.00			Ice	1.38	0.54	0.03
						1" Ice	1.69	0.77	0.05
						2" Ice			
(2) LGP21401	B	From Face	4.00	0.0000	162.00	No Ice	1.10	0.35	0.01
			0.00			1/2"	1.24	0.44	0.02
			-2.00			Ice	1.38	0.54	0.03
						1" Ice	1.69	0.77	0.05
						2" Ice			
(2) LGP21401	C	From Face	4.00	0.0000	162.00	No Ice	1.10	0.35	0.01
			0.00			1/2"	1.24	0.44	0.02
			-2.00			Ice	1.38	0.54	0.03
						1" Ice	1.69	0.77	0.05
						2" Ice			
DC6-48-60-18-8C	A	From Face	1.00	0.0000	162.00	No Ice	1.14	1.14	0.03
			0.00			1/2"	1.79	1.79	0.05
			1.00			Ice	2.00	2.00	0.07
						1" Ice	2.45	2.45	0.13
						2" Ice			
DC6-48-60-18-8F	C	From Face	1.00	0.0000	162.00	No Ice	0.92	0.92	0.02
			0.00			1/2"	1.46	1.46	0.04
			1.00			Ice	1.64	1.64	0.06
						1" Ice	2.04	2.04	0.11
						2" Ice			
150									
Platform Mount [LP 403-1]	C	None		0.0000	150.00	No Ice	18.85	18.85	1.50
						1/2"	24.30	24.30	1.80
						Ice	29.75	29.75	2.09
						1" Ice	40.65	40.65	2.69
						2" Ice			
QS6656-5D w/ Mount Pipe	A	From Face	4.00	0.0000	150.00	No Ice	8.37	8.46	0.11
			-7.00			1/2"	8.93	9.66	0.19
			0.00			Ice	9.46	10.55	0.27
						1" Ice	10.53	12.35	0.47
						2" Ice			
QS6656-5D w/ Mount Pipe	A	From Face	4.00	0.0000	150.00	No Ice	8.37	8.46	0.11
			2.50			1/2"	8.93	9.66	0.19
			0.00			Ice	9.46	10.55	0.27
						1" Ice	10.53	12.35	0.47
						2" Ice			
QS6656-5D w/ Mount Pipe	B	From Face	4.00	0.0000	150.00	No Ice	8.37	8.46	0.11
			-7.00			1/2"	8.93	9.66	0.19
			0.00			Ice	9.46	10.55	0.27
						1" Ice	10.53	12.35	0.47
						2" Ice			
QS6656-5D w/ Mount Pipe	B	From Face	4.00	0.0000	150.00	No Ice	8.37	8.46	0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			-2.50			1/2"	8.93	9.66	0.19
			0.00			Ice	9.46	10.55	0.27
						1" Ice	10.53	12.35	0.47
						2" Ice			
QS6656-5D w/ Mount Pipe	C	From Face	4.00	0.0000	150.00	No Ice	8.37	8.46	0.11
			-7.00			1/2"	8.93	9.66	0.19
			0.00			Ice	9.46	10.55	0.27
						1" Ice	10.53	12.35	0.47
						2" Ice			
QS6656-5D w/ Mount Pipe	C	From Face	4.00	0.0000	150.00	No Ice	8.37	8.46	0.11
			-2.50			1/2"	8.93	9.66	0.19
			0.00			Ice	9.46	10.55	0.27
						1" Ice	10.53	12.35	0.47
						2" Ice			
DB846F65ZAXY w/ Mount Pipe	A	From Face	4.00	0.0000	150.00	No Ice	7.27	7.82	0.05
			-2.50			1/2"	7.83	9.01	0.11
			0.00			Ice	8.35	9.91	0.19
						1" Ice	9.40	11.73	0.37
						2" Ice			
DB846F65ZAXY w/ Mount Pipe	A	From Face	4.00	0.0000	150.00	No Ice	7.27	7.82	0.05
			7.00			1/2"	7.83	9.01	0.11
			0.00			Ice	8.35	9.91	0.19
						1" Ice	9.40	11.73	0.37
						2" Ice			
DB846F65ZAXY w/ Mount Pipe	B	From Face	4.00	0.0000	150.00	No Ice	7.27	7.82	0.05
			2.50			1/2"	7.83	9.01	0.11
			0.00			Ice	8.35	9.91	0.19
						1" Ice	9.40	11.73	0.37
						2" Ice			
DB846F65ZAXY w/ Mount Pipe	B	From Face	4.00	0.0000	150.00	No Ice	7.27	7.82	0.05
			7.00			1/2"	7.83	9.01	0.11
			0.00			Ice	8.35	9.91	0.19
						1" Ice	9.40	11.73	0.37
						2" Ice			
LPA-80080/6CF w/ Mount Pipe	C	From Face	4.00	0.0000	150.00	No Ice	4.56	10.26	0.05
			2.50			1/2"	5.11	11.43	0.11
			0.00			Ice	5.61	12.31	0.19
						1" Ice	6.65	14.13	0.36
						2" Ice			
LPA-80080/6CF w/ Mount Pipe	C	From Face	4.00	0.0000	150.00	No Ice	4.56	10.26	0.05
			7.00			1/2"	5.11	11.43	0.11
			0.00			Ice	5.61	12.31	0.19
						1" Ice	6.65	14.13	0.36
						2" Ice			
DB-C1-12C-24AB-0Z	A	From Face	4.00	0.0000	150.00	No Ice	4.06	3.10	0.03
			0.00			1/2"	4.32	3.34	0.07
			0.00			Ice	4.58	3.58	0.11
						1" Ice	5.14	4.09	0.20
						2" Ice			
RFV01U-D2A	A	From Face	4.00	0.0000	150.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice	2.60	1.59	0.15
						2" Ice			
RFV01U-D2A	B	From Face	4.00	0.0000	150.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice	2.60	1.59	0.15
						2" Ice			
RFV01U-D2A	C	From Face	4.00	0.0000	150.00	No Ice	1.88	1.01	0.07
			0.00			1/2"	2.05	1.14	0.09
			0.00			Ice	2.22	1.28	0.11
						1" Ice	2.60	1.59	0.15
						2" Ice			
RFV01U-D1A	A	From Face	4.00	0.0000	150.00	No Ice	1.88	1.25	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1/2"	2.05	1.39	0.10
			0.00			Ice	2.22	1.54	0.12
						1" Ice	2.60	1.86	0.18
						2" Ice			
RFV01U-D1A	B	From Face	4.00	0.0000	150.00	No Ice	1.88	1.25	0.08
			0.00			1/2"	2.05	1.39	0.10
			0.00			Ice	2.22	1.54	0.12
						1" Ice	2.60	1.86	0.18
						2" Ice			
RFV01U-D1A	C	From Face	4.00	0.0000	150.00	No Ice	1.88	1.25	0.08
			0.00			1/2"	2.05	1.39	0.10
			0.00			Ice	2.22	1.54	0.12
						1" Ice	2.60	1.86	0.18
						2" Ice			
125									
Side Arm Mount [SO 901-1]	A	From Face	0.00	0.0000	125.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
Side Arm Mount [SO 901-1]	C	From Face	0.00	0.0000	125.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
PD201-1	C	From Face	3.00	0.0000	125.00	No Ice	1.18	1.18	0.00
			0.00			1/2"	2.09	2.09	0.01
			5.00			Ice	3.02	3.02	0.03
						1" Ice	4.58	4.58	0.08
						2" Ice			
PD128-1	A	From Face	3.00	0.0000	125.00	No Ice	1.28	1.28	0.01
			0.00			1/2"	2.27	2.27	0.02
			5.00			Ice	3.28	3.28	0.04
						1" Ice	5.13	5.13	0.09
						2" Ice			
110									
Side Arm Mount [SO 901-1]	A	From Face	0.00	0.0000	110.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
Side Arm Mount [SO 901-1]	B	From Face	0.00	0.0000	110.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
PD128-1	A	From Face	3.00	0.0000	110.00	No Ice	1.28	1.28	0.01
			0.00			1/2"	2.27	2.27	0.02
			5.00			Ice	3.28	3.28	0.04
						1" Ice	5.13	5.13	0.09
						2" Ice			
PD128-1	B	From Face	3.00	0.0000	110.00	No Ice	1.28	1.28	0.01
			0.00			1/2"	2.27	2.27	0.02
			5.00			Ice	3.28	3.28	0.04
						1" Ice	5.13	5.13	0.09
						2" Ice			
100									
Side Arm Mount [SO 901-1]	C	From Leg	0.00	0.0000	100.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
GPS_A	C	From Leg	3.00	0.0000	100.00	No Ice	0.26	0.26	0.00
			0.00			1/2"	0.32	0.32	0.00
			1.00			Ice	0.39	0.39	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice	0.56	0.56	0.02
						2" Ice			
95									
Side Arm Mount [SO 901-1]	B	From Face	0.00	0.0000	95.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
Side Arm Mount [SO 901-1]	C	From Face	0.00	0.0000	95.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
PD128-1	B	From Face	3.00	0.0000	95.00	No Ice	1.28	1.28	0.01
			0.00			1/2"	2.27	2.27	0.02
			5.00			Ice	3.28	3.28	0.04
						1" Ice	5.13	5.13	0.09
						2" Ice			
PD128-1	C	From Face	3.00	0.0000	95.00	No Ice	1.28	1.28	0.01
			0.00			1/2"	2.27	2.27	0.02
			5.00			Ice	3.28	3.28	0.04
						1" Ice	5.13	5.13	0.09
						2" Ice			
80									
Side Arm Mount [SO 901-1]	A	From Face	0.00	0.0000	80.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
Side Arm Mount [SO 901-1]	C	From Face	0.00	0.0000	80.00	No Ice	0.50	0.88	0.11
			0.00			1/2"	0.68	1.13	0.11
			0.00			Ice	0.86	1.38	0.11
						1" Ice	1.22	1.88	0.12
						2" Ice			
PD128-1	C	From Face	3.00	0.0000	80.00	No Ice	1.28	1.28	0.01
			0.00			1/2"	2.27	2.27	0.02
			5.00			Ice	3.28	3.28	0.04
						1" Ice	5.13	5.13	0.09
						2" Ice			
DB222	A	From Face	3.00	0.0000	80.00	No Ice	1.60	1.60	0.02
			0.00			1/2"	2.88	2.88	0.02
			5.00			Ice	4.16	4.16	0.03
						1" Ice	6.72	6.72	0.04
						2" Ice			
MOD 2013									
Jump Plate 120" x 4.5" x 1"	A	From Face	0.00	0.0000	80.00	No Ice	7.50	2.21	0.21
			0.00			1/2"	9.24	3.09	0.25
			0.00			Ice	11.01	3.99	0.28
						1" Ice	14.64	5.81	0.36
						2" Ice			
Jump Plate 120" x 4.5" x 1"	B	From Face	0.00	0.0000	80.00	No Ice	7.50	2.21	0.21
			0.00			1/2"	9.24	3.09	0.25
			0.00			Ice	11.01	3.99	0.28
						1" Ice	14.64	5.81	0.36
						2" Ice			
Jump Plate 120" x 4.5" x 1"	C	From Face	0.00	0.0000	80.00	No Ice	7.50	2.21	0.21
			0.00			1/2"	9.24	3.09	0.25
			0.00			Ice	11.01	3.99	0.28
						1" Ice	14.64	5.81	0.36
						2" Ice			
***									
Jump Plate 120" x 6.5" x 1.25"	A	From Face	0.00	0.0000	60.00	No Ice	9.65	3.08	0.41
			0.00			1/2"	11.23	3.97	0.47
			0.00			Ice	12.83	4.87	0.51
						1" Ice	16.11	6.71	0.59

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Jump Plate 120" x 6.5" x 1.25"	B	From Face	0.00 0.00 0.00	0.0000	60.00	2" Ice No Ice 1/2" Ice 1" Ice 2" Ice	9.65 11.23 12.83 16.11	3.08 3.97 4.87 6.71	0.41 0.47 0.51 0.59
Jump Plate 120" x 6.5" x 1.25"	C	From Face	0.00 0.00 0.00	0.0000	60.00	2" Ice No Ice 1/2" Ice 1" Ice 2" Ice	9.65 11.23 12.83 16.11	3.08 3.97 4.87 6.71	0.41 0.47 0.51 0.59
***									
(2) Jump Plate 120" x 6" x 1"	A	From Face	0.00 0.00 0.00	0.0000	40.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.17 10.78 12.43 15.79	2.42 3.30 4.19 6.03	0.30 0.35 0.38 0.47
(2) Jump Plate 120" x 6" x 1"	B	From Face	0.00 0.00 0.00	0.0000	40.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.17 10.78 12.43 15.79	2.42 3.30 4.19 6.03	0.30 0.35 0.38 0.47
(2) Jump Plate 120" x 6" x 1"	C	From Face	0.00 0.00 0.00	0.0000	40.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.17 10.78 12.43 15.79	2.42 3.30 4.19 6.03	0.30 0.35 0.38 0.47
***									
(2) Jump Plate 120" x 6.5" x 1.25"	A	From Face	0.00 0.00 0.00	0.0000	20.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.65 11.23 12.83 16.11	3.08 3.97 4.87 6.71	0.41 0.47 0.51 0.59
(2) Jump Plate 120" x 6.5" x 1.25"	B	From Face	0.00 0.00 0.00	0.0000	20.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.65 11.23 12.83 16.11	3.08 3.97 4.87 6.71	0.41 0.47 0.51 0.59
(2) Jump Plate 120" x 6.5" x 1.25"	C	From Face	0.00 0.00 0.00	0.0000	20.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.65 11.23 12.83 16.11	3.08 3.97 4.87 6.71	0.41 0.47 0.51 0.59
***									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
SP2-5.8	A	Paraboloid w/Radome	From Face	4.00 0.00 -1.00	15.0000		188.00	2.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.14 3.41 3.68 4.21	0.02 0.04 0.06 0.09
***											

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 190.00-185.00	187.50	1.183	39	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	1.386	0.000
					C	0.000	12.500		100.00	0.588	0.000
L2 185.00-180.00	182.50	1.174	39	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	2.310	0.000
					C	0.000	12.500		100.00	0.588	0.000
L3 180.00-175.00	177.50	1.164	38	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	2.310	0.000
					C	0.000	15.000		100.00	0.588	0.000
L4 175.00-170.00	172.50	1.155	38	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	2.310	0.000
					C	0.000	15.000		100.00	0.588	0.000
L5 170.00-165.00	167.50	1.145	38	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	12.210	0.000
					C	0.000	15.000		100.00	0.588	0.000
L6 165.00-160.00	162.50	1.135	37	15.000	A	0.000	15.000	15.000	100.00	2.853	0.000
					B	0.000	15.000		100.00	12.210	0.000
					C	0.000	15.000		100.00	0.588	0.000
L7 160.00-155.00	157.50	1.125	37	17.500	A	0.000	17.500	17.500	100.00	7.132	0.000
					B	0.000	17.500		100.00	12.210	0.000
					C	0.000	17.500		100.00	0.588	0.000
L8 155.00-150.00	152.50	1.115	37	17.500	A	0.000	17.500	17.500	100.00	7.132	0.000
					B	0.000	17.500		100.00	12.210	0.000
					C	0.000	17.500		100.00	0.588	0.000
L9 150.00-145.00	147.50	1.104	36	17.500	A	0.000	17.500	17.500	100.00	7.132	0.000
					B	0.000	17.500		100.00	12.210	0.000
					C	0.000	17.500		100.00	0.588	0.000
L10 145.00-140.00	142.50	1.093	36	17.500	A	0.000	17.500	17.500	100.00	7.132	0.000
					B	0.000	17.500		100.00	12.210	0.000
					C	0.000	17.500		100.00	0.588	0.000
L11 140.00-135.00	137.50	1.082	36	20.000	A	0.000	20.000	20.000	100.00	7.132	0.000
					B	0.000	20.000		100.00	12.210	0.000
					C	0.000	20.000		100.00	0.588	0.000
L12 135.00-130.00	132.50	1.071	35	20.000	A	0.000	20.000	20.000	100.00	7.132	0.000
					B	0.000	20.000		100.00	12.210	0.000
					C	0.000	20.000		100.00	0.588	0.000
L13 130.00-125.00	127.50	1.059	35	20.000	A	0.000	20.000	20.000	100.00	7.132	0.000
					B	0.000	20.000		100.00	12.210	0.000
					C	0.000	20.000		100.00	0.588	0.000
L14 125.00-120.00	122.50	1.047	34	20.000	A	0.000	20.000	20.000	100.00	7.132	0.000
					B	0.000	20.000		100.00	12.210	0.000
					C	0.000	20.000		100.00	0.588	0.000
L15 120.00-115.00	117.50	1.035	34	22.500	A	0.000	22.500	22.500	100.00	7.132	0.000
					B	0.000	22.500		100.00	12.210	0.000
					C	0.000	22.500		100.00	0.588	0.000
L16 115.00-112.67	113.83	1.025	34	10.503	A	0.000	10.503	10.503	100.00	5.329	0.000
					B	0.000	10.503		100.00	7.700	0.000
					C	0.000	10.503		100.00	2.274	0.000
L17 112.67-112.42	112.54	1.022	34	1.125	A	0.000	1.125	1.125	100.00	0.607	0.000
					B	0.000	1.125		100.00	0.861	0.000
					C	0.000	1.125		100.00	0.279	0.000
L18 112.42-107.42	109.92	1.015	33	22.500	A	0.000	22.500	22.500	100.00	12.133	0.000
					B	0.000	22.500		100.00	17.210	0.000
					C	0.000	22.500		100.00	5.588	0.000
L19 107.42-103.33	105.37	1.003	33	18.374	A	0.000	18.374	18.374	100.00	11.907	0.000
					B	0.000	18.374		100.00	16.054	0.000
					C	0.000	18.374		100.00	6.563	0.000
L20 103.33-103.08	103.21	0.997	33	1.125	A	0.000	1.125	1.125	100.00	0.857	0.000
					B	0.000	1.125		100.00	1.111	0.000
					C	0.000	1.125		100.00	0.529	0.000
L21 103.08-	101.54	0.993	33	13.874	A	0.000	13.874	13.874	100.00	9.231	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
100.00					B	0.000	13.874		100.00	12.362	0.000
					C	0.000	13.874		100.00	5.195	0.000
L22 100.00-95.00	97.50	0.981	32	25.000	A	0.000	25.000	25.000	100.00	12.133	0.000
					B	0.000	25.000		100.00	17.210	0.000
					C	0.000	25.000		100.00	5.588	0.000
L23 95.00-90.00	92.50	0.966	32	25.000	A	0.000	25.000	25.000	100.00	12.883	0.000
					B	0.000	25.000		100.00	17.960	0.000
					C	0.000	25.000		100.00	6.338	0.000
L24 90.00-89.50	89.75	0.958	32	2.500	A	0.000	2.500	2.500	100.00	1.588	0.000
					B	0.000	2.500		100.00	2.096	0.000
					C	0.000	2.500		100.00	0.934	0.000
L25 89.50-89.25	89.38	0.957	31	1.250	A	0.000	1.250	1.250	100.00	0.794	0.000
					B	0.000	1.250		100.00	1.048	0.000
					C	0.000	1.250		100.00	0.467	0.000
L26 89.25-85.50	87.38	0.951	31	18.750	A	0.000	18.750	18.750	100.00	13.037	0.000
					B	0.000	18.750		100.00	16.845	0.000
					C	0.000	18.750		100.00	8.128	0.000
L27 85.50-85.25	85.38	0.945	31	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L28 85.25-84.00	84.63	0.942	31	6.250	A	0.000	6.250	6.250	100.00	4.908	0.000
					B	0.000	6.250		100.00	6.178	0.000
					C	0.000	6.250		100.00	3.272	0.000
L29 84.00-83.75	83.88	0.94	31	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L30 83.75-82.50	83.13	0.937	31	6.250	A	0.000	6.250	6.250	100.00	4.908	0.000
					B	0.000	6.250		100.00	6.178	0.000
					C	0.000	6.250		100.00	3.272	0.000
L31 82.50-82.25	82.38	0.935	31	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L32 82.25-80.00	81.13	0.931	31	11.250	A	0.000	11.250	11.250	100.00	6.085	0.000
					B	0.000	11.250		100.00	8.370	0.000
					C	0.000	11.250		100.00	3.139	0.000
L33 80.00-75.00	77.50	0.919	30	25.000	A	0.000	25.000	25.000	100.00	10.883	0.000
					B	0.000	25.000		100.00	15.960	0.000
					C	0.000	25.000		100.00	4.338	0.000
L34 75.00-70.00	72.50	0.901	30	25.000	A	0.000	25.000	25.000	100.00	10.883	0.000
					B	0.000	25.000		100.00	15.960	0.000
					C	0.000	25.000		100.00	4.338	0.000
L35 70.00-65.00	67.50	0.883	29	25.000	A	0.000	25.000	25.000	100.00	10.883	0.000
					B	0.000	25.000		100.00	15.960	0.000
					C	0.000	25.000		100.00	4.338	0.000
L36 65.00-60.00	62.50	0.864	28	25.000	A	0.000	25.000	25.000	100.00	10.883	0.000
					B	0.000	25.000		100.00	15.960	0.000
					C	0.000	25.000		100.00	4.338	0.000
L37 60.00-58.50	59.25	0.851	28	7.500	A	0.000	7.500	7.500	100.00	3.265	0.000
					B	0.000	7.500		100.00	4.788	0.000
					C	0.000	7.500		100.00	1.301	0.000
L38 58.50-58.25	58.38	0.847	28	1.250	A	0.000	1.250	1.250	100.00	0.544	0.000
					B	0.000	1.250		100.00	0.798	0.000
					C	0.000	1.250		100.00	0.217	0.000
L39 58.25-53.25	55.75	0.836	28	25.000	A	0.000	25.000	25.000	100.00	8.070	0.000
					B	0.000	25.000		100.00	13.148	0.000
					C	0.000	25.000		100.00	1.525	0.000
L40 53.25-48.25	50.75	0.814	27	25.000	A	0.000	25.000	25.000	100.00	10.112	0.000
					B	0.000	25.000		100.00	15.189	0.000
					C	0.000	25.000		100.00	3.567	0.000
L41 48.25-48.00	48.13	0.802	26	1.250	A	0.000	1.250	1.250	100.00	0.627	0.000
					B	0.000	1.250		100.00	0.881	0.000
					C	0.000	1.250		100.00	0.300	0.000
L42 48.00-43.00	45.50	0.789	26	25.000	A	0.000	25.000	25.000	100.00	12.549	0.000
					B	0.000	25.000		100.00	17.627	0.000
					C	0.000	25.000		100.00	6.004	0.000
L43 43.00-40.00	41.50	0.769	25	15.000	A	0.000	15.000	15.000	100.00	7.530	0.000
					B	0.000	15.000		100.00	10.576	0.000
					C	0.000	15.000		100.00	3.603	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L44 40.00-35.00	37.50	0.747	25	25.000	A	0.000	25.000	25.000	100.00	13.729	0.000
					B	0.000	25.000		100.00	18.807	0.000
					C	0.000	25.000		100.00	7.184	0.000
L45 35.00-32.08	33.54	0.723	24	14.600	A	0.000	14.600	14.600	100.00	11.465	0.000
					B	0.000	14.600		100.00	14.431	0.000
					C	0.000	14.600		100.00	7.643	0.000
L46 32.08-31.83	31.96	0.713	23	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L47 31.83-28.75	30.29	0.703	23	15.400	A	0.000	15.400	15.400	100.00	12.094	0.000
					B	0.000	15.400		100.00	15.221	0.000
					C	0.000	15.400		100.00	8.062	0.000
L48 28.75-28.50	28.63	0.7	23	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L49 28.50-23.50	26.00	0.7	23	25.000	A	0.000	25.000	25.000	100.00	16.924	0.000
					B	0.000	25.000		100.00	22.002	0.000
					C	0.000	25.000		100.00	10.379	0.000
L50 23.50-18.50	21.00	0.7	23	25.000	A	0.000	25.000	25.000	100.00	14.216	0.000
					B	0.000	25.000		100.00	19.293	0.000
					C	0.000	25.000		100.00	7.671	0.000
L51 18.50-13.50	16.00	0.7	23	25.000	A	0.000	25.000	25.000	100.00	14.216	0.000
					B	0.000	25.000		100.00	19.293	0.000
					C	0.000	25.000		100.00	7.671	0.000
L52 13.50-8.50	11.00	0.7	23	25.000	A	0.000	25.000	25.000	100.00	10.650	0.000
					B	0.000	25.000		100.00	19.293	0.000
					C	0.000	25.000		100.00	7.495	0.000
L53 8.50-3.50	6.00	0.7	23	25.000	A	0.000	25.000	25.000	100.00	7.083	0.000
					B	0.000	25.000		100.00	9.228	0.000
					C	0.000	25.000		100.00	7.083	0.000
L54 3.50-0.00	1.75	0.7	23	17.500	A	0.000	17.500	17.500	100.00	3.778	0.000
					B	0.000	17.500		100.00	3.778	0.000
					C	0.000	17.500		100.00	3.778	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 190.00-185.00	187.50	1.183	7	1.5169	13.764	A	0.000	13.764	13.764	100.00	0.000	0.000
						B	0.000	13.764		100.00	2.870	0.000
						C	0.000	13.764		100.00	3.621	0.000
L2 185.00-180.00	182.50	1.174	7	1.5128	13.761	A	0.000	13.761	13.761	100.00	0.000	0.000
						B	0.000	13.761		100.00	4.779	0.000
						C	0.000	13.761		100.00	3.613	0.000
L3 180.00-175.00	177.50	1.164	7	1.5086	16.257	A	0.000	16.257	16.257	100.00	0.000	0.000
						B	0.000	16.257		100.00	4.773	0.000
						C	0.000	16.257		100.00	3.605	0.000
L4 175.00-170.00	172.50	1.155	7	1.5043	16.254	A	0.000	16.254	16.254	100.00	0.000	0.000
						B	0.000	16.254		100.00	4.768	0.000
						C	0.000	16.254		100.00	3.596	0.000
L5 170.00-165.00	167.50	1.145	7	1.4999	16.250	A	0.000	16.250	16.250	100.00	0.000	0.000
						B	0.000	16.250		100.00	19.012	0.000
						C	0.000	16.250		100.00	3.587	0.000
L6 165.00-160.00	162.50	1.135	6	1.4954	16.246	A	0.000	16.246	16.246	100.00	5.062	0.000
						B	0.000	16.246		100.00	19.001	0.000
						C	0.000	16.246		100.00	3.578	0.000
L7 160.00-155.00	157.50	1.125	6	1.4907	18.742	A	0.000	18.742	18.742	100.00	12.642	0.000
						B	0.000	18.742		100.00	18.989	0.000
						C	0.000	18.742		100.00	3.569	0.000
L8 155.00-150.00	152.50	1.115	6	1.4859	18.738	A	0.000	18.738	18.738	100.00	12.630	0.000
						B	0.000	18.738		100.00	18.977	0.000

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	18.738		100.00	3.559	0.000
L9 150.00-145.00	147.50	1.104	6	1.4809	18.734	A	0.000	18.734	18.734	100.00	12.618	0.000
						B	0.000	18.734		100.00	18.965	0.000
						C	0.000	18.734		100.00	3.549	0.000
L10 145.00-140.00	142.50	1.093	6	1.4758	18.730	A	0.000	18.730	18.730	100.00	12.605	0.000
						B	0.000	18.730		100.00	18.952	0.000
						C	0.000	18.730		100.00	3.539	0.000
L11 140.00-135.00	137.50	1.082	6	1.4706	21.225	A	0.000	21.225	21.225	100.00	12.592	0.000
						B	0.000	21.225		100.00	18.939	0.000
						C	0.000	21.225		100.00	3.529	0.000
L12 135.00-130.00	132.50	1.071	6	1.4651	21.221	A	0.000	21.221	21.221	100.00	12.578	0.000
						B	0.000	21.221		100.00	18.925	0.000
						C	0.000	21.221		100.00	3.518	0.000
L13 130.00-125.00	127.50	1.059	6	1.4595	21.216	A	0.000	21.216	21.216	100.00	12.564	0.000
						B	0.000	21.216		100.00	18.911	0.000
						C	0.000	21.216		100.00	3.507	0.000
L14 125.00-120.00	122.50	1.047	6	1.4537	21.211	A	0.000	21.211	21.211	100.00	12.550	0.000
						B	0.000	21.211		100.00	18.897	0.000
						C	0.000	21.211		100.00	3.495	0.000
L15 120.00-115.00	117.50	1.035	6	1.4476	23.706	A	0.000	23.706	23.706	100.00	12.535	0.000
						B	0.000	23.706		100.00	18.882	0.000
						C	0.000	23.706		100.00	3.483	0.000
L16 115.00-112.67	113.83	1.025	6	1.4431	11.064	A	0.000	11.064	11.064	100.00	8.191	0.000
						B	0.000	11.064		100.00	11.153	0.000
						C	0.000	11.064		100.00	3.966	0.000
L17 112.67-112.42	112.54	1.022	6	1.4414	1.185	A	0.000	1.185	1.185	100.00	0.919	0.000
						B	0.000	1.185		100.00	1.236	0.000
						C	0.000	1.185		100.00	0.467	0.000
L18 112.42-107.42	109.92	1.015	6	1.4380	23.698	A	0.000	23.698	23.698	100.00	18.370	0.000
						B	0.000	23.698		100.00	24.717	0.000
						C	0.000	23.698		100.00	9.323	0.000
L19 107.42-103.33	105.37	1.003	6	1.4320	19.348	A	0.000	19.348	19.348	100.00	17.559	0.000
						B	0.000	19.348		100.00	22.742	0.000
						C	0.000	19.348		100.00	10.174	0.000
L20 103.33-103.08	103.21	0.997	6	1.4290	1.185	A	0.000	1.185	1.185	100.00	1.239	0.000
						B	0.000	1.185		100.00	1.556	0.000
						C	0.000	1.185		100.00	0.786	0.000
L21 103.08-100.00	101.54	0.993	6	1.4267	14.607	A	0.000	14.607	14.607	100.00	13.708	0.000
						B	0.000	14.607		100.00	17.622	0.000
						C	0.000	14.607		100.00	8.133	0.000
L22 100.00-95.00	97.50	0.981	6	1.4209	26.184	A	0.000	26.184	26.184	100.00	18.889	0.000
						B	0.000	26.184		100.00	25.236	0.000
						C	0.000	26.184		100.00	9.850	0.000
L23 95.00-90.00	92.50	0.966	6	1.4134	26.178	A	0.000	26.178	26.178	100.00	19.773	0.000
						B	0.000	26.178		100.00	26.120	0.000
						C	0.000	26.178		100.00	10.738	0.000
L24 90.00-89.50	89.75	0.958	5	1.4092	2.617	A	0.000	2.617	2.617	100.00	2.340	0.000
						B	0.000	2.617		100.00	2.974	0.000
						C	0.000	2.617		100.00	1.436	0.000
L25 89.50-89.25	89.38	0.957	5	1.4086	1.309	A	0.000	1.309	1.309	100.00	1.170	0.000
						B	0.000	1.309		100.00	1.487	0.000
						C	0.000	1.309		100.00	0.718	0.000
L26 89.25-85.50	87.38	0.951	5	1.4054	19.628	A	0.000	19.628	19.628	100.00	19.083	0.000
						B	0.000	19.628		100.00	23.843	0.000
						C	0.000	19.628		100.00	12.310	0.000
L27 85.50-85.25	85.38	0.945	5	1.4021	1.308	A	0.000	1.308	1.308	100.00	1.426	0.000
						B	0.000	1.308		100.00	1.743	0.000
						C	0.000	1.308		100.00	0.975	0.000
L28 85.25-84.00	84.63	0.942	5	1.4009	6.542	A	0.000	6.542	6.542	100.00	7.129	0.000
						B	0.000	6.542		100.00	8.716	0.000
						C	0.000	6.542		100.00	4.872	0.000
L29 84.00-83.75	83.88	0.94	5	1.3997	1.308	A	0.000	1.308	1.308	100.00	1.425	0.000
						B	0.000	1.308		100.00	1.743	0.000
						C	0.000	1.308		100.00	0.974	0.000
L30 83.75-82.50	83.13	0.937	5	1.3984	6.541	A	0.000	6.541	6.541	100.00	7.126	0.000
						B	0.000	6.541		100.00	8.712	0.000
						C	0.000	6.541		100.00	4.869	0.000
L31 82.50-	82.38	0.935	5	1.3971	1.308	A	0.000	1.308	1.308	100.00	1.425	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
82.25						B	0.000	1.308		100.00	1.742	0.000
						C	0.000	1.308		100.00	0.973	0.000
L32 82.25-80.00	81.13	0.931	5	1.3950	11.773	A	0.000	11.773	11.773	100.00	9.352	0.000
						B	0.000	11.773		100.00	12.208	0.000
						C	0.000	11.773		100.00	5.291	0.000
L33 80.00-75.00	77.50	0.919	5	1.3886	26.157	A	0.000	26.157	26.157	100.00	17.526	0.000
						B	0.000	26.157		100.00	23.873	0.000
						C	0.000	26.157		100.00	8.503	0.000
L34 75.00-70.00	72.50	0.901	5	1.3794	26.150	A	0.000	26.150	26.150	100.00	17.494	0.000
						B	0.000	26.150		100.00	23.840	0.000
						C	0.000	26.150		100.00	8.476	0.000
L35 70.00-65.00	67.50	0.883	5	1.3696	26.141	A	0.000	26.141	26.141	100.00	17.459	0.000
						B	0.000	26.141		100.00	23.806	0.000
						C	0.000	26.141		100.00	8.446	0.000
L36 65.00-60.00	62.50	0.864	5	1.3591	26.133	A	0.000	26.133	26.133	100.00	17.422	0.000
						B	0.000	26.133		100.00	23.769	0.000
						C	0.000	26.133		100.00	8.415	0.000
L37 60.00-58.50	59.25	0.851	5	1.3518	7.838	A	0.000	7.838	7.838	100.00	5.219	0.000
						B	0.000	7.838		100.00	7.123	0.000
						C	0.000	7.838		100.00	2.518	0.000
L38 58.50-58.25	58.38	0.847	5	1.3498	1.306	A	0.000	1.306	1.306	100.00	0.870	0.000
						B	0.000	1.306		100.00	1.187	0.000
						C	0.000	1.306		100.00	0.419	0.000
L39 58.25-53.25	55.75	0.836	5	1.3436	26.120	A	0.000	26.120	26.120	100.00	13.548	0.000
						B	0.000	26.120		100.00	19.895	0.000
						C	0.000	26.120		100.00	4.548	0.000
L40 53.25-48.25	50.75	0.814	5	1.3311	26.109	A	0.000	26.109	26.109	100.00	15.955	0.000
						B	0.000	26.109		100.00	22.301	0.000
						C	0.000	26.109		100.00	6.961	0.000
L41 48.25-48.00	48.13	0.802	5	1.3240	1.305	A	0.000	1.305	1.305	100.00	0.948	0.000
						B	0.000	1.305		100.00	1.266	0.000
						C	0.000	1.305		100.00	0.499	0.000
L42 48.00-43.00	45.50	0.789	5	1.3166	26.097	A	0.000	26.097	26.097	100.00	18.940	0.000
						B	0.000	26.097		100.00	25.287	0.000
						C	0.000	26.097		100.00	9.954	0.000
L43 43.00-40.00	41.50	0.769	4	1.3046	15.652	A	0.000	15.652	15.652	100.00	11.339	0.000
						B	0.000	15.652		100.00	15.147	0.000
						C	0.000	15.652		100.00	5.951	0.000
L44 40.00-35.00	37.50	0.747	4	1.2914	26.076	A	0.000	26.076	26.076	100.00	20.247	0.000
						B	0.000	26.076		100.00	26.594	0.000
						C	0.000	26.076		100.00	11.274	0.000
L45 35.00-32.08	33.54	0.723	4	1.2771	15.222	A	0.000	15.222	15.222	100.00	15.863	0.000
						B	0.000	15.222		100.00	19.569	0.000
						C	0.000	15.222		100.00	10.626	0.000
L46 32.08-31.83	31.96	0.713	4	1.2709	1.303	A	0.000	1.303	1.303	100.00	1.357	0.000
						B	0.000	1.303		100.00	1.674	0.000
						C	0.000	1.303		100.00	0.909	0.000
L47 31.83-28.75	30.29	0.703	4	1.2641	16.049	A	0.000	16.049	16.049	100.00	16.696	0.000
						B	0.000	16.049		100.00	20.606	0.000
						C	0.000	16.049		100.00	11.177	0.000
L48 28.75-28.50	28.63	0.7	4	1.2570	1.302	A	0.000	1.302	1.302	100.00	1.354	0.000
						B	0.000	1.302		100.00	1.671	0.000
						C	0.000	1.302		100.00	0.906	0.000
L49 28.50-23.50	26.00	0.7	4	1.2450	26.037	A	0.000	26.037	26.037	100.00	23.687	0.000
						B	0.000	26.037		100.00	30.034	0.000
						C	0.000	26.037		100.00	14.737	0.000
L50 23.50-18.50	21.00	0.7	4	1.2187	26.016	A	0.000	26.016	26.016	100.00	20.264	0.000
						B	0.000	26.016		100.00	26.611	0.000
						C	0.000	26.016		100.00	11.327	0.000
L51 18.50-13.50	16.00	0.7	4	1.1860	25.988	A	0.000	25.988	25.988	100.00	20.150	0.000
						B	0.000	25.988		100.00	26.497	0.000
						C	0.000	25.988		100.00	11.229	0.000
L52 13.50-8.50	11.00	0.7	4	1.1423	25.952	A	0.000	25.952	25.952	100.00	14.111	0.000
						B	0.000	25.952		100.00	26.344	0.000
						C	0.000	25.952		100.00	10.236	0.000
L53 8.50-3.50	6.00	0.7	4	1.0752	25.896	A	0.000	25.896	25.896	100.00	8.158	0.000
						B	0.000	25.896		100.00	11.646	0.000
						C	0.000	25.896		100.00	8.158	0.000

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L54 3.50-0.00	1.75	0.7	4	0.9505	18.054	A	0.000	18.054	18.054	100.00	4.285	0.000
						B	0.000	18.054		100.00	4.285	0.000
						C	0.000	18.054		100.00	4.285	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 190.00-185.00	187.50	1.183	9	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	1.386	0.000
					C	0.000	12.500		100.00	0.588	0.000
L2 185.00-180.00	182.50	1.174	9	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	2.310	0.000
					C	0.000	12.500		100.00	0.588	0.000
L3 180.00-175.00	177.50	1.164	9	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	2.310	0.000
					C	0.000	15.000		100.00	0.588	0.000
L4 175.00-170.00	172.50	1.155	9	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	2.310	0.000
					C	0.000	15.000		100.00	0.588	0.000
L5 170.00-165.00	167.50	1.145	9	15.000	A	0.000	15.000	15.000	100.00	0.000	0.000
					B	0.000	15.000		100.00	12.210	0.000
					C	0.000	15.000		100.00	0.588	0.000
L6 165.00-160.00	162.50	1.135	9	15.000	A	0.000	15.000	15.000	100.00	2.853	0.000
					B	0.000	15.000		100.00	12.210	0.000
					C	0.000	15.000		100.00	0.588	0.000
L7 160.00-155.00	157.50	1.125	9	17.500	A	0.000	17.500	17.500	100.00	7.132	0.000
					B	0.000	17.500		100.00	12.210	0.000
					C	0.000	17.500		100.00	0.588	0.000
L8 155.00-150.00	152.50	1.115	9	17.500	A	0.000	17.500	17.500	100.00	7.132	0.000
					B	0.000	17.500		100.00	12.210	0.000
					C	0.000	17.500		100.00	0.588	0.000
L9 150.00-145.00	147.50	1.104	9	17.500	A	0.000	17.500	17.500	100.00	7.132	0.000
					B	0.000	17.500		100.00	12.210	0.000
					C	0.000	17.500		100.00	0.588	0.000
L10 145.00-140.00	142.50	1.093	8	17.500	A	0.000	17.500	17.500	100.00	7.132	0.000
					B	0.000	17.500		100.00	12.210	0.000
					C	0.000	17.500		100.00	0.588	0.000
L11 140.00-135.00	137.50	1.082	8	20.000	A	0.000	20.000	20.000	100.00	7.132	0.000
					B	0.000	20.000		100.00	12.210	0.000
					C	0.000	20.000		100.00	0.588	0.000
L12 135.00-130.00	132.50	1.071	8	20.000	A	0.000	20.000	20.000	100.00	7.132	0.000
					B	0.000	20.000		100.00	12.210	0.000
					C	0.000	20.000		100.00	0.588	0.000
L13 130.00-125.00	127.50	1.059	8	20.000	A	0.000	20.000	20.000	100.00	7.132	0.000
					B	0.000	20.000		100.00	12.210	0.000
					C	0.000	20.000		100.00	0.588	0.000
L14 125.00-120.00	122.50	1.047	8	20.000	A	0.000	20.000	20.000	100.00	7.132	0.000
					B	0.000	20.000		100.00	12.210	0.000
					C	0.000	20.000		100.00	0.588	0.000
L15 120.00-115.00	117.50	1.035	8	22.500	A	0.000	22.500	22.500	100.00	7.132	0.000
					B	0.000	22.500		100.00	12.210	0.000
					C	0.000	22.500		100.00	0.588	0.000
L16 115.00-112.67	113.83	1.025	8	10.503	A	0.000	10.503	10.503	100.00	5.329	0.000
					B	0.000	10.503		100.00	7.700	0.000
					C	0.000	10.503		100.00	2.274	0.000
L17 112.67-112.42	112.54	1.022	8	1.125	A	0.000	1.125	1.125	100.00	0.607	0.000
					B	0.000	1.125		100.00	0.861	0.000
					C	0.000	1.125		100.00	0.279	0.000

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L18 112.42-107.42	109.92	1.015	8	22.500	A	0.000	22.500	22.500	100.00	12.133	0.000
					B	0.000	22.500		100.00	17.210	0.000
					C	0.000	22.500		100.00	5.588	0.000
L19 107.42-103.33	105.37	1.003	8	18.374	A	0.000	18.374	18.374	100.00	11.907	0.000
					B	0.000	18.374		100.00	16.054	0.000
					C	0.000	18.374		100.00	6.563	0.000
L20 103.33-103.08	103.21	0.997	8	1.125	A	0.000	1.125	1.125	100.00	0.857	0.000
					B	0.000	1.125		100.00	1.111	0.000
					C	0.000	1.125		100.00	0.529	0.000
L21 103.08-100.00	101.54	0.993	8	13.874	A	0.000	13.874	13.874	100.00	9.231	0.000
					B	0.000	13.874		100.00	12.362	0.000
					C	0.000	13.874		100.00	5.195	0.000
L22 100.00-95.00	97.50	0.981	8	25.000	A	0.000	25.000	25.000	100.00	12.133	0.000
					B	0.000	25.000		100.00	17.210	0.000
					C	0.000	25.000		100.00	5.588	0.000
L23 95.00-90.00	92.50	0.966	7	25.000	A	0.000	25.000	25.000	100.00	12.883	0.000
					B	0.000	25.000		100.00	17.960	0.000
					C	0.000	25.000		100.00	6.338	0.000
L24 90.00-89.50	89.75	0.958	7	2.500	A	0.000	2.500	2.500	100.00	1.588	0.000
					B	0.000	2.500		100.00	2.096	0.000
					C	0.000	2.500		100.00	0.934	0.000
L25 89.50-89.25	89.38	0.957	7	1.250	A	0.000	1.250	1.250	100.00	0.794	0.000
					B	0.000	1.250		100.00	1.048	0.000
					C	0.000	1.250		100.00	0.467	0.000
L26 89.25-85.50	87.38	0.951	7	18.750	A	0.000	18.750	18.750	100.00	13.037	0.000
					B	0.000	18.750		100.00	16.845	0.000
					C	0.000	18.750		100.00	8.128	0.000
L27 85.50-85.25	85.38	0.945	7	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L28 85.25-84.00	84.63	0.942	7	6.250	A	0.000	6.250	6.250	100.00	4.908	0.000
					B	0.000	6.250		100.00	6.178	0.000
					C	0.000	6.250		100.00	3.272	0.000
L29 84.00-83.75	83.88	0.94	7	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L30 83.75-82.50	83.13	0.937	7	6.250	A	0.000	6.250	6.250	100.00	4.908	0.000
					B	0.000	6.250		100.00	6.178	0.000
					C	0.000	6.250		100.00	3.272	0.000
L31 82.50-82.25	82.38	0.935	7	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L32 82.25-80.00	81.13	0.931	7	11.250	A	0.000	11.250	11.250	100.00	6.085	0.000
					B	0.000	11.250		100.00	8.370	0.000
					C	0.000	11.250		100.00	3.139	0.000
L33 80.00-75.00	77.50	0.919	7	25.000	A	0.000	25.000	25.000	100.00	10.883	0.000
					B	0.000	25.000		100.00	15.960	0.000
					C	0.000	25.000		100.00	4.338	0.000
L34 75.00-70.00	72.50	0.901	7	25.000	A	0.000	25.000	25.000	100.00	10.883	0.000
					B	0.000	25.000		100.00	15.960	0.000
					C	0.000	25.000		100.00	4.338	0.000
L35 70.00-65.00	67.50	0.883	7	25.000	A	0.000	25.000	25.000	100.00	10.883	0.000
					B	0.000	25.000		100.00	15.960	0.000
					C	0.000	25.000		100.00	4.338	0.000
L36 65.00-60.00	62.50	0.864	7	25.000	A	0.000	25.000	25.000	100.00	10.883	0.000
					B	0.000	25.000		100.00	15.960	0.000
					C	0.000	25.000		100.00	4.338	0.000
L37 60.00-58.50	59.25	0.851	7	7.500	A	0.000	7.500	7.500	100.00	3.265	0.000
					B	0.000	7.500		100.00	4.788	0.000
					C	0.000	7.500		100.00	1.301	0.000
L38 58.50-58.25	58.38	0.847	7	1.250	A	0.000	1.250	1.250	100.00	0.544	0.000
					B	0.000	1.250		100.00	0.798	0.000
					C	0.000	1.250		100.00	0.217	0.000
L39 58.25-53.25	55.75	0.836	6	25.000	A	0.000	25.000	25.000	100.00	8.070	0.000
					B	0.000	25.000		100.00	13.148	0.000
					C	0.000	25.000		100.00	1.525	0.000
L40 53.25-48.25	50.75	0.814	6	25.000	A	0.000	25.000	25.000	100.00	10.112	0.000
					B	0.000	25.000		100.00	15.189	0.000

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	25.000		100.00	3.567	0.000
L41 48.25-48.00	48.13	0.802	6	1.250	A	0.000	1.250	1.250	100.00	0.627	0.000
					B	0.000	1.250		100.00	0.881	0.000
					C	0.000	1.250		100.00	0.300	0.000
L42 48.00-43.00	45.50	0.789	6	25.000	A	0.000	25.000	25.000	100.00	12.549	0.000
					B	0.000	25.000		100.00	17.627	0.000
					C	0.000	25.000		100.00	6.004	0.000
L43 43.00-40.00	41.50	0.769	6	15.000	A	0.000	15.000	15.000	100.00	7.530	0.000
					B	0.000	15.000		100.00	10.576	0.000
					C	0.000	15.000		100.00	3.603	0.000
L44 40.00-35.00	37.50	0.747	6	25.000	A	0.000	25.000	25.000	100.00	13.729	0.000
					B	0.000	25.000		100.00	18.807	0.000
					C	0.000	25.000		100.00	7.184	0.000
L45 35.00-32.08	33.54	0.723	6	14.600	A	0.000	14.600	14.600	100.00	11.465	0.000
					B	0.000	14.600		100.00	14.431	0.000
					C	0.000	14.600		100.00	7.643	0.000
L46 32.08-31.83	31.96	0.713	6	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L47 31.83-28.75	30.29	0.703	5	15.400	A	0.000	15.400	15.400	100.00	12.094	0.000
					B	0.000	15.400		100.00	15.221	0.000
					C	0.000	15.400		100.00	8.062	0.000
L48 28.75-28.50	28.63	0.7	5	1.250	A	0.000	1.250	1.250	100.00	0.982	0.000
					B	0.000	1.250		100.00	1.236	0.000
					C	0.000	1.250		100.00	0.654	0.000
L49 28.50-23.50	26.00	0.7	5	25.000	A	0.000	25.000	25.000	100.00	16.924	0.000
					B	0.000	25.000		100.00	22.002	0.000
					C	0.000	25.000		100.00	10.379	0.000
L50 23.50-18.50	21.00	0.7	5	25.000	A	0.000	25.000	25.000	100.00	14.216	0.000
					B	0.000	25.000		100.00	19.293	0.000
					C	0.000	25.000		100.00	7.671	0.000
L51 18.50-13.50	16.00	0.7	5	25.000	A	0.000	25.000	25.000	100.00	14.216	0.000
					B	0.000	25.000		100.00	19.293	0.000
					C	0.000	25.000		100.00	7.671	0.000
L52 13.50-8.50	11.00	0.7	5	25.000	A	0.000	25.000	25.000	100.00	10.650	0.000
					B	0.000	25.000		100.00	19.293	0.000
					C	0.000	25.000		100.00	7.495	0.000
L53 8.50-3.50	6.00	0.7	5	25.000	A	0.000	25.000	25.000	100.00	7.083	0.000
					B	0.000	25.000		100.00	9.228	0.000
					C	0.000	25.000		100.00	7.083	0.000
L54 3.50-0.00	1.75	0.7	5	17.500	A	0.000	17.500	17.500	100.00	3.778	0.000
					B	0.000	17.500		100.00	3.778	0.000
					C	0.000	17.500		100.00	3.778	0.000

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
17	0.9 Dead+1.0 Wind 210 deg - No Ice

Comb. No.	Description
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+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
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
L1	190 - 185	Pole	Max Tension	48	0.00	-0.00	0.00
			Max. Compression	26	-6.60	0.32	0.39
			Max. Mx	20	-3.44	10.85	0.03
			Max. My	14	-3.44	0.07	-10.79
			Max. Vy	8	2.82	-10.73	0.00
			Max. Vx	14	2.82	0.07	-10.79
			Max. Torque	18			-0.51
L2	185 - 180	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-9.18	-0.23	0.05
			Max. Mx	8	-4.73	-31.43	-0.16
			Max. My	14	-4.73	-0.16	-31.49
			Max. Vy	8	3.98	-31.43	-0.16
			Max. Vx	14	4.00	-0.16	-31.49
			Max. Torque	18			-0.51
L3	180 - 175	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-14.51	-0.69	-1.81
			Max. Mx	8	-7.77	-61.13	-0.59
			Max. My	14	-7.77	-0.23	-61.67
			Max. Vy	8	6.18	-61.13	-0.59
			Max. Vx	14	6.20	-0.23	-61.67
			Max. Torque	6			-1.25
L4	175 - 170	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-15.88	-0.79	-1.89
			Max. Mx	8	-8.69	-93.08	-0.61
			Max. My	14	-8.69	-0.22	-93.74
			Max. Vy	8	6.59	-93.08	-0.61
			Max. Vx	14	6.61	-0.22	-93.74
			Max. Torque	6			-1.25

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L5	170 - 165	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-25.10	-1.16	-1.81
			Max. Mx	8	-13.59	-147.10	-0.59
			Max. My	14	-13.59	-0.28	-147.76
			Max. Vy	8	10.99	-147.10	-0.59
			Max. Vx	14	11.00	-0.28	-147.76
			Max. Torque	6			-1.25
L6	165 - 160	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-36.20	-0.60	-1.92
			Max. Mx	8	-18.89	-214.85	-0.62
			Max. My	14	-18.89	-0.04	-215.85
			Max. Vy	8	15.99	-214.85	-0.62
			Max. Vx	14	16.00	-0.04	-215.85
			Max. Torque	20			1.38
L7	160 - 155	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-38.20	-0.64	-1.60
			Max. Mx	8	-20.10	-296.17	-0.53
			Max. My	14	-20.10	0.01	-296.93
			Max. Vy	8	16.54	-296.17	-0.53
			Max. Vx	14	16.46	0.01	-296.93
			Max. Torque	20			1.38
L8	155 - 150	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-40.20	-0.68	-1.29
			Max. Mx	8	-21.31	-380.22	-0.45
			Max. My	14	-21.32	0.07	-380.32
			Max. Vy	8	17.09	-380.22	-0.45
			Max. Vx	14	16.92	0.07	-380.32
			Max. Torque	20			1.38
L9	150 - 145	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-50.05	-0.22	-0.03
			Max. Mx	8	-25.92	-489.64	0.01
			Max. My	14	-25.95	0.08	-486.49
			Max. Vy	8	22.15	-489.64	0.01
			Max. Vx	14	21.55	0.08	-486.49
			Max. Torque	20			1.83
L10	145 - 140	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-52.08	-0.26	0.28
			Max. Mx	8	-27.19	-601.66	0.03
			Max. My	14	-27.22	0.07	-595.25
			Max. Vy	8	22.67	-601.66	0.03
			Max. Vx	14	21.98	0.07	-595.25
			Max. Torque	20			1.83
L11	140 - 135	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-54.32	-0.30	0.63
			Max. Mx	8	-28.60	-716.36	0.06
			Max. My	14	-28.63	0.06	-706.30
			Max. Vy	8	23.23	-716.36	0.06
			Max. Vx	14	22.47	0.06	-706.30
			Max. Torque	20			1.83
L12	135 - 130	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-56.54	-0.35	0.98
			Max. Mx	8	-30.01	-833.82	0.09
			Max. My	14	-30.04	0.05	-819.78
			Max. Vy	8	23.77	-833.82	0.09
			Max. Vx	14	22.95	0.05	-819.78
			Max. Torque	20			1.83
L13	130 - 125	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-58.77	-0.40	1.33
			Max. Mx	8	-31.43	-953.97	0.11
			Max. My	14	-31.46	0.04	-935.63
			Max. Vy	8	24.30	-953.97	0.11
			Max. Vx	14	23.42	0.04	-935.63
			Max. Torque	20			1.83
L14	125 - 120	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-61.40	0.09	1.44
			Max. Mx	8	-33.12	-1077.73	0.06
			Max. My	14	-33.15	0.33	-1055.12
			Max. Vy	8	24.98	-1077.73	0.06
			Max. Vx	14	24.02	0.33	-1055.12

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	20			1.97
L15	120 - 115	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-63.82	0.04	1.82
			Max. Mx	8	-34.69	-1203.96	0.13
			Max. My	14	-34.72	0.35	-1176.41
			Max. Vy	8	25.53	-1203.96	0.13
			Max. Vx	14	24.53	0.35	-1176.41
			Max. Torque	20			1.97
L16	115 - 112.666	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-65.01	0.02	2.00
			Max. Mx	8	-35.42	-1263.85	0.16
			Max. My	14	-35.45	0.37	-1233.89
			Max. Vy	8	25.80	-1263.85	0.16
			Max. Vx	14	24.77	0.37	-1233.89
			Max. Torque	20			1.97
L17	112.666 - 112.416	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-65.16	0.01	2.02
			Max. Mx	8	-35.52	-1270.30	0.16
			Max. My	14	-35.55	0.37	-1240.09
			Max. Vy	8	25.83	-1270.30	0.16
			Max. Vx	14	24.81	0.37	-1240.09
			Max. Torque	20			1.97
L18	112.416 - 107.416	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-68.51	-0.04	3.08
			Max. Mx	8	-37.72	-1401.73	0.57
			Max. My	14	-37.74	0.39	-1367.16
			Max. Vy	8	26.56	-1401.73	0.57
			Max. Vx	14	25.99	0.39	-1367.16
			Max. Torque	20			1.97
L19	107.416 - 103.333	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-70.98	-0.08	3.39
			Max. Mx	8	-39.30	-1511.12	0.62
			Max. My	14	-39.31	0.41	-1474.93
			Max. Vy	8	27.04	-1511.12	0.62
			Max. Vx	14	26.83	0.41	-1474.93
			Max. Torque	20			1.65
L20	103.333 - 103.083	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-71.13	-0.08	3.41
			Max. Mx	8	-39.40	-1517.88	0.63
			Max. My	14	-39.41	0.42	-1481.64
			Max. Vy	8	27.08	-1517.88	0.63
			Max. Vx	14	26.88	0.42	-1481.64
			Max. Torque	20			1.65
L21	103.083 - 100	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-73.00	-0.12	3.64
			Max. Mx	8	-40.59	-1601.91	0.67
			Max. My	14	-40.59	0.43	-1565.43
			Max. Vy	8	27.44	-1601.91	0.67
			Max. Vx	14	27.51	0.43	-1565.43
			Max. Torque	20			1.65
L22	100 - 95	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-76.29	0.17	3.87
			Max. Mx	8	-42.80	-1740.48	0.57
			Max. My	14	-42.80	0.68	-1704.60
			Max. Vy	8	28.07	-1740.48	0.57
			Max. Vx	14	28.09	0.68	-1704.60
			Max. Torque	20			1.71
L23	95 - 90	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-79.85	-0.50	3.93
			Max. Mx	8	-45.16	-1883.80	0.40
			Max. My	14	-45.14	0.32	-1848.99
			Max. Vy	8	28.81	-1883.80	0.40
			Max. Vx	14	29.30	0.32	-1848.99

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L24	90 - 89.5	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-80.17	-0.51	3.97
			Max. Mx	8	-45.37	-1898.21	0.40
			Max. My	14	-45.35	0.32	-1863.66
			Max. Vy	8	28.87	-1898.21	0.40
			Max. Vx	14	29.41	0.32	-1863.66
L25	89.5 - 89.25	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-80.35	-0.51	3.99
			Max. Mx	8	-45.48	-1905.43	0.40
			Max. My	14	-45.47	0.32	-1871.01
			Max. Vy	8	28.90	-1905.43	0.40
			Max. Vx	14	29.46	0.32	-1871.01
L26	89.25 - 85.5	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-83.04	-0.55	4.31
			Max. Mx	8	-47.24	-2015.23	0.41
			Max. My	14	-47.23	0.30	-1982.98
			Max. Vy	8	29.68	-2015.23	0.41
			Max. Vx	14	30.29	0.30	-1982.98
L27	85.5 - 85.25	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-83.23	-0.56	4.33
			Max. Mx	8	-47.38	-2022.65	0.42
			Max. My	14	-47.36	0.29	-1990.55
			Max. Vy	8	29.73	-2022.65	0.42
			Max. Vx	14	30.35	0.29	-1990.55
L28	85.25 - 84	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-84.22	-0.57	4.43
			Max. Mx	8	-48.03	-2059.97	0.42
			Max. My	14	-48.01	0.29	-2028.64
			Max. Vy	8	30.00	-2059.97	0.42
			Max. Vx	14	30.63	0.29	-2028.64
L29	84 - 83.75	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-84.39	-0.57	4.45
			Max. Mx	8	-48.15	-2067.47	0.42
			Max. My	14	-48.13	0.29	-2036.30
			Max. Vy	8	30.04	-2067.47	0.42
			Max. Vx	14	30.69	0.29	-2036.30
L30	83.75 - 82.5	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-85.28	-0.59	4.56
			Max. Mx	8	-48.71	-2105.18	0.42
			Max. My	14	-48.69	0.28	-2074.81
			Max. Vy	8	30.31	-2105.18	0.42
			Max. Vx	14	30.97	0.28	-2074.81
L31	82.5 - 82.25	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-85.45	-0.59	4.58
			Max. Mx	8	-48.81	-2112.76	0.43
			Max. My	14	-48.79	0.28	-2082.56
			Max. Vy	8	30.35	-2112.76	0.43
			Max. Vx	14	31.02	0.28	-2082.56
L32	82.25 - 80	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-86.84	-0.61	4.76
			Max. Mx	8	-49.71	-2181.31	0.43
			Max. My	14	-49.69	0.26	-2152.82
			Max. Vy	8	30.60	-2181.31	0.43
			Max. Vx	14	31.48	0.26	-2152.82
L33	80 - 75	Pole	Max. Torque	20			1.88
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-91.73	-0.21	4.74
			Max. Mx	8	-53.20	-2338.56	0.31
			Max. My	14	-53.18	0.62	-2314.75
			Max. Vy	8	31.71	-2338.56	0.31

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	14	32.52	0.62	-2314.75
			Max. Torque	20			2.01
L34	75 - 70	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-95.19	-0.27	5.15
			Max. Mx	8	-55.68	-2498.34	0.35
			Max. My	14	-55.67	0.61	-2478.43
			Max. Vy	8	32.23	-2498.34	0.35
			Max. Vx	14	32.99	0.61	-2478.43
			Max. Torque	20			2.01
L35	70 - 65	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-98.64	-0.32	5.56
			Max. Mx	8	-58.17	-2660.67	0.40
			Max. My	14	-58.15	0.61	-2644.41
			Max. Vy	8	32.73	-2660.67	0.40
			Max. Vx	14	33.44	0.61	-2644.41
			Max. Torque	20			2.01
L36	65 - 60	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-102.08	-0.38	5.97
			Max. Mx	8	-60.66	-2825.45	0.44
			Max. My	14	-60.64	0.61	-2812.59
			Max. Vy	8	33.21	-2825.45	0.44
			Max. Vx	14	33.87	0.61	-2812.59
			Max. Torque	20			2.01
L37	60 - 58.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-105.10	-0.39	6.09
			Max. Mx	8	-63.01	-2876.09	0.46
			Max. My	14	-62.99	0.61	-2864.21
			Max. Vy	8	33.85	-2876.09	0.46
			Max. Vx	14	34.50	0.61	-2864.21
			Max. Torque	20			2.01
L38	58.5 - 58.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-105.29	-0.40	6.11
			Max. Mx	8	-63.15	-2884.55	0.46
			Max. My	14	-63.13	0.61	-2872.83
			Max. Vy	8	33.87	-2884.55	0.46
			Max. Vx	14	34.52	0.61	-2872.83
			Max. Torque	20			2.01
L39	58.25 - 53.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-108.82	-0.45	6.52
			Max. Mx	8	-65.83	-3054.92	0.51
			Max. My	14	-65.82	0.60	-3046.33
			Max. Vy	8	34.31	-3054.92	0.51
			Max. Vx	14	34.93	0.60	-3046.33
			Max. Torque	20			2.01
L40	53.25 - 48.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-112.39	-0.50	6.92
			Max. Mx	8	-68.52	-3227.42	0.55
			Max. My	14	-68.51	0.60	-3221.79
			Max. Vy	8	34.72	-3227.42	0.55
			Max. Vx	14	35.31	0.60	-3221.79
			Max. Torque	20			2.01
L41	48.25 - 48	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-112.60	-0.51	6.94
			Max. Mx	8	-68.69	-3236.10	0.55
			Max. My	14	-68.68	0.60	-3230.62
			Max. Vy	8	34.74	-3236.10	0.55
			Max. Vx	14	35.34	0.60	-3230.62
			Max. Torque	20			2.01
L42	48 - 43	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-116.74	-0.56	7.34
			Max. Mx	8	-71.87	-3410.83	0.60
			Max. My	14	-71.85	0.59	-3409.26
			Max. Vy	8	35.17	-3410.83	0.60
			Max. Vx	14	36.16	0.59	-3409.26
			Max. Torque	20			2.01
L43	43 - 40	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-119.21	-0.59	7.58

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	8	-73.78	-3516.67	0.63
			Max. My	14	-73.76	0.59	-3518.37
			Max. Vy	8	35.42	-3516.67	0.63
			Max. Vx	14	36.62	0.59	-3518.37
			Max. Torque	20			2.01
L44	40 - 35	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-126.16	-0.64	7.97
			Max. Mx	8	-79.10	-3698.57	0.67
			Max. My	14	-79.08	0.59	-3707.20
			Max. Vy	8	36.59	-3698.57	0.67
			Max. Vx	14	38.17	0.59	-3707.20
			Max. Torque	20			2.01
L45	35 - 32.08	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-128.67	-0.67	8.20
			Max. Mx	8	-80.96	-3805.97	0.70
			Max. My	14	-80.94	0.59	-3819.23
			Max. Vy	8	37.01	-3805.97	0.70
			Max. Vx	14	38.62	0.59	-3819.23
			Max. Torque	20			2.01
L46	32.08 - 31.83	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-128.91	-0.67	8.22
			Max. Mx	8	-81.16	-3815.22	0.70
			Max. My	14	-81.14	0.59	-3828.88
			Max. Vy	8	37.03	-3815.22	0.70
			Max. Vx	14	38.65	0.59	-3828.88
			Max. Torque	20			2.01
L47	31.83 - 28.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-131.94	-0.70	8.46
			Max. Mx	8	-83.52	-3929.92	0.73
			Max. My	14	-83.50	0.58	-3948.59
			Max. Vy	8	37.47	-3929.92	0.73
			Max. Vx	14	39.13	0.58	-3948.59
			Max. Torque	20			2.01
L48	28.75 - 28.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-132.17	-0.70	8.48
			Max. Mx	8	-83.69	-3939.29	0.73
			Max. My	14	-83.67	0.58	-3958.37
			Max. Vy	8	37.50	-3939.29	0.73
			Max. Vx	14	39.16	0.58	-3958.37
			Max. Torque	20			2.01
L49	28.5 - 23.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-136.50	-0.75	8.86
			Max. Mx	8	-87.03	-4127.58	0.78
			Max. My	14	-87.02	0.58	-4155.83
			Max. Vy	8	37.84	-4127.58	0.78
			Max. Vx	14	39.87	0.58	-4155.83
			Max. Torque	20			2.01
L50	23.5 - 18.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-144.84	-0.79	9.24
			Max. Mx	8	-93.79	-4318.70	0.82
			Max. My	14	-93.78	0.57	-4357.92
			Max. Vy	8	38.96	-4318.70	0.82
			Max. Vx	14	41.34	0.57	-4357.92
			Max. Torque	20			2.01
L51	18.5 - 13.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-149.52	-0.84	9.61
			Max. Mx	8	-97.62	-4514.17	0.87
			Max. My	14	-97.60	0.57	-4566.14
			Max. Vy	8	39.26	-4514.17	0.87
			Max. Vx	14	42.00	0.57	-4566.14
			Max. Torque	20			2.01
L52	13.5 - 8.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-154.05	-1.10	9.90
			Max. Mx	8	-101.39	-4711.10	0.90
			Max. My	14	-101.38	0.47	-4777.63
			Max. Vy	8	39.51	-4711.10	0.90
			Max. Vx	14	42.64	0.47	-4777.63

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L53	8.5 - 3.5	Pole	Max. Torque	20			2.01
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-158.21	-1.20	9.96
			Max. Mx	8	-105.03	-4909.18	0.89
			Max. My	14	-105.03	0.41	-4992.32
			Max. Vy	8	39.74	-4909.18	0.89
			Max. Vx	14	43.27	0.41	-4992.32
			Max. Torque	20			2.01
L54	3.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-161.02	-1.20	9.96
			Max. Mx	8	-107.58	-5048.47	0.87
			Max. My	14	-107.57	0.39	-5144.43
			Max. Vy	8	39.89	-5048.47	0.87
			Max. Vx	14	43.69	0.39	-5144.43
			Max. Torque	20			2.01

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	161.02	0.00	0.00
	Max. H_x	20	107.58	39.83	0.00
	Max. H_z	2	107.58	0.00	37.88
	Max. M_x	2	4828.45	0.00	37.88
	Max. M_z	8	5048.47	-39.87	-0.01
	Max. Torsion	20	2.01	39.83	0.00
	Min. Vert	5	80.69	-19.11	32.79
	Min. H_x	8	107.58	-39.87	-0.01
	Min. H_z	14	107.58	-0.01	-43.67
	Min. M_x	14	-5144.43	-0.01	-43.67
	Min. M_z	20	-5042.10	39.83	0.00
	Min. Torsion	8	-1.97	-39.87	-0.01

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	89.65	0.00	0.00	-1.18	0.78	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	107.58	-0.00	-37.88	-4828.45	0.51	-0.17
0.9 Dead+1.0 Wind 0 deg - No Ice	80.69	-0.00	-37.88	-4788.96	0.27	-0.16
1.2 Dead+1.0 Wind 30 deg - No Ice	107.58	19.11	-32.79	-4179.08	-2439.01	0.91
0.9 Dead+1.0 Wind 30 deg - No Ice	80.69	19.11	-32.79	-4144.86	-2419.48	0.91
1.2 Dead+1.0 Wind 60 deg - No Ice	107.58	38.08	-21.80	-2568.44	-4494.61	1.69
0.9 Dead+1.0 Wind 60 deg - No Ice	80.69	38.08	-21.80	-2547.75	-4459.26	1.69
1.2 Dead+1.0 Wind 90 deg - No Ice	107.58	39.87	0.01	-0.87	-5048.47	1.97
0.9 Dead+1.0 Wind 90 deg - No Ice	80.69	39.87	0.01	-0.51	-5008.01	1.97
1.2 Dead+1.0 Wind 120 deg - No Ice	107.58	33.13	18.96	2416.27	-4230.81	1.86
0.9 Dead+1.0 Wind 120 deg - No Ice	80.69	33.13	18.96	2397.04	-4196.75	1.85
1.2 Dead+1.0 Wind 150 deg	107.58	19.13	32.86	4189.31	-2442.84	1.25

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
- No Ice						
0.9 Dead+1.0 Wind 150 deg - No Ice	80.69	19.13	32.86	4155.70	-2423.27	1.25
1.2 Dead+1.0 Wind 180 deg - No Ice	107.58	0.01	43.67	5144.43	0.39	0.30
0.9 Dead+1.0 Wind 180 deg - No Ice	80.69	0.01	43.67	5104.06	0.14	0.30
1.2 Dead+1.0 Wind 210 deg - No Ice	107.58	-19.09	32.82	4182.09	2437.57	-0.84
0.9 Dead+1.0 Wind 210 deg - No Ice	80.69	-19.09	32.82	4148.55	2417.57	-0.84
1.2 Dead+1.0 Wind 240 deg - No Ice	107.58	-33.07	18.94	2413.64	4221.70	-1.67
0.9 Dead+1.0 Wind 240 deg - No Ice	80.69	-33.07	18.94	2394.43	4187.24	-1.66
1.2 Dead+1.0 Wind 270 deg - No Ice	107.58	-39.83	-0.00	-0.99	5042.10	-2.01
0.9 Dead+1.0 Wind 270 deg - No Ice	80.69	-39.83	-0.00	-0.63	5001.22	-2.01
1.2 Dead+1.0 Wind 300 deg - No Ice	107.58	-38.08	-21.82	-2571.21	4497.17	-1.81
0.9 Dead+1.0 Wind 300 deg - No Ice	80.69	-38.08	-21.82	-2550.51	4461.31	-1.80
1.2 Dead+1.0 Wind 330 deg - No Ice	107.58	-19.12	-32.84	-4187.67	2441.53	-1.22
0.9 Dead+1.0 Wind 330 deg - No Ice	80.69	-19.12	-32.84	-4153.37	2421.51	-1.21
1.2 Dead+1.0 Ice+1.0 Temp	161.02	0.00	0.00	-9.96	-1.20	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	161.02	0.00	-11.48	-1481.67	-1.83	-0.14
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	161.02	5.77	-9.94	-1284.21	-741.71	0.21
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	161.02	10.06	-5.78	-748.36	-1287.30	0.50
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	161.02	11.54	-0.00	-10.88	-1482.51	0.64
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	161.02	9.99	5.74	725.57	-1284.09	0.63
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	161.02	5.77	9.95	1265.15	-741.50	0.46
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	161.02	-0.00	11.56	1466.97	-0.92	0.17
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	161.02	-5.76	9.94	1264.46	738.44	-0.20
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	161.02	-9.98	5.74	725.79	1279.56	-0.49
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	161.02	-11.53	0.00	-9.97	1478.12	-0.64
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	161.02	-10.06	-5.78	-748.18	1284.46	-0.62
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	161.02	-5.76	-9.94	-1285.21	738.25	-0.46
Dead+Wind 0 deg - Service	89.65	-0.00	-8.92	-1131.87	0.70	-0.04
Dead+Wind 30 deg - Service	89.65	4.50	-7.72	-979.76	-570.73	0.21
Dead+Wind 60 deg - Service	89.65	8.97	-5.13	-602.57	-1052.37	0.40
Dead+Wind 90 deg - Service	89.65	9.39	0.00	-1.07	-1182.01	0.46
Dead+Wind 120 deg - Service	89.65	7.80	4.46	565.12	-990.44	0.44
Dead+Wind 150 deg - Service	89.65	4.50	7.74	980.43	-571.63	0.29
Dead+Wind 180 deg - Service	89.65	0.00	10.28	1204.32	0.67	0.07
Dead+Wind 210 deg - Service	89.65	-4.49	7.73	978.74	571.55	-0.20
Dead+Wind 240 deg - Service	89.65	-7.79	4.46	564.50	989.46	-0.39
Dead+Wind 270 deg - Service	89.65	-9.38	-0.00	-1.09	1181.68	-0.47
Dead+Wind 300 deg -	89.65	-8.97	-5.14	-603.22	1054.13	-0.43

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
Service						
Dead+Wind 330 deg - Service	89.65	-4.50	-7.73	-981.77	572.48	-0.29

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-89.65	0.00	0.00	89.65	0.00	0.000%
2	-0.00	-107.58	-37.88	0.00	107.58	37.88	0.000%
3	-0.00	-80.69	-37.88	0.00	80.69	37.88	0.000%
4	19.11	-107.58	-32.79	-19.11	107.58	32.79	0.000%
5	19.11	-80.69	-32.79	-19.11	80.69	32.79	0.000%
6	38.08	-107.58	-21.80	-38.08	107.58	21.80	0.000%
7	38.08	-80.69	-21.80	-38.08	80.69	21.80	0.000%
8	39.87	-107.58	0.01	-39.87	107.58	-0.01	0.000%
9	39.87	-80.69	0.01	-39.87	80.69	-0.01	0.000%
10	33.13	-107.58	18.96	-33.13	107.58	-18.96	0.000%
11	33.13	-80.69	18.96	-33.13	80.69	-18.96	0.000%
12	19.13	-107.58	32.86	-19.13	107.58	-32.86	0.000%
13	19.13	-80.69	32.86	-19.13	80.69	-32.86	0.000%
14	0.01	-107.58	43.67	-0.01	107.58	-43.67	0.000%
15	0.01	-80.69	43.67	-0.01	80.69	-43.67	0.000%
16	-19.09	-107.58	32.82	19.09	107.58	-32.82	0.000%
17	-19.09	-80.69	32.82	19.09	80.69	-32.82	0.000%
18	-33.07	-107.58	18.94	33.07	107.58	-18.94	0.000%
19	-33.07	-80.69	18.94	33.07	80.69	-18.94	0.000%
20	-39.83	-107.58	-0.00	39.83	107.58	0.00	0.000%
21	-39.83	-80.69	-0.00	39.83	80.69	0.00	0.000%
22	-38.08	-107.58	-21.82	38.08	107.58	21.82	0.000%
23	-38.08	-80.69	-21.82	38.08	80.69	21.82	0.000%
24	-19.12	-107.58	-32.84	19.12	107.58	32.84	0.000%
25	-19.12	-80.69	-32.84	19.12	80.69	32.84	0.000%
26	0.00	-161.02	0.00	0.00	161.02	0.00	0.000%
27	0.00	-161.02	-11.48	-0.00	161.02	11.48	0.000%
28	5.77	-161.02	-9.94	-5.77	161.02	9.94	0.000%
29	10.06	-161.02	-5.78	-10.06	161.02	5.78	0.000%
30	11.54	-161.02	-0.00	-11.54	161.02	0.00	0.000%
31	9.99	-161.02	5.74	-9.99	161.02	-5.74	0.000%
32	5.77	-161.02	9.95	-5.77	161.02	-9.95	0.000%
33	-0.00	-161.02	11.56	0.00	161.02	-11.56	0.000%
34	-5.76	-161.02	9.94	5.76	161.02	-9.94	0.000%
35	-9.98	-161.02	5.74	9.98	161.02	-5.74	0.000%
36	-11.53	-161.02	0.00	11.53	161.02	-0.00	0.000%
37	-10.06	-161.02	-5.78	10.06	161.02	5.78	0.000%
38	-5.76	-161.02	-9.94	5.76	161.02	9.94	0.000%
39	-0.00	-89.65	-8.92	0.00	89.65	8.92	0.000%
40	4.50	-89.65	-7.72	-4.50	89.65	7.72	0.000%
41	8.97	-89.65	-5.13	-8.97	89.65	5.13	0.000%
42	9.39	-89.65	0.00	-9.39	89.65	-0.00	0.000%
43	7.80	-89.65	4.46	-7.80	89.65	-4.46	0.000%
44	4.50	-89.65	7.74	-4.50	89.65	-7.74	0.000%
45	0.00	-89.65	10.28	-0.00	89.65	-10.28	0.000%
46	-4.49	-89.65	7.73	4.49	89.65	-7.73	0.000%
47	-7.79	-89.65	4.46	7.79	89.65	-4.46	0.000%
48	-9.38	-89.65	-0.00	9.38	89.65	0.00	0.000%
49	-8.97	-89.65	-5.14	8.97	89.65	5.14	0.000%
50	-4.50	-89.65	-7.73	4.50	89.65	7.73	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	5	0.00000001	0.00011169
3	Yes	5	0.00000001	0.00004386
4	Yes	6	0.00000001	0.00006649
5	Yes	5	0.00000001	0.00086294
6	Yes	6	0.00000001	0.00006945
7	Yes	5	0.00000001	0.00089362
8	Yes	5	0.00000001	0.00017389
9	Yes	5	0.00000001	0.00008151
10	Yes	6	0.00000001	0.00006828
11	Yes	5	0.00000001	0.00088629
12	Yes	6	0.00000001	0.00006428
13	Yes	5	0.00000001	0.00083310
14	Yes	5	0.00000001	0.00011472
15	Yes	5	0.00000001	0.00004492
16	Yes	6	0.00000001	0.00006431
17	Yes	5	0.00000001	0.00083331
18	Yes	6	0.00000001	0.00006776
19	Yes	5	0.00000001	0.00087955
20	Yes	5	0.00000001	0.00017587
21	Yes	5	0.00000001	0.00008268
22	Yes	6	0.00000001	0.00006953
23	Yes	5	0.00000001	0.00089451
24	Yes	6	0.00000001	0.00006709
25	Yes	5	0.00000001	0.00087037
26	Yes	4	0.00000001	0.00000001
27	Yes	6	0.00000001	0.00019387
28	Yes	6	0.00000001	0.00020362
29	Yes	6	0.00000001	0.00020419
30	Yes	6	0.00000001	0.00019405
31	Yes	6	0.00000001	0.00020232
32	Yes	6	0.00000001	0.00020126
33	Yes	6	0.00000001	0.00019178
34	Yes	6	0.00000001	0.00020096
35	Yes	6	0.00000001	0.00020178
36	Yes	6	0.00000001	0.00019347
37	Yes	6	0.00000001	0.00020383
38	Yes	6	0.00000001	0.00020351
39	Yes	4	0.00000001	0.00052938
40	Yes	4	0.00000001	0.00099311
41	Yes	5	0.00000001	0.00003376
42	Yes	4	0.00000001	0.00057608
43	Yes	5	0.00000001	0.00003422
44	Yes	4	0.00000001	0.00095100
45	Yes	4	0.00000001	0.00054784
46	Yes	4	0.00000001	0.00095368
47	Yes	5	0.00000001	0.00003400
48	Yes	4	0.00000001	0.00057697
49	Yes	5	0.00000001	0.00003384
50	Yes	5	0.00000001	0.00003349

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190 - 185	13.410	49	0.5702	0.0011
L2	185 - 180	12.814	49	0.5699	0.0011
L3	180 - 175	12.218	49	0.5680	0.0012
L4	175 - 170	11.625	49	0.5656	0.0011
L5	170 - 165	11.035	49	0.5618	0.0010

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L6	165 - 160	10.450	49	0.5558	0.0010
L7	160 - 155	9.872	49	0.5471	0.0009
L8	155 - 150	9.303	49	0.5392	0.0008
L9	150 - 145	8.744	49	0.5287	0.0008
L10	145 - 140	8.197	49	0.5152	0.0007
L11	140 - 135	7.666	49	0.4983	0.0006
L12	135 - 130	7.151	49	0.4847	0.0006
L13	130 - 125	6.651	49	0.4688	0.0005
L14	125 - 120	6.170	49	0.4504	0.0005
L15	120 - 115	5.709	49	0.4294	0.0004
L16	115 - 112.666	5.268	49	0.4130	0.0004
L17	112.666 - 112.416	5.068	49	0.4047	0.0004
L18	112.416 - 107.416	5.047	49	0.4040	0.0004
L19	107.416 - 103.333	4.631	49	0.3892	0.0003
L20	103.333 - 103.083	4.304	49	0.3759	0.0003
L21	103.083 - 100	4.284	49	0.3751	0.0003
L22	100 - 95	4.046	49	0.3643	0.0003
L23	95 - 90	3.671	49	0.3504	0.0003
L24	90 - 89.5	3.312	49	0.3353	0.0003
L25	89.5 - 89.25	3.277	49	0.3337	0.0003
L26	89.25 - 85.5	3.260	49	0.3330	0.0003
L27	85.5 - 85.25	3.002	49	0.3225	0.0002
L28	85.25 - 84	2.986	49	0.3218	0.0002
L29	84 - 83.75	2.902	49	0.3186	0.0002
L30	83.75 - 82.5	2.885	49	0.3178	0.0002
L31	82.5 - 82.25	2.802	49	0.3138	0.0002
L32	82.25 - 80	2.786	49	0.3129	0.0002
L33	80 - 75	2.640	49	0.3044	0.0002
L34	75 - 70	2.330	49	0.2886	0.0002
L35	70 - 65	2.037	49	0.2716	0.0002
L36	65 - 60	1.762	49	0.2535	0.0002
L37	60 - 58.5	1.506	49	0.2342	0.0002
L38	58.5 - 58.25	1.433	49	0.2292	0.0002
L39	58.25 - 53.25	1.421	49	0.2282	0.0002
L40	53.25 - 48.25	1.192	49	0.2089	0.0001
L41	48.25 - 48	0.984	49	0.1884	0.0001
L42	48 - 43	0.974	49	0.1876	0.0001
L43	43 - 40	0.787	49	0.1700	0.0001
L44	40 - 35	0.684	49	0.1589	0.0001
L45	35 - 32.08	0.527	49	0.1398	0.0001
L46	32.08 - 31.83	0.445	49	0.1281	0.0001
L47	31.83 - 28.75	0.439	49	0.1273	0.0001
L48	28.75 - 28.5	0.360	49	0.1169	0.0001
L49	28.5 - 23.5	0.354	49	0.1159	0.0001
L50	23.5 - 18.5	0.243	49	0.0954	0.0001
L51	18.5 - 13.5	0.153	49	0.0768	0.0000
L52	13.5 - 8.5	0.083	49	0.0573	0.0000
L53	8.5 - 3.5	0.033	49	0.0369	0.0000
L54	3.5 - 0	0.006	49	0.0155	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
188.00	Platform Mount [LP 403-1]	49	13.172	0.5702	0.0011	266276
187.00	SP2-5.8	49	13.052	0.5702	0.0011	266276
185.00	Side Arm Mount [SO 102-3]	49	12.814	0.5699	0.0012	266276
184.00	Side Arm Mount [SO 701-1]	49	12.695	0.5696	0.0012	220602
179.00	Platform Mount [LP 403-1]	49	12.100	0.5675	0.0012	121577
170.00	Platform Mount [LP 405-1]	49	11.035	0.5618	0.0011	57910

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
162.00	Platform Mount [LP 403-1]	49	10.102	0.5506	0.0009	34327
150.00	Platform Mount [LP 403-1]	49	8.744	0.5287	0.0008	23783
125.00	Side Arm Mount [SO 901-1]	49	6.170	0.4504	0.0005	14370
110.00	Side Arm Mount [SO 901-1]	49	4.844	0.3971	0.0004	18433
100.00	Side Arm Mount [SO 901-1]	49	4.046	0.3643	0.0003	18166
95.00	Side Arm Mount [SO 901-1]	49	3.671	0.3504	0.0003	19481
80.00	Side Arm Mount [SO 901-1]	49	2.640	0.3044	0.0002	16910
60.00	Jump Plate 120" x 6.5" x 1.25"	49	1.506	0.2342	0.0002	15378
40.00	(2) Jump Plate 120" x 6" x 1"	49	0.684	0.1589	0.0001	15336
20.00	(2) Jump Plate 120" x 6.5" x 1.25"	49	0.178	0.0823	0.0000	15057

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190 - 185	57.275	22	2.4387	0.0047
L2	185 - 180	54.726	22	2.4372	0.0048
L3	180 - 175	52.181	22	2.4292	0.0049
L4	175 - 170	49.645	22	2.4194	0.0047
L5	170 - 165	47.122	22	2.4029	0.0044
L6	165 - 160	44.621	22	2.3773	0.0040
L7	160 - 155	42.153	22	2.3393	0.0037
L8	155 - 150	39.722	22	2.3051	0.0035
L9	150 - 145	37.332	22	2.2599	0.0032
L10	145 - 140	34.996	22	2.2017	0.0029
L11	140 - 135	32.728	22	2.1293	0.0026
L12	135 - 130	30.529	22	2.0710	0.0024
L13	130 - 125	28.396	22	2.0026	0.0022
L14	125 - 120	26.340	22	1.9238	0.0020
L15	120 - 115	24.372	22	1.8343	0.0018
L16	115 - 112.666	22.488	22	1.7641	0.0016
L17	112.666 - 112.416	21.634	22	1.7286	0.0016
L18	112.416 - 107.416	21.544	22	1.7256	0.0015
L19	107.416 - 103.333	19.770	22	1.6620	0.0014
L20	103.333 - 103.083	18.373	22	1.6054	0.0014
L21	103.083 - 100	18.289	22	1.6018	0.0014
L22	100 - 95	17.270	22	1.5559	0.0013
L23	95 - 90	15.671	22	1.4964	0.0012
L24	90 - 89.5	14.138	22	1.4317	0.0011
L25	89.5 - 89.25	13.989	22	1.4249	0.0011
L26	89.25 - 85.5	13.914	22	1.4220	0.0011
L27	85.5 - 85.25	12.815	22	1.3769	0.0011
L28	85.25 - 84	12.743	22	1.3742	0.0011
L29	84 - 83.75	12.385	22	1.3604	0.0010
L30	83.75 - 82.5	12.314	22	1.3571	0.0010
L31	82.5 - 82.25	11.961	22	1.3401	0.0010
L32	82.25 - 80	11.891	22	1.3361	0.0010
L33	80 - 75	11.270	22	1.2995	0.0010
L34	75 - 70	9.944	22	1.2320	0.0009
L35	70 - 65	8.692	22	1.1595	0.0008
L36	65 - 60	7.518	22	1.0821	0.0007
L37	60 - 58.5	6.428	22	0.9996	0.0007
L38	58.5 - 58.25	6.117	22	0.9783	0.0006
L39	58.25 - 53.25	6.066	22	0.9743	0.0006
L40	53.25 - 48.25	5.088	22	0.8917	0.0006
L41	48.25 - 48	4.200	22	0.8043	0.0005
L42	48 - 43	4.158	22	0.8007	0.0005
L43	43 - 40	3.359	22	0.7254	0.0004
L44	40 - 35	2.918	22	0.6783	0.0004

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L45	35 - 32.08	2.250	22	0.5965	0.0003
L46	32.08 - 31.83	1.900	22	0.5467	0.0003
L47	31.83 - 28.75	1.872	22	0.5432	0.0003
L48	28.75 - 28.5	1.535	22	0.4990	0.0003
L49	28.5 - 23.5	1.509	22	0.4948	0.0003
L50	23.5 - 18.5	1.037	22	0.4069	0.0002
L51	18.5 - 13.5	0.652	22	0.3275	0.0002
L52	13.5 - 8.5	0.352	22	0.2443	0.0001
L53	8.5 - 3.5	0.142	22	0.1572	0.0001
L54	3.5 - 0	0.024	22	0.0661	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
188.00	Platform Mount [LP 403-1]	22	56.255	2.4387	0.0048	62721
187.00	SP2-5.8	22	55.745	2.4385	0.0049	62721
185.00	Side Arm Mount [SO 102-3]	22	54.726	2.4372	0.0049	62721
184.00	Side Arm Mount [SO 701-1]	22	54.216	2.4360	0.0050	52175
179.00	Platform Mount [LP 403-1]	22	51.673	2.4274	0.0050	29302
170.00	Platform Mount [LP 405-1]	22	47.122	2.4029	0.0045	13834
162.00	Platform Mount [LP 403-1]	22	43.136	2.3547	0.0039	8130
150.00	Platform Mount [LP 403-1]	22	37.332	2.2599	0.0033	5584
125.00	Side Arm Mount [SO 901-1]	22	26.340	1.9238	0.0020	3364
110.00	Side Arm Mount [SO 901-1]	22	20.678	1.6958	0.0015	4313
100.00	Side Arm Mount [SO 901-1]	22	17.270	1.5559	0.0013	4249
95.00	Side Arm Mount [SO 901-1]	22	15.671	1.4964	0.0012	4557
80.00	Side Arm Mount [SO 901-1]	22	11.270	1.2995	0.0010	3955
60.00	Jump Plate 120" x 6.5" x 1.25"	22	6.428	0.9996	0.0007	3602
40.00	(2) Jump Plate 120" x 6" x 1"	22	2.918	0.6783	0.0004	3592
20.00	(2) Jump Plate 120" x 6.5" x 1.25"	22	0.759	0.3511	0.0002	3528

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	190 - 185 (1)	P30x0.375	5.00	0.00	0.0	34.9011	-3.44	1311.06	0.003
L2	185 - 180 (2)	P30x0.375	5.00	0.00	0.0	34.9011	-4.73	1311.06	0.004
L3	180 - 175 (3)	P36x0.375	5.00	0.00	0.0	41.9697	-7.77	1490.10	0.005
L4	175 - 170 (4)	P36x0.375	5.00	0.00	0.0	41.9697	-8.69	1490.10	0.006
L5	170 - 165 (5)	P36x0.375	5.00	0.00	0.0	41.9697	-13.59	1490.10	0.009
L6	165 - 160 (6)	P36x0.375	5.00	0.00	0.0	41.9697	-18.89	1490.10	0.013
L7	160 - 155 (7)	P42x0.375	5.00	0.00	0.0	49.0383	-20.10	1668.87	0.012
L8	155 - 150 (8)	P42x0.375	5.00	0.00	0.0	49.0383	-21.31	1668.87	0.013
L9	150 - 145 (9)	P42x0.375	5.00	0.00	0.0	49.038	-25.92	1668.87	0.016

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L10	145 - 140 (10)	P42x0.375	5.00	0.00	0.0	3 49.038	-27.19	1668.87	0.016
L11	140 - 135 (11)	P48x0.375	5.00	0.00	0.0	3 56.106	-28.60	1847.49	0.015
L12	135 - 130 (12)	P48x0.375	5.00	0.00	0.0	9 56.106	-30.01	1847.49	0.016
L13	130 - 125 (13)	P48x0.375	5.00	0.00	0.0	9 56.106	-31.43	1847.49	0.017
L14	125 - 120 (14)	P48x0.375	5.00	0.00	0.0	9 56.106	-33.12	1847.49	0.018
L15	120 - 115 (15)	P54x0.375	5.00	0.00	0.0	9 63.175	-34.69	2026.00	0.017
L16	115 - 112.666 (16)	P54x0.375	2.33	0.00	0.0	5 63.175	-35.42	2026.00	0.017
L17	112.666 - 112.416 (17)	P54x0.4875	0.25	0.00	0.0	5 81.955	-35.52	2797.17	0.013
L18	112.416 - 107.416 (18)	P54x0.4875	5.00	0.00	0.0	8 81.955	-37.72	2797.17	0.013
L19	107.416 - 103.333 (19)	P54x0.4875	4.08	0.00	0.0	8 81.955	-39.30	2797.17	0.014
L20	103.333 - 103.083 (20)	P54x0.4875	0.25	0.00	0.0	8 81.955	-39.40	2797.17	0.014
L21	103.083 - 100 (21)	P54x0.4875	3.08	0.00	0.0	8 81.955	-40.59	2797.17	0.015
L22	100 - 95 (22)	P60x0.475	5.00	0.00	0.0	8 88.826	-42.80	2934.04	0.015
L23	95 - 90 (23)	P60x0.475	5.00	0.00	0.0	6 88.826	-45.16	2934.04	0.015
L24	90 - 89.5 (24)	P60x0.475	0.50	0.00	0.0	6 88.826	-45.37	2934.04	0.015
L25	89.5 - 89.25 (25)	P60x0.55625	0.25	0.00	0.0	6 103.87	-45.48	3570.37	0.013
L26	89.25 - 85.5 (26)	P60x0.55625	3.75	0.00	0.0	90 103.87	-47.24	3570.37	0.013
L27	85.5 - 85.25 (27)	P60x0.6375	0.25	0.00	0.0	90 118.88	-47.38	4245.55	0.011
L28	85.25 - 84 (28)	P60x0.6375	1.25	0.00	0.0	90 118.88	-48.03	4245.55	0.011
L29	84 - 83.75 (29)	P60x0.525	0.25	0.00	0.0	90 98.094	-48.15	3321.02	0.014
L30	83.75 - 82.5 (30)	P60x0.525	1.25	0.00	0.0	3 98.094	-48.71	3321.02	0.015
L31	82.5 - 82.25 (31)	P60x0.45	0.25	0.00	0.0	3 84.186	-48.81	2746.08	0.018
L32	82.25 - 80 (32)	P60x0.45	2.25	0.00	0.0	8 84.186	-49.71	2746.08	0.018
L33	80 - 75 (33)	P60x0.575	5.00	0.00	0.0	8 107.34	-53.20	3722.74	0.014
L34	75 - 70 (34)	P60x0.575	5.00	0.00	0.0	60 107.34	-55.68	3722.74	0.015
L35	70 - 65 (35)	P60x0.575	5.00	0.00	0.0	60 107.34	-58.14	3722.74	0.016
L36	65 - 60 (36)	P60x0.575	5.00	0.00	0.0	60 107.34	-60.63	3722.74	0.016
L37	60 - 58.5 (37)	P60x0.7	1.50	0.00	0.0	60 130.40	-62.99	4791.24	0.013
L38	58.5 - 58.25 (38)	P60x0.625	0.25	0.00	0.0	80 116.58	-63.12	4139.15	0.015
L39	58.25 - 53.25 (39)	P60x0.625	5.00	0.00	0.0	30 116.58	-65.81	4139.15	0.016
L40	53.25 - 48.25 (40)	P60x0.625	5.00	0.00	0.0	30 116.58	-68.51	4139.15	0.017
L41	48.25 - 48 (41)	P60x0.775	0.25	0.00	0.0	30 144.19	-68.67	5450.65	0.013
L42	48 - 43 (42)	P60x0.775	5.00	0.00	0.0	70 144.19	-71.85	5450.65	0.013
L43	43 - 40 (43)	P60x0.775	3.00	0.00	0.0	70 144.19	-73.76	5450.65	0.014
						70			

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L44	40 - 35 (44)	P60x0.775	5.00	0.00	0.0	144.1970	-79.07	5450.65	0.015
L45	35 - 32.08 (45)	P60x0.775	2.92	0.00	0.0	144.1970	-80.93	5450.65	0.015
L46	32.08 - 31.83 (46)	P60x0.9625	0.25	0.00	0.0	178.5170	-81.13	6747.93	0.012
L47	31.83 - 28.75 (47)	P60x0.9625	3.08	0.00	0.0	178.5170	-83.49	6747.93	0.012
L48	28.75 - 28.5 (48)	P60x0.8125	0.25	0.00	0.0	151.0790	-83.66	5710.78	0.015
L49	28.5 - 23.5 (49)	P60x0.8125	5.00	0.00	0.0	151.0790	-87.01	5710.78	0.015
L50	23.5 - 18.5 (50)	P60x0.95	5.00	0.00	0.0	176.2350	-93.77	6661.70	0.014
L51	18.5 - 13.5 (51)	P60x0.95	5.00	0.00	0.0	176.2350	-97.60	6661.70	0.015
L52	13.5 - 8.5 (52)	P60x0.95	5.00	0.00	0.0	176.2350	-101.38	6661.70	0.015
L53	8.5 - 3.5 (53)	P60x0.95	5.00	0.00	0.0	176.2350	-105.03	6661.70	0.016
L54	3.5 - 0 (54)	P60x0.95	3.50	0.00	0.0	176.2350	-107.58	6661.70	0.016

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	190 - 185 (1)	P30x0.375	10.91	947.86	0.012	0.00	947.86	0.000
L2	185 - 180 (2)	P30x0.375	31.52	947.86	0.033	0.00	947.86	0.000
L3	180 - 175 (3)	P36x0.375	61.67	1338.81	0.046	0.00	1338.81	0.000
L4	175 - 170 (4)	P36x0.375	93.75	1338.81	0.070	0.00	1338.81	0.000
L5	170 - 165 (5)	P36x0.375	147.76	1338.81	0.110	0.00	1338.81	0.000
L6	165 - 160 (6)	P36x0.375	215.85	1338.81	0.161	0.00	1338.81	0.000
L7	160 - 155 (7)	P42x0.375	296.93	1796.56	0.165	0.00	1796.56	0.000
L8	155 - 150 (8)	P42x0.375	380.22	1796.56	0.212	0.00	1796.56	0.000
L9	150 - 145 (9)	P42x0.375	489.64	1796.56	0.273	0.00	1796.56	0.000
L10	145 - 140 (10)	P42x0.375	601.66	1796.56	0.335	0.00	1796.56	0.000
L11	140 - 135 (11)	P48x0.375	716.36	2321.11	0.309	0.00	2321.11	0.000
L12	135 - 130 (12)	P48x0.375	833.83	2321.11	0.359	0.00	2321.11	0.000
L13	130 - 125 (13)	P48x0.375	953.97	2321.11	0.411	0.00	2321.11	0.000
L14	125 - 120 (14)	P48x0.375	1077.73	2321.11	0.464	0.00	2321.11	0.000
L15	120 - 115 (15)	P54x0.375	1203.97	2912.46	0.413	0.00	2912.46	0.000
L16	115 - 112.666 (16)	P54x0.375	1263.85	2912.46	0.434	0.00	2912.46	0.000
L17	112.666 - 112.416 (17)	P54x0.4875	1270.31	3864.47	0.329	0.00	3864.47	0.000
L18	112.416 - 107.416 (18)	P54x0.4875	1401.73	3864.47	0.363	0.00	3864.47	0.000
L19	107.416 - 103.333 (19)	P54x0.4875	1511.12	3864.47	0.391	0.00	3864.47	0.000
L20	103.333 - 103.083 (20)	P54x0.4875	1517.88	3864.47	0.393	0.00	3864.47	0.000
L21	103.083 - 100 (21)	P54x0.4875	1601.91	3864.47	0.415	0.00	3864.47	0.000
L22	100 - 95 (22)	P60x0.475	1740.48	4598.57	0.378	0.00	4598.57	0.000
L23	95 - 90 (23)	P60x0.475	1883.80	4598.57	0.410	0.00	4598.57	0.000
L24	90 - 89.5 (24)	P60x0.475	1898.22	4598.57	0.413	0.00	4598.57	0.000
L25	89.5 - 89.25 (25)	P60x0.55625	1905.43	5456.53	0.349	0.00	5456.53	0.000
L26	89.25 - 85.5 (26)	P60x0.55625	2015.22	5456.53	0.369	0.00	5456.53	0.000
L27	85.5 - 85.25 (27)	P60x0.6375	2022.65	6334.56	0.319	0.00	6334.56	0.000
L28	85.25 - 84	P60x0.6375	2059.97	6334.56	0.325	0.00	6334.56	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L29	84 - 83.75 (28)	P60x0.525	2067.47	5124.16	0.403	0.00	5124.16	0.000
L30	83.75 - 82.5 (29)	P60x0.525	2105.18	5124.16	0.411	0.00	5124.16	0.000
L31	82.5 - 82.25 (30)	P60x0.45	2112.76	4338.67	0.487	0.00	4338.67	0.000
L32	82.25 - 80 (31)	P60x0.45	2181.31	4338.67	0.503	0.00	4338.67	0.000
L33	80 - 75 (32)	P60x0.575	2338.56	5657.38	0.413	0.00	5657.38	0.000
L34	75 - 70 (33)	P60x0.575	2498.34	5657.38	0.442	0.00	5657.38	0.000
L35	70 - 65 (34)	P60x0.575	2664.01	5657.38	0.471	0.00	5657.38	0.000
L36	65 - 60 (35)	P60x0.575	2833.47	5657.38	0.501	0.00	5657.38	0.000
L37	60 - 58.5 (36)	P60x0.7	2885.48	7023.43	0.411	0.00	7023.43	0.000
L38	58.5 - 58.25 (37)	P60x0.625	2894.17	6198.18	0.467	0.00	6198.18	0.000
L39	58.25 - 53.25 (38)	P60x0.625	3068.97	6198.18	0.495	0.00	6198.18	0.000
L40	53.25 - 48.25 (39)	P60x0.625	3245.72	6198.18	0.524	0.00	6198.18	0.000
L41	48.25 - 48 (40)	P60x0.775	3254.60	7865.35	0.414	0.00	7865.35	0.000
L42	48 - 43 (41)	P60x0.775	3434.53	7865.35	0.437	0.00	7865.35	0.000
L43	43 - 40 (42)	P60x0.775	3544.41	7865.35	0.451	0.00	7865.35	0.000
L44	40 - 35 (43)	P60x0.775	3734.53	7865.35	0.475	0.00	7865.35	0.000
L45	35 - 32.08 (44)	P60x0.775	3847.30	7865.35	0.489	0.00	7865.35	0.000
L46	32.08 - 31.83 (45)	P60x0.9625	3857.02	10041.58	0.384	0.00	10041.58	0.000
L47	31.83 - 28.75 (46)	P60x0.9625	3977.52	10041.58	0.396	0.00	10041.58	0.000
L48	28.75 - 28.5 (47)	P60x0.8125	3987.36	8292.48	0.481	0.00	8292.48	0.000
L49	28.5 - 23.5 (48)	P60x0.8125	4186.09	8292.48	0.505	0.00	8292.48	0.000
L50	23.5 - 18.5 (49)	P60x0.95	4389.46	9893.33	0.444	0.00	9893.33	0.000
L51	18.5 - 13.5 (50)	P60x0.95	4598.95	9893.33	0.465	0.00	9893.33	0.000
L52	13.5 - 8.5 (51)	P60x0.95	4811.60	9893.33	0.486	0.00	9893.33	0.000
L53	8.5 - 3.5 (52)	P60x0.95	5027.42	9893.33	0.508	0.00	9893.33	0.000
L54	3.5 - 0 (53)	P60x0.95	5180.32	9893.33	0.524	0.00	9893.33	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	190 - 185 (1)	P30x0.375	2.80	395.78	0.007	0.22	994.73	0.000
L2	185 - 180 (2)	P30x0.375	3.99	395.78	0.010	0.01	994.73	0.000
L3	180 - 175 (3)	P36x0.375	6.20	454.19	0.014	0.17	1094.28	0.000
L4	175 - 170 (4)	P36x0.375	6.61	454.19	0.015	0.17	1094.28	0.000
L5	170 - 165 (5)	P36x0.375	11.00	454.19	0.024	0.17	1094.28	0.000
L6	165 - 160 (6)	P36x0.375	16.00	454.19	0.035	0.29	1094.28	0.000
L7	160 - 155 (7)	P42x0.375	16.46	421.13	0.039	0.29	1185.51	0.000
L8	155 - 150 (8)	P42x0.375	17.09	421.13	0.041	1.34	1185.51	0.001
L9	150 - 145 (9)	P42x0.375	22.15	421.13	0.053	1.79	1185.51	0.002
L10	145 - 140 (10)	P42x0.375	22.67	421.13	0.054	1.79	1185.51	0.002
L11	140 - 135 (11)	P48x0.375	23.23	394.81	0.059	1.79	1270.83	0.001
L12	135 - 130 (12)	P48x0.375	23.77	394.81	0.060	1.79	1270.83	0.001
L13	130 - 125 (13)	P48x0.375	24.30	394.81	0.062	1.79	1270.83	0.001
L14	125 - 120 (14)	P48x0.375	24.98	394.81	0.063	1.93	1270.83	0.002
L15	120 - 115 (15)	P54x0.375	25.53	406.96	0.063	1.93	1474.98	0.001
L16	115 - 112.666 (16)	P54x0.375	25.80	406.96	0.063	1.93	1474.98	0.001

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L17	112.666 - 112.416 (17)	P54x0.4875	25.83	732.85	0.035	1.93	2650.55	0.001
L18	112.416 - 107.416 (18)	P54x0.4875	26.56	732.85	0.036	1.61	2650.55	0.001
L19	107.416 - 103.333 (19)	P54x0.4875	27.04	732.85	0.037	1.61	2650.55	0.001
L20	103.333 - 103.083 (20)	P54x0.4875	27.08	732.85	0.037	1.61	2650.55	0.001
L21	103.083 - 100 (21)	P54x0.4875	27.44	732.85	0.037	1.61	2650.55	0.001
L22	100 - 95 (22)	P60x0.475	28.07	710.49	0.040	1.67	2858.41	0.001
L23	95 - 90 (23)	P60x0.475	28.81	710.49	0.041	1.84	2858.41	0.001
L24	90 - 89.5 (24)	P60x0.475	28.87	710.49	0.041	1.84	2858.41	0.001
L25	89.5 - 89.25 (25)	P60x0.55625	28.90	1012.19	0.029	1.84	4066.63	0.000
L26	89.25 - 85.5 (26)	P60x0.55625	29.68	1012.19	0.029	1.84	4066.63	0.000
L27	85.5 - 85.25 (27)	P60x0.6375	29.73	1348.20	0.022	1.84	5511.49	0.000
L28	85.25 - 84 (28)	P60x0.6375	30.00	1348.20	0.022	1.84	5511.49	0.000
L29	84 - 83.75 (29)	P60x0.525	30.04	889.19	0.034	1.84	3574.31	0.001
L30	83.75 - 82.5 (30)	P60x0.525	30.31	889.19	0.034	1.84	3574.31	0.001
L31	82.5 - 82.25 (31)	P60x0.45	30.35	629.38	0.048	1.84	2533.13	0.001
L32	82.25 - 80 (32)	P60x0.45	30.60	629.38	0.049	1.84	2533.13	0.001
L33	80 - 75 (33)	P60x0.575	31.71	1090.24	0.029	1.97	4378.80	0.000
L34	75 - 70 (34)	P60x0.575	32.23	1090.24	0.030	1.97	4378.80	0.000
L35	70 - 65 (35)	P60x0.575	33.68	1090.24	0.031	1.81	4378.80	0.000
L36	65 - 60 (36)	P60x0.575	34.10	1090.24	0.031	1.81	4378.80	0.000
L37	60 - 58.5 (37)	P60x0.7	34.74	1478.82	0.023	1.81	6788.03	0.000
L38	58.5 - 58.25 (38)	P60x0.625	34.75	1314.11	0.026	1.81	5273.53	0.000
L39	58.25 - 53.25 (39)	P60x0.625	35.16	1314.11	0.027	1.81	5273.53	0.000
L40	53.25 - 48.25 (40)	P60x0.625	35.54	1314.11	0.027	1.81	5273.53	0.000
L41	48.25 - 48 (41)	P60x0.775	35.57	1635.20	0.022	1.81	8514.42	0.000
L42	48 - 43 (42)	P60x0.775	36.39	1635.20	0.022	1.81	8514.42	0.000
L43	43 - 40 (43)	P60x0.775	36.86	1635.20	0.023	1.81	8514.42	0.000
L44	40 - 35 (44)	P60x0.775	38.40	1635.20	0.023	1.81	8514.42	0.000
L45	35 - 32.08 (45)	P60x0.775	38.85	1635.20	0.024	1.81	8514.42	0.000
L46	32.08 - 31.83 (46)	P60x0.9625	38.88	2024.38	0.019	1.81	10507.50	0.000
L47	31.83 - 28.75 (47)	P60x0.9625	39.36	2024.38	0.019	1.81	10507.50	0.000
L48	28.75 - 28.5 (48)	P60x0.8125	39.39	1713.23	0.023	1.81	8915.08	0.000
L49	28.5 - 23.5 (49)	P60x0.8125	40.10	1713.23	0.023	1.81	8915.08	0.000
L50	23.5 - 18.5 (50)	P60x0.95	41.57	1998.51	0.021	1.81	10375.42	0.000
L51	18.5 - 13.5 (51)	P60x0.95	42.23	1998.51	0.021	1.81	10375.42	0.000
L52	13.5 - 8.5 (52)	P60x0.95	42.87	1998.51	0.021	1.81	10375.42	0.000
L53	8.5 - 3.5 (53)	P60x0.95	43.49	1998.51	0.022	1.81	10375.42	0.000
L54	3.5 - 0 (54)	P60x0.95	43.91	1998.51	0.022	1.81	10375.42	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	190 - 185 (1)	0.003	0.012	0.000	0.007	0.000	0.014	1.050	4.8.2
L2	185 - 180 (2)	0.004	0.033	0.000	0.010	0.000	0.037	1.050	4.8.2
L3	180 - 175 (3)	0.005	0.046	0.000	0.014	0.000	0.051	1.050	4.8.2
L4	175 - 170 (4)	0.006	0.070	0.000	0.015	0.000	0.076	1.050	4.8.2
L5	170 - 165 (5)	0.009	0.110	0.000	0.024	0.000	0.120	1.050	4.8.2
L6	165 - 160 (6)	0.013	0.161	0.000	0.035	0.000	0.175	1.050	4.8.2
L7	160 - 155 (7)	0.012	0.165	0.000	0.039	0.000	0.179	1.050	4.8.2
L8	155 - 150 (8)	0.013	0.212	0.000	0.041	0.001	0.226	1.050	4.8.2
L9	150 - 145 (9)	0.016	0.273	0.000	0.053	0.002	0.291	1.050	4.8.2
L10	145 - 140 (10)	0.016	0.335	0.000	0.054	0.002	0.354	1.050	4.8.2
L11	140 - 135 (11)	0.015	0.309	0.000	0.059	0.001	0.328	1.050	4.8.2
L12	135 - 130 (12)	0.016	0.359	0.000	0.060	0.001	0.379	1.050	4.8.2
L13	130 - 125 (13)	0.017	0.411	0.000	0.062	0.001	0.432	1.050	4.8.2
L14	125 - 120 (14)	0.018	0.464	0.000	0.063	0.002	0.486	1.050	4.8.2
L15	120 - 115 (15)	0.017	0.413	0.000	0.063	0.001	0.435	1.050	4.8.2
L16	115 - 112.666 (16)	0.017	0.434	0.000	0.063	0.001	0.456	1.050	4.8.2
L17	112.666 - 112.416 (17)	0.013	0.329	0.000	0.035	0.001	0.343	1.050	4.8.2
L18	112.416 - 107.416 (18)	0.013	0.363	0.000	0.036	0.001	0.378	1.050	4.8.2
L19	107.416 - 103.333 (19)	0.014	0.391	0.000	0.037	0.001	0.406	1.050	4.8.2
L20	103.333 - 103.083 (20)	0.014	0.393	0.000	0.037	0.001	0.408	1.050	4.8.2
L21	103.083 - 100 (21)	0.015	0.415	0.000	0.037	0.001	0.430	1.050	4.8.2
L22	100 - 95 (22)	0.015	0.378	0.000	0.040	0.001	0.395	1.050	4.8.2
L23	95 - 90 (23)	0.015	0.410	0.000	0.041	0.001	0.427	1.050	4.8.2
L24	90 - 89.5 (24)	0.015	0.413	0.000	0.041	0.001	0.430	1.050	4.8.2
L25	89.5 - 89.25 (25)	0.013	0.349	0.000	0.029	0.000	0.363	1.050	4.8.2
L26	89.25 - 85.5 (26)	0.013	0.369	0.000	0.029	0.000	0.383	1.050	4.8.2
L27	85.5 - 85.25 (27)	0.011	0.319	0.000	0.022	0.000	0.331	1.050	4.8.2
L28	85.25 - 84 (28)	0.011	0.325	0.000	0.022	0.000	0.337	1.050	4.8.2
L29	84 - 83.75 (29)	0.014	0.403	0.000	0.034	0.001	0.419	1.050	4.8.2
L30	83.75 - 82.5 (30)	0.015	0.411	0.000	0.034	0.001	0.427	1.050	4.8.2
L31	82.5 - 82.25 (31)	0.018	0.487	0.000	0.048	0.001	0.507	1.050	4.8.2
L32	82.25 - 80 (32)	0.018	0.503	0.000	0.049	0.001	0.523	1.050	4.8.2
L33	80 - 75 (33)	0.014	0.413	0.000	0.029	0.000	0.429	1.050	4.8.2
L34	75 - 70 (34)	0.015	0.442	0.000	0.030	0.000	0.457	1.050	4.8.2
L35	70 - 65 (35)	0.016	0.471	0.000	0.031	0.000	0.487	1.050	4.8.2
L36	65 - 60 (36)	0.016	0.501	0.000	0.031	0.000	0.518	1.050	4.8.2
L37	60 - 58.5 (37)	0.013	0.411	0.000	0.023	0.000	0.425	1.050	4.8.2
L38	58.5 - 58.25 (38)	0.015	0.467	0.000	0.026	0.000	0.483	1.050	4.8.2
L39	58.25 - 53.25 (39)	0.016	0.495	0.000	0.027	0.000	0.512	1.050	4.8.2
L40	53.25 - 48.25 (40)	0.017	0.524	0.000	0.027	0.000	0.541	1.050	4.8.2
L41	48.25 - 48 (41)	0.013	0.414	0.000	0.022	0.000	0.427	1.050	4.8.2
L42	48 - 43 (42)	0.013	0.437	0.000	0.022	0.000	0.450	1.050	4.8.2
L43	43 - 40 (43)	0.014	0.451	0.000	0.023	0.000	0.465	1.050	4.8.2
L44	40 - 35 (44)	0.015	0.475	0.000	0.023	0.000	0.490	1.050	4.8.2
L45	35 - 32.08 (45)	0.015	0.489	0.000	0.024	0.000	0.505	1.050	4.8.2
L46	32.08 - 31.83 (46)	0.012	0.384	0.000	0.019	0.000	0.397	1.050	4.8.2

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L47	31.83 - 28.75 (47)	0.012	0.396	0.000	0.019	0.000	0.409	1.050	4.8.2
L48	28.75 - 28.5 (48)	0.015	0.481	0.000	0.023	0.000	0.496	1.050	4.8.2
L49	28.5 - 23.5 (49)	0.015	0.505	0.000	0.023	0.000	0.521	1.050	4.8.2
L50	23.5 - 18.5 (50)	0.014	0.444	0.000	0.021	0.000	0.458	1.050	4.8.2
L51	18.5 - 13.5 (51)	0.015	0.465	0.000	0.021	0.000	0.480	1.050	4.8.2
L52	13.5 - 8.5 (52)	0.015	0.486	0.000	0.021	0.000	0.502	1.050	4.8.2
L53	8.5 - 3.5 (53)	0.016	0.508	0.000	0.022	0.000	0.524	1.050	4.8.2
L54	3.5 - 0 (54)	0.016	0.524	0.000	0.022	0.000	0.540	1.050	4.8.2

Section Capacity Table

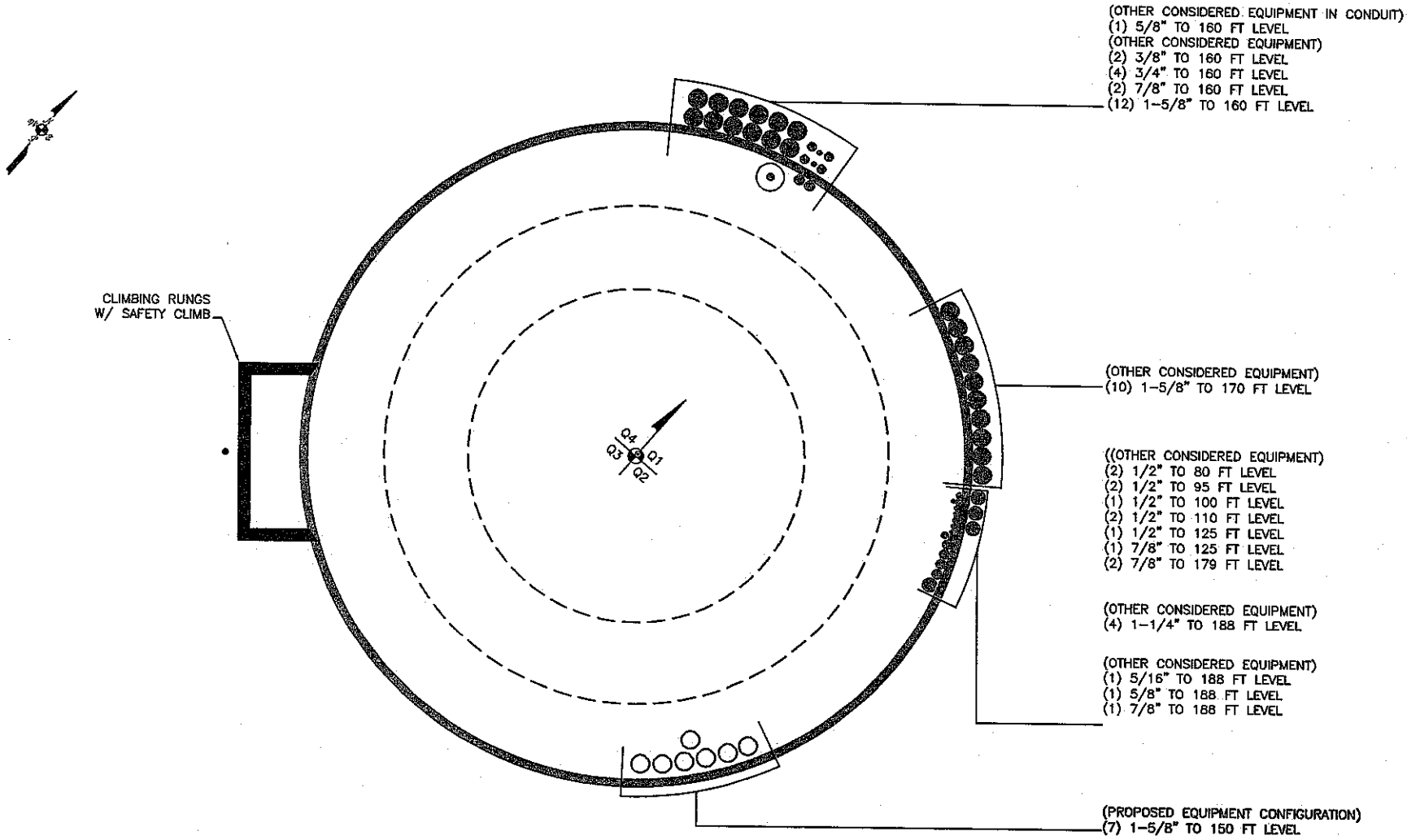
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	190 - 185	Pole	P30x0.375	1	-3.44	1376.61	1.4	Pass
L2	185 - 180	Pole	P30x0.375	2	-4.73	1376.61	3.5	Pass
L3	180 - 175	Pole	P36x0.375	3	-7.77	1564.60	4.9	Pass
L4	175 - 170	Pole	P36x0.375	4	-8.69	1564.60	7.2	Pass
L5	170 - 165	Pole	P36x0.375	5	-13.59	1564.60	11.4	Pass
L6	165 - 160	Pole	P36x0.375	6	-18.89	1564.60	16.7	Pass
L7	160 - 155	Pole	P42x0.375	7	-20.10	1752.31	17.0	Pass
L8	155 - 150	Pole	P42x0.375	8	-21.31	1752.31	21.5	Pass
L9	150 - 145	Pole	P42x0.375	9	-25.92	1752.31	27.7	Pass
L10	145 - 140	Pole	P42x0.375	10	-27.19	1752.31	33.7	Pass
L11	140 - 135	Pole	P48x0.375	11	-28.60	1939.86	31.2	Pass
L12	135 - 130	Pole	P48x0.375	12	-30.01	1939.86	36.1	Pass
L13	130 - 125	Pole	P48x0.375	13	-31.43	1939.86	41.1	Pass
L14	125 - 120	Pole	P48x0.375	14	-33.12	1939.86	46.3	Pass
L15	120 - 115	Pole	P54x0.375	15	-34.69	2127.30	41.4	Pass
L16	115 - 112.666	Pole	P54x0.375	16	-35.42	2127.30	43.4	Pass
L17	112.666 - 112.416	Pole	P54x0.4875	17	-35.52	2937.03	32.6	Pass
L18	112.416 - 107.416	Pole	P54x0.4875	18	-37.72	2937.03	36.0	Pass
L19	107.416 - 103.333	Pole	P54x0.4875	19	-39.30	2937.03	38.7	Pass
L20	103.333 - 103.083	Pole	P54x0.4875	20	-39.40	2937.03	38.9	Pass
L21	103.083 - 100	Pole	P54x0.4875	21	-40.59	2937.03	41.0	Pass
L22	100 - 95	Pole	P60x0.475	22	-42.80	3080.74	37.6	Pass
L23	95 - 90	Pole	P60x0.475	23	-45.16	3080.74	40.6	Pass
L24	90 - 89.5	Pole	P60x0.475	24	-45.37	3080.74	40.9	Pass
L25	89.5 - 89.25	Pole	P60x0.55625	25	-45.48	3748.89	34.6	Pass
L26	89.25 - 85.5	Pole	P60x0.55625	26	-47.24	3748.89	36.5	Pass
L27	85.5 - 85.25	Pole	P60x0.6375	27	-47.38	4457.83	31.5	Pass
L28	85.25 - 84	Pole	P60x0.6375	28	-48.03	4457.83	32.1	Pass
L29	84 - 83.75	Pole	P60x0.525	29	-48.15	3487.07	39.9	Pass
L30	83.75 - 82.5	Pole	P60x0.525	30	-48.71	3487.07	40.6	Pass
L31	82.5 - 82.25	Pole	P60x0.45	31	-48.81	2883.38	48.3	Pass
L32	82.25 - 80	Pole	P60x0.45	32	-49.71	2883.38	49.8	Pass
L33	80 - 75	Pole	P60x0.575	33	-53.20	3908.88	40.8	Pass
L34	75 - 70	Pole	P60x0.575	34	-55.68	3908.88	43.6	Pass
L35	70 - 65	Pole	P60x0.575	35	-58.14	3908.88	46.4	Pass
L36	65 - 60	Pole	P60x0.575	36	-60.63	3908.88	49.3	Pass
L37	60 - 58.5	Pole	P60x0.7	37	-62.99	5030.80	40.4	Pass
L38	58.5 - 58.25	Pole	P60x0.625	38	-63.12	4346.11	46.0	Pass
L39	58.25 - 53.25	Pole	P60x0.625	39	-65.81	4346.11	48.7	Pass
L40	53.25 - 48.25	Pole	P60x0.625	40	-68.51	4346.11	51.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
L41	48.25 - 48	Pole	P60x0.775	41	-68.67	5723.18	40.7	Pass
L42	48 - 43	Pole	P60x0.775	42	-71.85	5723.18	42.9	Pass
L43	43 - 40	Pole	P60x0.775	43	-73.76	5723.18	44.3	Pass
L44	40 - 35	Pole	P60x0.775	44	-79.07	5723.18	46.7	Pass
L45	35 - 32.08	Pole	P60x0.775	45	-80.93	5723.18	48.1	Pass
L46	32.08 - 31.83	Pole	P60x0.9625	46	-81.13	7085.33	37.8	Pass
L47	31.83 - 28.75	Pole	P60x0.9625	47	-83.49	7085.33	38.9	Pass
L48	28.75 - 28.5	Pole	P60x0.8125	48	-83.66	5996.32	47.2	Pass
L49	28.5 - 23.5	Pole	P60x0.8125	49	-87.01	5996.32	49.6	Pass
L50	23.5 - 18.5	Pole	P60x0.95	50	-93.77	6994.78	43.6	Pass
L51	18.5 - 13.5	Pole	P60x0.95	51	-97.60	6994.78	45.7	Pass
L52	13.5 - 8.5	Pole	P60x0.95	52	-101.38	6994.78	47.8	Pass
L53	8.5 - 3.5	Pole	P60x0.95	53	-105.03	6994.78	49.9	Pass
L54	3.5 - 0	Pole	P60x0.95	54	-107.58	6994.78	51.5	Pass
							Summary	
						Pole (L40)	51.5	Pass
						RATING =	**51.5**	**Pass**

Note: Above stress ratio for reinforced sections are approximate. More exact calculation are presented in Appendix C.

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 829046 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

CCIpole

per TIA-222- H

Site BU: 829046

Work Order: 1765202

CROWN CASTLE

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Pole Geometry

	Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material
1	190	10		0	30	30	0.375		A53-B-42
2	180	20		0	36.00	36	0.375		A53-B-42
3	160	20		0	42.00	42	0.375		A53-B-42
4	140	20		0	48.00	48	0.375		A53-B-42
5	120	20		0	54.00	54	0.375		A53-B-42
6	100	20		0	60.00	60	0.375		A53-B-42
7	80	20		0	60.00	60	0.5		A53-B-42
8	60	20		0	60.00	60	0.625		A53-B-42
9	40	20		0	60.00	60	0.625		A53-B-42
10	20	20		0	60.00	60	0.75		A53-B-42

Reinforcement Configuration

	Bottom Effective Elevation (ft)	Top Effective Elevation (ft)	Type	Model	Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	32.08	plate	MS-850 (1.1875")	3	0	120	240															
2	28.75	48.25	plate	MS-650 (1.1875")	3	24	144	264															
3	58.5	85.5	plate	MS-450 (1.1875")	3	0	120	240															
4	84	103.333	plate	MS-600 (1.1875")	3	21	141	261															
5	103.333	112.666	plate	MS-600 (1.1875")	3				0	120	240												
6	82.5	89.5	plate	MS-450 (1.1875")	3							90	210	330									
7																							
8																							
9																							
10																							

Reinforcement Details

	B (in)	H (in)	Gross Area (in^2)	Pole Face to Centroid (in)	Bottom Termination Length (in)	Top Termination Length (in)	L_u (in)	Net Area (in^2)	Bolt Hole Size (in)	Reinforcement Material
1	8.5	1.25	10.625	0.625	45.000	45.000	17.250	9.063	1.1875	A572-65
2	6.5	1.25	8.125	0.625	33.000	33.000	19.250	6.563	1.1875	A572-65
3	4.5	1	4.5	0.5	18.000	18.000	20.625	3.250	1.1875	A572-65
4	6	1	6	0.5	24.000	24.000	16.375	4.750	1.1875	A572-65
5	6	1	6	0.5	24.000	24.000	16.375	4.750	1.1875	A572-65
6	4.5	1	4.5	0.5	18.000	18.000	20.625	3.250	1.1875	A572-65

TNX Geometry Input

Increment (ft): 5

	Section Height (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Tapered Pole Grade	Weight Multiplier
1	190 - 185	5		0	30.000	30.000	0.375	A53-B-42	1.000
2	185 - 180	5	0	0	30.000	30.000	0.375	A53-B-42	1.000
3	180 - 175	5		0	36.000	36.000	0.375	A53-B-42	1.000
4	175 - 170	5		0	36.000	36.000	0.375	A53-B-42	1.000
5	170 - 165	5		0	36.000	36.000	0.375	A53-B-42	1.000
6	165 - 160	5	0	0	36.000	36.000	0.375	A53-B-42	1.000
7	160 - 155	5		0	42.000	42.000	0.375	A53-B-42	1.000
8	155 - 150	5		0	42.000	42.000	0.375	A53-B-42	1.000
9	150 - 145	5		0	42.000	42.000	0.375	A53-B-42	1.000
10	145 - 140	5	0	0	42.000	42.000	0.375	A53-B-42	1.000
11	140 - 135	5		0	48.000	48.000	0.375	A53-B-42	1.000
12	135 - 130	5		0	48.000	48.000	0.375	A53-B-42	1.000
13	130 - 125	5		0	48.000	48.000	0.375	A53-B-42	1.000
14	125 - 120	5	0	0	48.000	48.000	0.375	A53-B-42	1.000
15	120 - 115	5		0	54.000	54.000	0.375	A53-B-42	1.000
16	115 - 112.666	2.334		0	54.000	54.000	0.375	A53-B-42	1.000
17	112.666 - 112.416	0.25		0	54.000	54.000	0.4875	A53-B-42	0.990
18	112.416 - 107.416	5		0	54.000	54.000	0.4875	A53-B-42	0.990
19	107.416 - 103.333	4.083		0	54.000	54.000	0.4875	A53-B-42	0.990
20	103.333 - 103.083	0.25		0	54.000	54.000	0.4875	A53-B-42	0.990
21	103.083 - 100	3.083	0	0	54.000	54.000	0.4875	A53-B-42	0.990
22	100 - 95	5		0	60.000	60.000	0.475	A53-B-42	0.993
23	95 - 90	5		0	60.000	60.000	0.475	A53-B-42	0.993
24	90 - 89.5	0.5		0	60.000	60.000	0.475	A53-B-42	0.993
25	89.5 - 89.25	0.25		0	60.000	60.000	0.55625	A53-B-42	0.979
26	89.25 - 85.5	3.75		0	60.000	60.000	0.55625	A53-B-42	0.979
27	85.5 - 85.25	0.25		0	60.000	60.000	0.6375	A53-B-42	0.969
28	85.25 - 84	1.25		0	60.000	60.000	0.6375	A53-B-42	0.969
29	84 - 83.75	0.25		0	60.000	60.000	0.525	A53-B-42	0.991
30	83.75 - 82.5	1.25		0	60.000	60.000	0.525	A53-B-42	0.991
31	82.5 - 82.25	0.25		0	60.000	60.000	0.45	A53-B-42	0.995
32	82.25 - 80	2.25	0	0	60.000	60.000	0.45	A53-B-42	0.995
33	80 - 75	5		0	60.000	60.000	0.575	A53-B-42	0.996
34	75 - 70	5		0	60.000	60.000	0.575	A53-B-42	0.996
35	70 - 65	5		0	60.000	60.000	0.575	A53-B-42	0.996
36	65 - 60	5	0	0	60.000	60.000	0.575	A53-B-42	0.996
37	60 - 58.5	1.5		0	60.000	60.000	0.7	A53-B-42	0.998
38	58.5 - 58.25	0.25		0	60.000	60.000	0.625	A53-B-42	1.000
39	58.25 - 53.25	5		0	60.000	60.000	0.625	A53-B-42	1.000
40	53.25 - 48.25	5		0	60.000	60.000	0.625	A53-B-42	1.000
41	48.25 - 48	0.25		0	60.000	60.000	0.775	A53-B-42	0.978
42	48 - 43	5		0	60.000	60.000	0.775	A53-B-42	0.978
43	43 - 40	3	0	0	60.000	60.000	0.775	A53-B-42	0.978
44	40 - 35	5		0	60.000	60.000	0.775	A53-B-42	0.978
45	35 - 32.08	2.92		0	60.000	60.000	0.775	A53-B-42	0.978
46	32.08 - 31.83	0.25		0	60.000	60.000	0.9625	A53-B-42	0.968
47	31.83 - 28.75	3.08		0	60.000	60.000	0.9625	A53-B-42	0.968
48	28.75 - 28.5	0.25		0	60.000	60.000	0.8125	A53-B-42	0.983
49	28.5 - 23.5	5	0	0	60.000	60.000	0.8125	A53-B-42	0.983
50	23.5 - 18.5	5		0	60.000	60.000	0.95	A53-B-42	0.973
51	18.5 - 13.5	5		0	60.000	60.000	0.95	A53-B-42	0.973
52	13.5 - 8.5	5		0	60.000	60.000	0.95	A53-B-42	0.973
53	8.5 - 3.5	5		0	60.000	60.000	0.95	A53-B-42	0.973
54	3.5 - 0	3.5		0	60.000	60.000	0.95	A53-B-42	0.973

TNX Section Forces

Increment (ft): 5

	Section Height (ft)	TNX Output P_u (K)	M_{ux} (kip-ft)	V_u (K)
1	190 - 185	3.44	10.91	2.80
2	185 - 180	4.73	31.52	3.99
3	180 - 175	7.77	61.67	6.20
4	175 - 170	8.69	93.75	6.61
5	170 - 165	13.59	147.76	11.00
6	165 - 160	18.89	215.85	16.00
7	160 - 155	20.10	296.93	16.46
8	155 - 150	21.32	380.32	16.92
9	150 - 145	25.92	489.64	22.15
10	145 - 140	27.19	601.66	22.67
11	140 - 135	28.60	716.36	23.23
12	135 - 130	30.01	833.82	23.77
13	130 - 125	31.43	953.97	24.30
14	125 - 120	33.12	1077.73	24.98
15	120 - 115	34.69	1203.96	25.53
16	115 - 112.666	35.42	1263.85	25.80
17	112.666 - 112.416	35.52	1270.30	25.83
18	112.416 - 107.416	37.72	1401.73	26.56
19	107.416 - 103.333	39.30	1511.12	27.04
20	103.333 - 103.083	39.40	1517.88	27.08
21	103.083 - 100	40.59	1601.91	27.44
22	100 - 95	42.80	1740.48	28.07
23	95 - 90	45.16	1883.80	28.81
24	90 - 89.5	45.37	1898.21	28.87
25	89.5 - 89.25	45.48	1905.43	28.90
26	89.25 - 85.5	47.24	2015.23	29.68
27	85.5 - 85.25	47.38	2022.65	29.73
28	85.25 - 84	48.03	2059.97	30.00
29	84 - 83.75	48.15	2067.47	30.04
30	83.75 - 82.5	48.71	2105.18	30.31
31	82.5 - 82.25	48.81	2112.76	30.35
32	82.25 - 80	49.71	2181.31	30.60
33	80 - 75	53.20	2338.56	31.71
34	75 - 70	55.68	2498.34	32.23
35	70 - 65	58.14	2664.01	33.68
36	65 - 60	60.63	2833.48	34.10
37	60 - 58.5	62.99	2885.48	34.74
38	58.5 - 58.25	63.12	2894.17	34.75
39	58.25 - 53.25	65.81	3068.96	35.16
40	53.25 - 48.25	68.51	3245.71	35.54
41	48.25 - 48	68.67	3254.60	35.57
42	48 - 43	71.85	3434.54	36.39
43	43 - 40	73.76	3544.41	36.86
44	40 - 35	79.07	3734.52	38.40
45	35 - 32.08	80.93	3847.30	38.85
46	32.08 - 31.83	81.13	3857.02	38.88
47	31.83 - 28.75	83.49	3977.52	39.36
48	28.75 - 28.5	83.66	3987.36	39.39
49	28.5 - 23.5	87.01	4186.09	40.10
50	23.5 - 18.5	93.77	4389.46	41.57
51	18.5 - 13.5	97.60	4598.95	42.23
52	13.5 - 8.5	101.38	4811.60	42.87
53	8.5 - 3.5	105.03	5027.42	43.49
54	3.5 - 0	107.57	5180.31	43.91

Analysis Results

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
190 - 185	Pole	TP30x30x0.375	Pole	1.3%	Pass
185 - 180	Pole	TP30x30x0.375	Pole	3.5%	Pass
180 - 175	Pole	TP36x36x0.375	Pole	4.9%	Pass
175 - 170	Pole	TP36x36x0.375	Pole	7.2%	Pass
170 - 165	Pole	TP36x36x0.375	Pole	11.4%	Pass
165 - 160	Pole	TP36x36x0.375	Pole	16.6%	Pass
160 - 155	Pole	TP42x42x0.375	Pole	16.9%	Pass
155 - 150	Pole	TP42x42x0.375	Pole	21.4%	Pass
150 - 145	Pole	TP42x42x0.375	Pole	27.5%	Pass
145 - 140	Pole	TP42x42x0.375	Pole	33.5%	Pass
140 - 135	Pole	TP48x48x0.375	Pole	30.9%	Pass
135 - 130	Pole	TP48x48x0.375	Pole	35.8%	Pass
130 - 125	Pole	TP48x48x0.375	Pole	40.8%	Pass
125 - 120	Pole	TP48x48x0.375	Pole	46.0%	Pass
120 - 115	Pole	TP54x54x0.375	Pole	41.1%	Pass
115 - 112.67	Pole	TP54x54x0.375	Pole	43.1%	Pass
112.67 - 112.42	Pole + Reinf.	TP54x54x0.4875	Pole	33.1%	Pass
112.42 - 107.42	Pole + Reinf.	TP54x54x0.4875	Pole	36.5%	Pass
107.42 - 103.33	Pole + Reinf.	TP54x54x0.4875	Pole	39.3%	Pass
103.33 - 103.08	Pole + Reinf.	TP54x54x0.4875	Pole	39.5%	Pass
103.08 - 100	Pole + Reinf.	TP54x54x0.4875	Pole	41.6%	Pass
100 - 95	Pole + Reinf.	TP60x60x0.475	Pole	37.9%	Pass
95 - 90	Pole + Reinf.	TP60x60x0.475	Pole	41.0%	Pass
90 - 89.5	Pole + Reinf.	TP60x60x0.475	Pole	41.3%	Pass
89.5 - 89.25	Pole + Reinf.	TP60x60x0.5563	Pole	35.8%	Pass
89.25 - 85.5	Pole + Reinf.	TP60x60x0.5563	Pole	37.8%	Pass
85.5 - 85.25	Pole + Reinf.	TP60x60x0.6375	Pole	33.3%	Pass
85.25 - 84	Pole + Reinf.	TP60x60x0.6375	Pole	34.0%	Pass
84 - 83.75	Pole + Reinf.	TP60x60x0.525	Pole	40.7%	Pass
83.75 - 82.5	Pole + Reinf.	TP60x60x0.525	Pole	41.4%	Pass
82.5 - 82.25	Pole + Reinf.	TP60x60x0.45	Pole	48.6%	Pass
82.25 - 80	Pole + Reinf.	TP60x60x0.45	Pole	50.2%	Pass
80 - 75	Pole + Reinf.	TP60x60x0.575	Reinf. 3 Compression	41.3%	Pass
75 - 70	Pole + Reinf.	TP60x60x0.575	Reinf. 3 Compression	44.1%	Pass
70 - 65	Pole + Reinf.	TP60x60x0.575	Reinf. 3 Compression	47.0%	Pass
65 - 60	Pole + Reinf.	TP60x60x0.575	Reinf. 3 Compression	49.9%	Pass
60 - 58.5	Pole + Reinf.	TP60x60x0.7	Reinf. 3 Compression	42.0%	Pass
58.5 - 58.25	Pole	TP60x60x0.625	Pole	45.9%	Pass
58.25 - 53.25	Pole	TP60x60x0.625	Pole	48.7%	Pass
53.25 - 48.25	Pole	TP60x60x0.625	Pole	51.5%	Pass
48.25 - 48	Pole + Reinf.	TP60x60x0.775	Pole	42.1%	Pass
48 - 43	Pole + Reinf.	TP60x60x0.775	Pole	44.4%	Pass
43 - 40	Pole + Reinf.	TP60x60x0.775	Pole	45.9%	Pass
40 - 35	Pole + Reinf.	TP60x60x0.775	Pole	48.3%	Pass
35 - 32.08	Pole + Reinf.	TP60x60x0.775	Pole	49.8%	Pass
32.08 - 31.83	Pole + Reinf.	TP60x60x0.9625	Pole	40.2%	Pass
31.83 - 28.75	Pole + Reinf.	TP60x60x0.9625	Pole	41.5%	Pass
28.75 - 28.5	Pole + Reinf.	TP60x60x0.8125	Pole	48.8%	Pass
28.5 - 23.5	Pole + Reinf.	TP60x60x0.8125	Pole	51.2%	Pass
23.5 - 18.5	Pole + Reinf.	TP60x60x0.95	Pole	45.6%	Pass
18.5 - 13.5	Pole + Reinf.	TP60x60x0.95	Pole	47.7%	Pass
13.5 - 8.5	Pole + Reinf.	TP60x60x0.95	Pole	49.9%	Pass
8.5 - 3.5	Pole + Reinf.	TP60x60x0.95	Pole	52.2%	Pass
3.5 - 0	Pole + Reinf.	TP60x60x0.95	Pole	53.7%	Pass
				Summary	
			Pole	53.7%	Pass
			Reinforcement	49.9%	Pass
			Overall	53.7%	Pass

Additional Calculations

Section Elevation (ft)	Moment of Inertia (in^4)			Area (in^2)			% Capacity*						
	Pole	Reinf.	Total	Pole	Reinf.	Total	Pole	R1	R2	R3	R4	R5	R6
190 - 185	3829	n/a	3829	34.90	n/a	34.90	1.3%						
185 - 180	3829	n/a	3829	34.90	n/a	34.90	3.5%						
180 - 175	6659	n/a	6659	41.97	n/a	41.97	4.9%						
175 - 170	6659	n/a	6659	41.97	n/a	41.97	7.2%						
170 - 165	6659	n/a	6659	41.97	n/a	41.97	11.4%						
165 - 160	6659	n/a	6659	41.97	n/a	41.97	16.6%						
160 - 155	10622	n/a	10622	49.04	n/a	49.04	16.9%						
155 - 150	10622	n/a	10622	49.04	n/a	49.04	21.4%						
150 - 145	10622	n/a	10622	49.04	n/a	49.04	27.5%						
145 - 140	10622	n/a	10622	49.04	n/a	49.04	33.5%						
140 - 135	15908	n/a	15908	56.11	n/a	56.11	30.9%						
135 - 130	15908	n/a	15908	56.11	n/a	56.11	35.8%						
130 - 125	15908	n/a	15908	56.11	n/a	56.11	40.8%						
125 - 120	15908	n/a	15908	56.11	n/a	56.11	46.0%						
120 - 115	22710	n/a	22710	63.18	n/a	63.18	41.1%						
115 - 112.67	22710	n/a	22710	63.18	n/a	63.18	43.1%						
112.67 - 112.42	22710	6834	29544	63.18	18.00	81.18	33.1%					29.6%	
112.42 - 107.42	22710	6834	29544	63.18	18.00	81.18	36.5%					32.7%	
107.42 - 103.33	22710	6834	29544	63.18	18.00	81.18	39.3%					35.2%	
103.33 - 103.08	22710	6834	29544	63.18	18.00	81.18	39.5%				35.3%		
103.08 - 100	22710	6834	29544	63.18	18.00	81.18	41.6%				37.2%		
100 - 95	31217	8400	39617	70.24	18.00	88.24	37.9%				33.6%		
95 - 90	31217	8400	39617	70.24	18.00	88.24	41.0%				36.3%		
90 - 89.5	31217	8400	39617	70.24	18.00	88.24	41.3%				36.6%		
89.5 - 89.25	31217	14691	45908	70.24	31.50	101.74	35.8%				31.7%		34.9%
89.25 - 85.5	31217	14691	45908	70.24	31.50	101.74	37.8%				33.5%		36.9%
85.5 - 85.25	31217	20982	52199	70.24	45.00	115.24	33.3%			32.6%	29.5%		32.6%
85.25 - 84	31217	20982	52199	70.24	45.00	115.24	34.0%			33.2%	30.1%		33.2%
84 - 83.75	31217	12582	43799	70.24	27.00	97.24	40.7%			39.8%			39.8%
83.75 - 82.5	31217	12582	43799	70.24	27.00	97.24	41.4%			40.5%			40.5%
82.5 - 82.25	31217	6291	37508	70.24	13.50	83.74	48.6%			47.5%			
82.25 - 80	31217	6291	37508	70.24	13.50	83.74	50.2%			49.0%			
80 - 75	41363	6291	47654	93.46	13.50	106.96	41.2%			41.3%			
75 - 70	41363	6291	47654	93.46	13.50	106.96	43.9%			44.1%			
70 - 65	41363	6291	47654	93.46	13.50	106.96	46.8%			47.0%			
65 - 60	41363	6291	47654	93.46	13.50	106.96	49.8%			49.9%			
60 - 58.5	51381	6291	57672	116.58	13.50	130.08	40.8%			42.0%			
58.5 - 58.25	51381	n/a	51381	116.58	n/a	116.58	45.9%						
58.25 - 53.25	51381	n/a	51381	116.58	n/a	116.58	48.7%						
53.25 - 48.25	51381	n/a	51381	116.58	n/a	116.58	51.5%						
48.25 - 48	51381	11475	62856	116.58	24.38	140.96	42.1%		38.6%				
48 - 43	51381	11475	62856	116.58	24.38	140.96	44.4%		40.8%				
43 - 40	51381	11475	62856	116.58	24.38	140.96	45.9%		42.1%				
40 - 35	51381	11475	62856	116.58	24.38	140.96	48.3%		44.3%				
35 - 32.08	51381	11475	62856	116.58	24.38	140.96	49.8%		45.7%				
32.08 - 31.83	51381	26521	77901	116.58	56.25	172.83	40.2%	36.4%	36.9%				
31.83 - 28.75	51381	26521	77901	116.58	56.25	172.83	41.5%	36.3%	38.0%				
28.75 - 28.5	51381	15046	66426	116.58	31.88	148.46	48.8%	42.7%					
28.5 - 23.5	51381	15046	66426	116.58	31.88	148.46	51.2%	44.8%					
23.5 - 18.5	61271	15046	76317	139.60	31.88	171.48	45.6%	40.9%					
18.5 - 13.5	61271	15046	76317	139.60	31.88	171.48	47.7%	42.8%					
13.5 - 8.5	61271	15046	76317	139.60	31.88	171.48	49.9%	44.8%					
8.5 - 3.5	61271	15046	76317	139.60	31.88	171.48	52.2%	46.8%					
3.5 - 0	61271	15046	76317	139.60	31.88	171.48	53.7%	49.9%					

Note: Section capacity checked in 5 degree increments.
Rating per TIA-222-H Section 15.5.

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

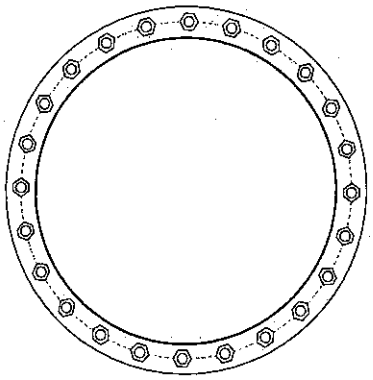
Elevation = 180 ft.

Applied Loads	
Moment (kip-ft)	31.52
Axial Force (kips)	4.73
Shear Force (kips)	3.99

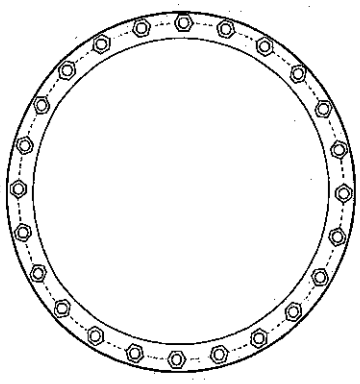
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - External



Bottom Plate - Internal



Connection Properties

Bolt Data

(24) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 33" BC

Top Plate Data

36" OD x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

30" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

30" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data

36" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	1.71	
Allowable (kips)	54.54	
Stress Rating:	3.0%	Pass

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	Pirod OK
Tension Side Stress Rating:	Pirod OK

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	Pirod OK
Tension Side Stress Rating:	Pirod OK

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

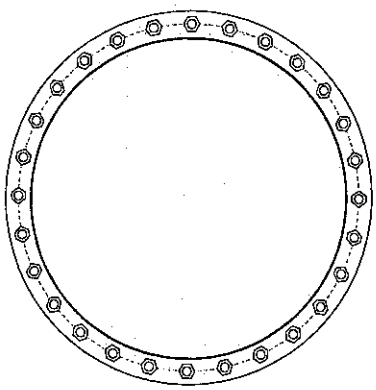
Elevation = 160 ft.

Applied Loads	
Moment (kip-ft)	215.85
Axial Force (kips)	18.89
Shear Force (kips)	16.00

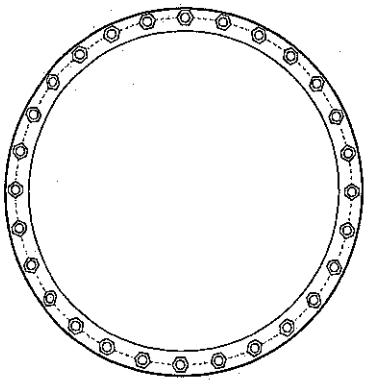
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - External



Bottom Plate - Internal



Connection Properties

Bolt Data

(28) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 39" BC

Top Plate Data

42" OD x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

36" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

36" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data

42" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	8.81	
Allowable (kips)	54.53	
Stress Rating:	**15.4%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

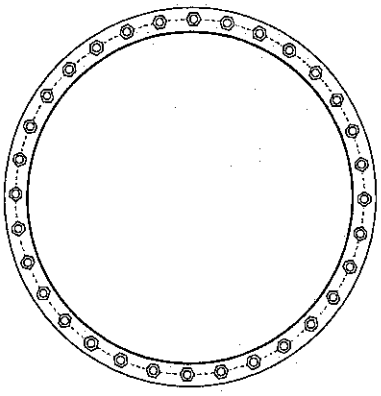
Elevation = 140 ft.

Applied Loads	
Moment (kip-ft)	601.66
Axial Force (kips)	27.19
Shear Force (kips)	22.67

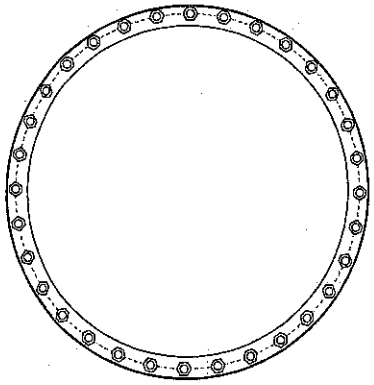
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - External



Bottom Plate - Internal



Connection Properties

Bolt Data

(32) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 45" BC

Top Plate Data

48" OD x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

42" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

42" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data

48" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	19.20	
Allowable (kips)	54.53	
Stress Rating:	**33.5%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

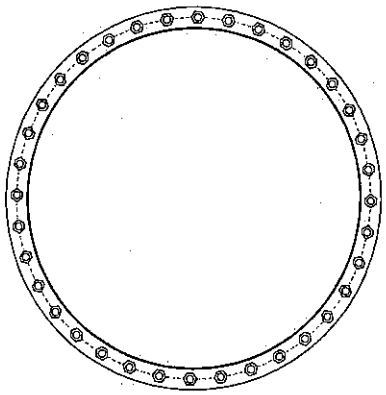
Elevation = 120 ft.

Applied Loads	
Moment (kip-ft)	1077.73
Axial Force (kips)	33.12
Shear Force (kips)	24.98

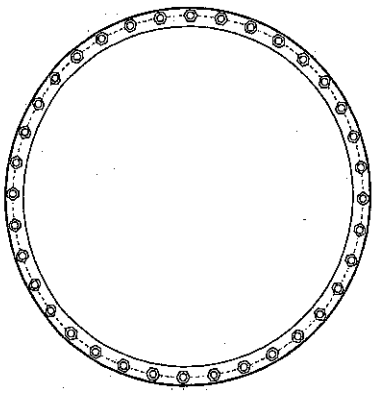
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - External



Bottom Plate - Internal



Connection Properties

Bolt Data

(36) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 51" BC

Top Plate Data

54" OD x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

48" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

48" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data

54" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	27.25	
Allowable (kips)	54.53	
Stress Rating:	47.6%	Pass

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	Pirod OK
Tension Side Stress Rating:	Pirod OK

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	Pirod OK
Tension Side Stress Rating:	Pirod OK

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

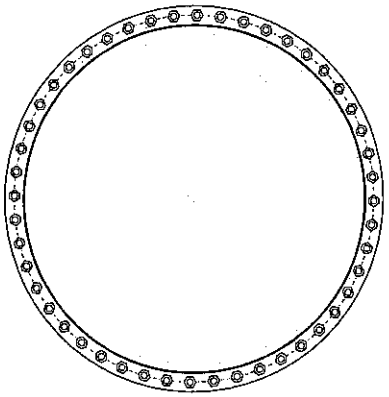
Elevation = 100 ft.

Applied Loads	
Moment (kip-ft)	1601.91
Axial Force (kips)	40.59
Shear Force (kips)	27.44

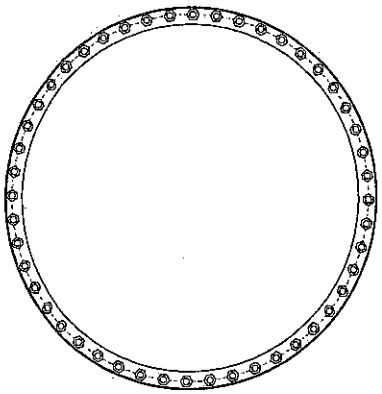
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - External



Bottom Plate - Internal



Connection Properties

Bolt Data

(48) 1" ø bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 57" BC

Top Plate Data

60" OD x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data

54" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data

N/A

Bottom Stiffener Data

N/A

Top Pole Data

54" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data

60" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	27.25	
Allowable (kips)	54.53	
Stress Rating:	**47.6%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

1. PARAMETERS

Flange Elevation: 80'- 0"

1.1 tnxTower Reactions

Apply TIA-222-H Section 15.5? No

Moment: $M := 2181.31 kip \cdot ft$

Axial Load: $P := 49.71 kip$

Shear Load: $V := 30.60 kip$

1.2 Shaft Properties at the Flange

Upper Shaft Diameter: $D_{shaft1} := 60 in$

Upper Shaft Thickness: $t_1 := 0.375 in$

Lower Shaft Diameter: $D_{shaft2} := 60 in$

Lower Shaft Thickness: $t_2 := 0.5 in$

Shaft Grade: $Fy_{shaft} := 42$ $Fu_{shaft} := 63 ksi$

1.3 Existing Bridge Stiffener Properties

(Verify existing bolted connection for reduced moment.)

Number of Existing Bridge Stiffeners: $N_{exist} := 3$

Existing Bridge Stiffener Grade: $Fy_{Ex} := 65 ksi$ $Fu_{Ex} := 80 ksi$

Diameter to the centroid of Existing Bridge Stiffeners: $BC_{exist} := 61 in$

Thickness of Existing Bridge Stiffeners: $t_{exist} := 1 in$

Width of Existing Bridge Stiffeners: $w_{exist} := 4.5 in$

Gross Area of One Existing Bridge Stiffener: $A_{g_exist} := w_{exist} \cdot t_{exist} = 4.5 \cdot in^2$

Moment of Inertia of Existing Bridge Stiffeners: $I_{exist} := \frac{N_{exist} \cdot BC_{exist}^2 \cdot A_{g_exist}}{8} = 6279.19 \cdot in^4$

Radius of Gyration about x-axis: $r_{x2} := \frac{t_{exist}}{\sqrt{12}} = 0.29 \cdot in$

1.4 Flange Bolt Properties

Number of Flange Bolts: $N_{bolts} := 64$

Diameter of Flange Bolts: 1-1/4"

Bolt Circle of Flange Bolts: $BC_{bolts} := 50in$

Gross Area of One Flange Bolt: $A_{g_bolts} := \frac{\pi}{4} \cdot D_{bolts}^2 = 1.23 \cdot in^2$

Moment of Inertia of Flange Bolts: $I_{bolts} := \frac{N_{bolts} \cdot BC_{bolts}^2 \cdot A_{g_bolts}}{8} = 24543.69 \cdot in^4$

1.5 Division of Forces

Total Gross Area: $A_{g_total} := N_{exist} \cdot A_{g_exist} + N_{bolts} \cdot A_{g_bolts} = 92.04 \cdot in^2$

Total Moment of Inertia: $I_{total} := I_{exist} + I_{bolts} = 30822.88 \cdot in^4$

1.6 Reactions to Existing Bridge Stiffeners

Moment Reaction to Existing Bridge Stiffeners: $M_{exist} := M \cdot \left(\frac{I_{exist}}{I_{total}}\right) = 444.37 \cdot kip \cdot ft$

Axial Reaction to Existing Bridge Stiffeners: $P_{exist} := 0kip$

Shear Reaction to Existing Bridge Stiffeners: $V_{exist} := 0kip$

1.7 Reactions to Flange Bolts

(It is assumed that all shear and axial loads are taken by the flange bolts)

Moment Reaction to Flange Bolts: $M_{bolts} := M \cdot \left(\frac{I_{bolts}}{I_{total}}\right) = 1736.94 \cdot kip \cdot ft$

Axial Reaction to Flange Bolts: $P_{bolts} := P = 49.71 \cdot kip$

Shear Reaction to Flange Bolts: $V_{bolts} := V = 30.6 \cdot kip$

Check Flange Connection in CCIplate with these Reactions

2. Existing Bridge Stiffener Checks

2.1 Maximum Axial Forces in Single Existing Bridge Stiffener

Outer Radius of Bolt Circle: $C := \frac{BC_{exist}}{2} = 30.5 \cdot in$

Critical Compression Bending Stress: $P_{comp} := \frac{M_{exist} \cdot C}{I_{exist}} \cdot A_{g_exist} + \frac{P_{exist}}{N_{exist}} = 116.56 \cdot kip$

Critical Tension Bending Stress: $P_{tens} := \frac{M_{exist} \cdot C}{I_{exist}} \cdot A_{g_exist} - \frac{P_{exist}}{N_{exist}} = 116.56 \cdot kip$

2.2 Available Compression Strength

[AISC 15th Edition E3-1]

Resistance Factor: $\phi_c := 0.9$

Unbraced Length: $L_u := 20.625in$

Effective Length Factor: $K := 1.0$

Effective Length of Member: $L_c := K \cdot L_u = 20.63 \cdot in$ [AISC 15th Edition E3-2]

Strength of Bridge Stiffener: $Fy_{Ex} = 65 \cdot ksi$ $Fu_{Ex} = 80 \cdot ksi$

Elastic Buckling Stress:
[AISC 15th Ed., Eq. E3-4]

$$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{L_c}{r_{x2}}\right)^2} = 56.07 \cdot ksi$$

Determination of Crticial Stress:
[AISC 15th Ed., Eqs. E3-2 and E3-3]

$$F_{cr} := \begin{cases} \left(0.658^{\frac{Fy_{Ex}}{F_e}} \cdot Fy_{Ex}\right) & \text{if } 4.71 \cdot \sqrt{\frac{E}{Fy_{Ex}}} \geq \frac{L_c}{r_{x2}} \\ \left(0.877 \cdot F_e\right) & \text{otherwise} \end{cases}$$

$$F_{cr} = 40.01 \cdot ksi$$

Allowable Compressive Strength:
[AISC 15th Ed., Eqs. J4-6 and E3-1]

$$\phi P_n := \begin{cases} \left(\phi_c \cdot Fy_{Ex} \cdot A_{g_exist}\right) & \text{if } \frac{L_c}{r_{x2}} \leq 25 \\ \left(\phi_c \cdot F_{cr} \cdot A_{g_exist}\right) & \text{otherwise} \end{cases}$$

$\phi P_n = 162.05 \cdot kip$

Check Compressive Strength: $Check_{comp} := \begin{cases} \text{"OK"} & \text{if } Capacity_{comp} \le 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$

$Check_{comp} = \text{"OK"}$

$Capacity_{comp} = 68.5\ \%$

2.3 Available Tension Strength

Gross Section Yield [AISC 15th Edition Ch. D2]

Available Tension Yield Strength: $\phi P_{ty} := 0.9 \cdot Fy_{Ex} \cdot A_{g_exist} = 263.25 \cdot kip$

Net Section Fracture

Bolt Hole Diameter: $BH := 1.1875in$

Thickness: $T := t_{exist} = 1 \cdot in$

Net Area: $A_{net} := A_{g_exist} - \left(BH + \frac{1}{16}in\right) \cdot T = 3.25 \cdot in^2$

Net Area Limitation: $A_e := A_{net} = 3.25 \cdot in^2$

Available Fractile Strength: $\phi P_{tr} := 0.75 \cdot Fu_{Ex} \cdot A_e = 195 \cdot kip$

Tension Check

Controlling Mode of Failure: $Check_{mode} := \begin{cases} \text{"Fracture Controls"} & \text{if } \frac{P_{tens}}{\phi P_{tr}} > \frac{P_{tens}}{\phi P_{ty}} \\ \text{"Yield Controls"} & \text{otherwise} \end{cases}$

$Check_{mode} = \text{"Fracture Controls"}$

$\phi P_{nt} := \begin{cases} \phi P_{tr} & \text{if } Check_{mode} = \text{"Fracture Controls"} \\ \phi P_{ty} & \text{otherwise} \end{cases}$

Controlling Tension Mode Check: $Check_{tension} := \begin{cases} \text{"OK"} & \text{if } Capacity_{tension} \le 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$

$Check_{tension} = \text{"OK"}$

$Capacity_{tension} = 56.93\ \%$

SUMMARY

tnxTower Reactions: $M = 2181.31 \cdot kip \cdot ft$ $P = 49.71 \cdot kip$ $V = 30.6 \cdot kip$

Flange Bolts:

Diameter of Flange Bolts: $D_{bolts} = 1\frac{1}{4} \cdot in$

Bolt Circle of Flange Bolts: $BC_{bolts} = 50 \cdot in$

Loads to Flange Bolts: $M_{bolts} = 1736.94 \cdot ft \cdot kip$ $P = 49.71 \cdot kip$ $V = 30.6 \cdot kip$

See CCIPlate for Flange Bolt and Plate Capacities

Existing Jump Plates:

Moment to Proposed Bridge Stiffeners: $M_{exist} = 444.37 \, ft \cdot kip$

Number of Existing Bridge Stiffeners: $N_{exist} = 3$

Thickness: $t_{exist} = 1 \cdot in$

Width: $w_{exist} = 4.5 \cdot in$

Controlling Capacity of Existing Bridge Stiffeners: $Capacity_{exist} = 68.5 \, \%$

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

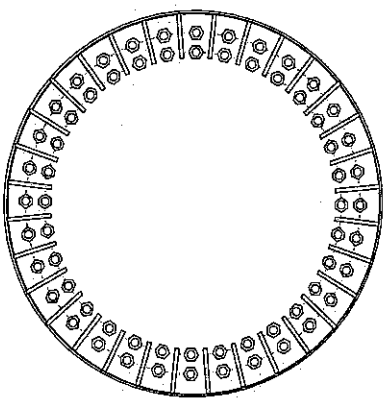
Elevation = 80 ft.

Applied Loads	
Moment (kip-ft)	1736.94
Axial Force (kips)	49.71
Shear Force (kips)	30.60

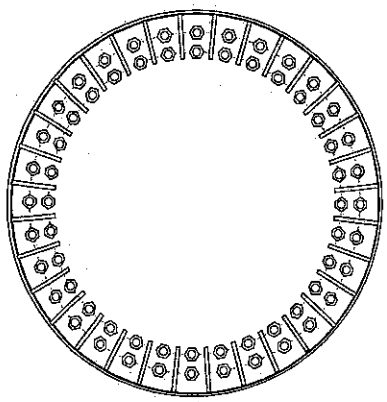
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - Internal



Bottom Plate - Internal



Connection Properties

Bolt Data

GROUP 1: (32) 1-1/4" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 47" BC
GROUP 2: (32) 1-1/4" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 53" BC

Top Plate Data
60" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data
60" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data
(32) 10"H x 7"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Bottom Stiffener Data
(32) 10"H x 7"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Top Pole Data
60" x 0.375" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data
60" x 0.5" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	27.51	
Allowable (kips)	76.31	
Stress Rating:	**34.3%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Top Stiffener Capacity

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Bottom Stiffener Capacity

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Top Pole Capacity

Punching Shear:	**Pirod OK**

Bottom Pole Capacity

Punching Shear:	**Pirod OK**

1. PARAMETERS

Flange Elevation: 60' - 0"

1.1 tnxTower Reactions

Apply TIA-222-H Section 15.5? No

Moment: $M := 2833.48 kip \cdot ft$

Axial Load: $P := 60.63 kip$

Shear Load: $V := 34.10 kip$

1.2 Shaft Properties at the Flange

Upper Shaft Diameter: $D_{shaft1} := 60 in$

Upper Shaft Thickness: $t_1 := 0.5 in$

Lower Shaft Diameter: $D_{shaft2} := 60 in$

Lower Shaft Thickness: $t_2 := 0.625 in$

Shaft Grade: $Fy_{shaft} := 42$ $Fu_{shaft} := 63 ksi$

1.3 Existing Bridge Stiffener Properties

(Verify existing bolted connection for reduced moment.)

Number of Existing Bridge Stiffeners: $N_{exist} := 3$

Existing Bridge Stiffener Grade: $Fy_{Ex} := 65 ksi$ $Fu_{Ex} := 80 ksi$

Diameter to the centroid of Existing Bridge Stiffeners: $BC_{exist} := 61.25 in$

Thickness of Existing Bridge Stiffeners: $t_{exist} := 1.25 in$

Width of Existing Bridge Stiffeners: $w_{exist} := 6.5 in$

Gross Area of One Existing Bridge Stiffener: $A_{g_exist} := w_{exist} \cdot t_{exist} = 8.13 \cdot in^2$

Moment of Inertia of Existing Bridge Stiffeners: $I_{exist} := \frac{N_{exist} \cdot BC_{exist}^2 \cdot A_{g_exist}}{8} = 11430.54 \cdot in^4$

Radius of Gyration about x-axis: $r_{x2} := \frac{t_{exist}}{\sqrt{12}} = 0.36 \cdot in$

1.4 Flange Bolt Properties

Number of Flange Bolts: $N_{bolts} := 64$

Diameter of Flange Bolts: 1-1/4"

Bolt Circle of Flange Bolts: $BC_{bolts} := 50in$

Gross Area of One Flange Bolt: $A_{g_bolts} := \frac{\pi}{4} \cdot D_{bolts}^2 = 1.23 \cdot in^2$

Moment of Inertia of Flange Bolts: $I_{bolts} := \frac{N_{bolts} \cdot BC_{bolts}^2 \cdot A_{g_bolts}}{8} = 24543.69 \cdot in^4$

1.5 Division of Forces

Total Gross Area: $A_{g_total} := N_{exist} \cdot A_{g_exist} + N_{bolts} \cdot A_{g_bolts} = 102.91 \cdot in^2$

Total Moment of Inertia: $I_{total} := I_{exist} + I_{bolts} = 35974.23 \cdot in^4$

1.6 Reactions to Existing Bridge Stiffeners

Moment Reaction to Existing Bridge Stiffeners: $M_{exist} := M \cdot \left(\frac{I_{exist}}{I_{total}}\right) = 900.32 \cdot kip \cdot ft$

Axial Reaction to Existing Bridge Stiffeners: $P_{exist} := 0kip$

Shear Reaction to Existing Bridge Stiffeners: $V_{exist} := 0kip$

1.7 Reactions to Flange Bolts

(It is assumed that all shear and axial loads are taken by the flange bolts)

Moment Reaction to Flange Bolts: $M_{bolts} := M \cdot \left(\frac{I_{bolts}}{I_{total}}\right) = 1933.16 \cdot kip \cdot ft$

Axial Reaction to Flange Bolts: $P_{bolts} := P = 60.63 \cdot kip$

Shear Reaction to Flange Bolts: $V_{bolts} := V = 34.1 \cdot kip$

Check Flange Connection in CCIplate with these Reactions

2. Existing Bridge Stiffener Checks

2.1 Maximum Axial Forces in Single Existing Bridge Stiffener

Outer Radius of Bolt Circle: $C := \frac{BC_{exist}}{2} = 30.63 \cdot in$

Critical Compression Bending Stress: $P_{comp} := \frac{M_{exist} \cdot C}{I_{exist}} \cdot A_{g_exist} + \frac{P_{exist}}{N_{exist}} = 235.18 \cdot kip$

Critical Tension Bending Stress: $P_{tens} := \frac{M_{exist} \cdot C}{I_{exist}} \cdot A_{g_exist} - \frac{P_{exist}}{N_{exist}} = 235.18 \cdot kip$

2.2 Available Compression Strength

[AISC 15th Edition E3-1]

Resistance Factor: $\phi_c := 0.9$

Unbraced Length: $L_u := 19.2in$

Effective Length Factor: $K := 1.0$

Effective Length of Member: $L_c := K \cdot L_u = 19.2 \cdot in$ [AISC 15th Edition E3-2]

Strength of Bridge Stiffener: $Fy_{Ex} = 65 \cdot ksi$ $Fu_{Ex} = 80 \cdot ksi$

Elastic Buckling Stress:
[AISC 15th Ed., Eq. E3-4]

$$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{L_c}{r_{x2}}\right)^2} = 101.1 \cdot ksi$$

Determination of Crticial Stress:
[AISC 15th Ed., Eqs. E3-2 and E3-3]

$$F_{cr} := \begin{cases} \left(0.658^{\frac{Fy_{Ex}}{F_e}} \cdot Fy_{Ex}\right) & \text{if } 4.71 \cdot \sqrt{\frac{E}{Fy_{Ex}}} \geq \frac{L_c}{r_{x2}} \\ \left(0.877 \cdot F_e\right) & \text{otherwise} \end{cases}$$

$$F_{cr} = 49.66 \cdot ksi$$

Allowable Compressive Strength:
[AISC 15th Ed., Eqs. J4-6 and E3-1]

$$\phi P_n := \begin{cases} \left(\phi_c \cdot Fy_{Ex} \cdot A_{g_exist}\right) & \text{if } \frac{L_c}{r_{x2}} \leq 25 \\ \left(\phi_c \cdot F_{cr} \cdot A_{g_exist}\right) & \text{otherwise} \end{cases}$$

$\phi P_n = 363.17 \cdot kip$

Check Compressive Strength:

$$Check_{comp} := \begin{cases} \text{"OK"} & \text{if } Capacity_{comp} \le 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{comp} = \text{"OK"}$

$Capacity_{comp} = 61.68\%$

2.3 Available Tension Strength

Gross Section Yield

[AISC 15th Edition Ch. D2]

Available Tension Yield Strength: $\phi P_{ty} := 0.9 \cdot Fy_{Ex} \cdot A_{g_exist} = 475.31 \cdot kip$

Net Section Fracture

Bolt Hole Diameter: $BH := 1.1875in$

Thickness: $T := t_{exist} = 1.25 \cdot in$

Net Area: $A_{net} := A_{g_exist} - \left(BH + \frac{1}{16}in\right) \cdot T = 6.56 \cdot in^2$

Net Area Limitation: $A_e := A_{net} = 6.56 \cdot in^2$

Available Fractile Strength: $\phi P_{tr} := 0.75 \cdot Fu_{Ex} \cdot A_e = 393.75 \cdot kip$

Tension Check

Controlling Mode of Failure:

$$Check_{mode} := \begin{cases} \text{"Fracture Controls"} & \text{if } \frac{P_{tens}}{\phi P_{tr}} > \frac{P_{tens}}{\phi P_{ty}} \\ \text{"Yield Controls"} & \text{otherwise} \end{cases}$$

$Check_{mode} = \text{"Fracture Controls"}$

$$\phi P_{nt} := \begin{cases} \phi P_{tr} & \text{if } Check_{mode} = \text{"Fracture Controls"} \\ \phi P_{ty} & \text{otherwise} \end{cases}$$

Controlling Tension Mode Check:

$$Check_{tension} := \begin{cases} \text{"OK"} & \text{if } Capacity_{tension} \le 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{tension} = \text{"OK"}$

$Capacity_{tension} = 56.89\%$

SUMMARY

tnxTower Reactions: $M = 2833.48 \cdot kip \cdot ft$ $P = 60.63 \cdot kip$ $V = 34.1 \cdot kip$

Flange Bolts:

Diameter of Flange Bolts: $D_{bolts} = 1\frac{1}{4} \cdot in$

Bolt Circle of Flange Bolts: $BC_{bolts} = 50 \cdot in$

Loads to Flange Bolts: $M_{bolts} = 1938.16 \cdot ft \cdot kip$ $P_{bolts} = 60.63 \cdot kip$ $V_{bolts} = 34.1 \cdot kip$

See CCIPlate for Flange Bolt and Plate Capacities

Existing Jump Plates:

Moment to Proposed Bridge Stiffeners: $M_{exist} = 900.32 \, ft \cdot kip$

Number of Existing Bridge Stiffeners: $N_{exist} = 3$

Thickness: $t_{exist} = 1.25 \cdot in$

Width: $w_{exist} = 6.5 \cdot in$

Controlling Capacity of Existing Bridge Stiffeners: $Capacity_{exist} = 61.7 \, \%$

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

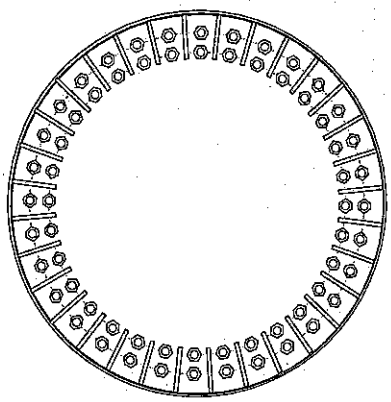
Elevation = 60 ft.

Applied Loads	
Moment (kip-ft)	1933.16
Axial Force (kips)	60.63
Shear Force (kips)	34.10

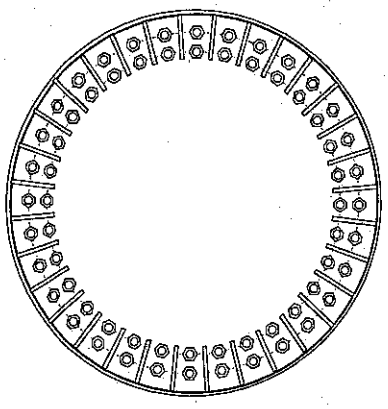
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - Internal



Bottom Plate - Internal



Connection Properties

Bolt Data

GROUP 1: (32) 1-1/4" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 47" BC
GROUP 2: (32) 1-1/4" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 53" BC

Top Plate Data
60" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data
60" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data
(32) 10"H x 7"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Bottom Stiffener Data
(32) 10"H x 7"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Top Pole Data
60" x 0.5" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data
60" x 0.625" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	30.62	
Allowable (kips)	76.31	
Stress Rating:	**38.2%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Top Stiffener Capacity

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Bottom Stiffener Capacity

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Top Pole Capacity

Punching Shear:	**Pirod OK**

Bottom Pole Capacity

Punching Shear:	**Pirod OK**

1. PARAMETERS

Flange Elevation: 40'- 0"

1.1 tnxTower Reactions

Apply TIA-222-H Section 15.5? No

Moment: $M := 3544.41 kip \cdot ft$

Axial Load: $P := 73.76 kip$

Shear Load: $V := 36.86 kip$

1.2 Shaft Properties at the Flange

Upper Shaft Diameter: $D_{shaft1} := 60 in$

Upper Shaft Thickness: $t_1 := 0.625 in$

Lower Shaft Diameter: $D_{shaft2} := 60 in$

Lower Shaft Thickness: $t_2 := 0.625 in$

Shaft Grade: $Fy_{shaft} := 42$ $Fu_{shaft} := 63 ksi$

1.3 Existing Bridge Stiffener Properties

(Verify existing bolted connection for reduced moment.)

Number of Existing Bridge Stiffeners: $N_{exist} := 6$

Existing Bridge Stiffener Grade: $Fy_{Ex} := 65 ksi$ $Fu_{Ex} := 80 ksi$

Diameter to the centroid of Existing Bridge Stiffeners: $BC_{exist} := 61 in$

Thickness of Existing Bridge Stiffeners: $t_{exist} := 1 in$

Width of Existing Bridge Stiffeners: $w_{exist} := 6 in$

Gross Area of One Existing Bridge Stiffener: $A_{g_exist} := w_{exist} \cdot t_{exist} = 6 \cdot in^2$

Moment of Inertia of Existing Bridge Stiffeners: $I_{exist} := \frac{N_{exist} \cdot BC_{exist}^2 \cdot A_{g_exist}}{8} = 16744.5 \cdot in^4$

Radius of Gyration about x-axis: $r_{x2} := \frac{t_{exist}}{\sqrt{12}} = 0.29 \cdot in$

1.4 Flange Bolt Properties

Number of Flange Bolts: $N_{bolts} := 64$

Diameter of Flange Bolts:

Bolt Circle of Flange Bolts: $BC_{bolts} := 50in$

Gross Area of One Flange Bolt: $A_{g_bolts} := \frac{\pi}{4} \cdot D_{bolts}^2 = 1.23 \cdot in^2$

Moment of Inertia of Flange Bolts: $I_{bolts} := \frac{N_{bolts} \cdot BC_{bolts}^2 \cdot A_{g_bolts}}{8} = 24543.69 \cdot in^4$

1.5 Division of Forces

Total Gross Area: $A_{g_total} := N_{exist} \cdot A_{g_exist} + N_{bolts} \cdot A_{g_bolts} = 114.54 \cdot in^2$

Total Moment of Inertia: $I_{total} := I_{exist} + I_{bolts} = 41288.19 \cdot in^4$

1.6 Reactions to Existing Bridge Stiffeners

Moment Reaction to Existing Bridge Stiffeners: $M_{exist} := M \cdot \left(\frac{I_{exist}}{I_{total}}\right) = 1437.44 \cdot kip \cdot ft$

Axial Reaction to Existing Bridge Stiffeners: $P_{exist} := 0kip$

Shear Reaction to Existing Bridge Stiffeners: $V_{exist} := 0kip$

1.7 Reactions to Flange Bolts

(It is assumed that all shear and axial loads are taken by the flange bolts)

Moment Reaction to Flange Bolts: $M_{bolts} := M \cdot \left(\frac{I_{bolts}}{I_{total}}\right) = 2106.97 \cdot kip \cdot ft$

Axial Reaction to Flange Bolts: $P_{bolts} := P = 73.76 \cdot kip$

Shear Reaction to Flange Bolts: $V_{bolts} := V = 36.86 \cdot kip$

Check Flange Connection in CCIplate with these Reactions

2. Existing Bridge Stiffener Checks

2.1 Maximum Axial Forces in Single Existing Bridge Stiffener

Outer Radius of Bolt Circle: $C := \frac{BC_{exist}}{2} = 30.5 \cdot in$

Critical Compression Bending Stress: $P_{comp} := \frac{M_{exist} \cdot C}{I_{exist}} \cdot A_{g_exist} + \frac{P_{exist}}{N_{exist}} = 188.52 \cdot kip$

Critical Tension Bending Stress: $P_{tens} := \frac{M_{exist} \cdot C}{I_{exist}} \cdot A_{g_exist} - \frac{P_{exist}}{N_{exist}} = 188.52 \cdot kip$

2.2 Available Compression Strength

[AISC 15th Edition E3-1]

Resistance Factor: $\phi_c := 0.9$

Unbraced Length: $L_u := 16.375in$

Effective Length Factor: $K := 1.0$

Effective Length of Member: $L_c := K \cdot L_u = 16.38 \cdot in$ [AISC 15th Edition E3-2]

Strength of Bridge Stiffener: $Fy_{Ex} = 65 \cdot ksi$ $Fu_{Ex} = 80 \cdot ksi$

Elastic Buckling Stress:
[AISC 15th Ed., Eq. E3-4]

$$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{L_c}{r_{x2}}\right)^2} = 88.95 \cdot ksi$$

Determination of Crticial Stress:
[AISC 15th Ed., Eqs. E3-2 and E3-3]

$$F_{cr} := \begin{cases} \left(0.658^{\frac{Fy_{Ex}}{F_e}} \cdot Fy_{Ex}\right) & \text{if } 4.71 \cdot \sqrt{\frac{E}{Fy_{Ex}}} \geq \frac{L_c}{r_{x2}} \\ \left(0.877 \cdot F_e\right) & \text{otherwise} \end{cases}$$

$F_{cr} = 47.87 \cdot ksi$

Allowable Compressive Strength:
[AISC 15th Ed., Eqs. J4-6 and E3-1]

$$\phi P_n := \begin{cases} \left(\phi_c \cdot Fy_{Ex} \cdot A_{g_exist}\right) & \text{if } \frac{L_c}{r_{x2}} \leq 25 \\ \left(\phi_c \cdot F_{cr} \cdot A_{g_exist}\right) & \text{otherwise} \end{cases}$$

$\phi P_n = 258.51 \cdot kip$

Check Compressive Strength:

$$Check_{comp} := \begin{cases} \text{"OK"} & \text{if } Capacity_{comp} \le 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{comp} = \text{"OK"}$

$Capacity_{comp} = 69.45\%$

2.3 Available Tension Strength

Gross Section Yield

[AISC 15th Edition Ch. D2]

Available Tension Yield Strength: $\phi P_{ty} := 0.9 \cdot Fy_{Ex} \cdot A_{g_exist} = 351 \cdot kip$

Net Section Fracture

Bolt Hole Diameter: $BH := 1.1875in$

Thickness: $T := t_{exist} = 1 \cdot in$

Net Area: $A_{net} := A_{g_exist} - \left(BH + \frac{1}{16}in\right) \cdot T = 4.75 \cdot in^2$

Net Area Limitation: $A_e := A_{net} = 4.75 \cdot in^2$

Available Fractile Strength: $\phi P_{tr} := 0.75 \cdot Fu_{Ex} \cdot A_e = 285 \cdot kip$

Tension Check

Controlling Mode of Failure:

$$Check_{mode} := \begin{cases} \text{"Fracture Controls"} & \text{if } \frac{P_{tens}}{\phi P_{tr}} > \frac{P_{tens}}{\phi P_{ty}} \\ \text{"Yield Controls"} & \text{otherwise} \end{cases}$$

$Check_{mode} = \text{"Fracture Controls"}$

$$\phi P_{nt} := \begin{cases} \phi P_{tr} & \text{if } Check_{mode} = \text{"Fracture Controls"} \\ \phi P_{ty} & \text{otherwise} \end{cases}$$

Controlling Tension Mode Check:

$$Check_{tension} := \begin{cases} \text{"OK"} & \text{if } Capacity_{tension} \le 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{tension} = \text{"OK"}$

$Capacity_{tension} = 63.\%$

SUMMARY

tnxTower Reactions: $M = 3544.41 \cdot kip \cdot ft$ $P = 73.76 \cdot kip$ $V = 36.86 \cdot kip$

Flange Bolts:

Diameter of Flange Bolts: $D_{bolts} = 1\frac{1}{4} \cdot in$

Bolt Circle of Flange Bolts: $BC_{bolts} = 50 \cdot in$

Loads to Flange Bolts: $M_{bolts} = 2106.97 \cdot ft \cdot kip$ $P = 73.76 \cdot kip$ $V = 36.86 \cdot kip$

See CCIPlate for Flange Bolt and Plate Capacities

Existing Jump Plates:

Moment to Proposed Bridge Stiffeners: $M_{exist} = 1437.44\ ft \cdot kip$

Number of Existing Bridge Stiffeners: $N_{exist} = 6$

Thickness: $t_{exist} = 1 \cdot in$

Width: $w_{exist} = 6 \cdot in$

Controlling Capacity of Existing Bridge Stiffeners: $Capacity_{exist} = 69.5\ \%$

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

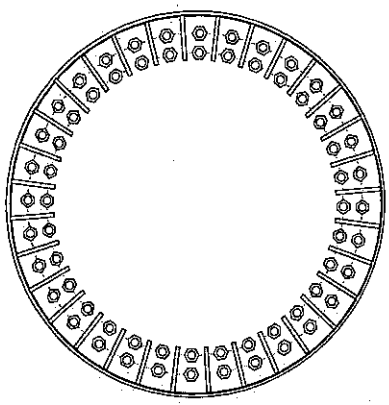
Elevation = 40 ft.

Applied Loads	
Moment (kip-ft)	2106.97
Axial Force (kips)	73.76
Shear Force (kips)	36.86

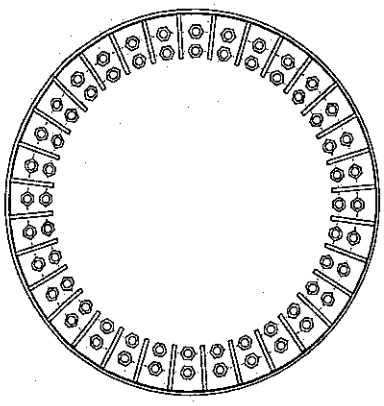
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - Internal



Bottom Plate - Internal



Connection Properties

Bolt Data

GROUP 1: (32) 1-1/4" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 47" BC
GROUP 2: (32) 1-1/4" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 53" BC

Top Plate Data
60" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data
60" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data
(32) 10"H x 7"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Bottom Stiffener Data
(32) 10"H x 7"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Top Pole Data
60" x 0.625" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data
60" x 0.625" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	33.37	
Allowable (kips)	76.31	
Stress Rating:	**41.7%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Top Stiffener Capacity

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Bottom Stiffener Capacity

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Top Pole Capacity

Punching Shear:	**Pirod OK**

Bottom Pole Capacity

Punching Shear:	**Pirod OK**

1. PARAMETERS

Flange Elevation: 20'- 0"

1.1 tnxTower Reactions

Apply TIA-222-H Section 15.5? No

Moment: $M := 4389.46 kip \cdot ft$

Axial Load: $P := 93.77 kip$

Shear Load: $V := 41.57 kip$

1.2 Shaft Properties at the Flange

Upper Shaft Diameter: $D_{shaft1} := 60 in$

Upper Shaft Thickness: $t_1 := 0.625 in$

Lower Shaft Diameter: $D_{shaft2} := 60 in$

Lower Shaft Thickness: $t_2 := 0.75 in$

Shaft Grade: $Fy_{shaft} := 42$ $Fu_{shaft} := 63 ksi$

1.3 Existing Bridge Stiffener Properties

(Verify existing bolted connection for reduced moment.)

Number of Existing Bridge Stiffeners: $N_{exist} := 6$

Existing Bridge Stiffener Grade: $Fy_{Ex} := 65 ksi$ $Fu_{Ex} := 80 ksi$

Diameter to the centroid of Existing Bridge Stiffeners: $BC_{exist} := 61.25 in$

Thickness of Existing Bridge Stiffeners: $t_{exist} := 1.25 in$

Width of Existing Bridge Stiffeners: $w_{exist} := 6.5 in$

Gross Area of One Existing Bridge Stiffener: $A_{g_exist} := w_{exist} \cdot t_{exist} = 8.13 \cdot in^2$

Moment of Inertia of Existing Bridge Stiffeners: $I_{exist} := \frac{N_{exist} \cdot BC_{exist}^2 \cdot A_{g_exist}}{8} = 22861.08 \cdot in^4$

Radius of Gyration about x-axis: $r_{x2} := \frac{t_{exist}}{\sqrt{12}} = 0.36 \cdot in$

1.4 Flange Bolt Properties

Number of Flange Bolts: $N_{bolts} := 64$

Diameter of Flange Bolts:

Bolt Circle of Flange Bolts: $BC_{bolts} := 50in$

Gross Area of One Flange Bolt: $A_{g_bolts} := \frac{\pi}{4} \cdot D_{bolts}^2 = 1.23 \cdot in^2$

Moment of Inertia of Flange Bolts: $I_{bolts} := \frac{N_{bolts} \cdot BC_{bolts}^2 \cdot A_{g_bolts}}{8} = 24543.69 \cdot in^4$

1.5 Division of Forces

Total Gross Area: $A_{g_total} := N_{exist} \cdot A_{g_exist} + N_{bolts} \cdot A_{g_bolts} = 127.29 \cdot in^2$

Total Moment of Inertia: $I_{total} := I_{exist} + I_{bolts} = 47404.78 \cdot in^4$

1.6 Reactions to Existing Bridge Stiffeners

Moment Reaction to Existing Bridge Stiffeners: $M_{exist} := M \cdot \left(\frac{I_{exist}}{I_{total}}\right) = 2116.83 \cdot kip \cdot ft$

Axial Reaction to Existing Bridge Stiffeners: $P_{exist} := 0kip$

Shear Reaction to Existing Bridge Stiffeners: $V_{exist} := 0kip$

1.7 Reactions to Flange Bolts

(It is assumed that all shear and axial loads are taken by the flange bolts)

Moment Reaction to Flange Bolts: $M_{bolts} := M \cdot \left(\frac{I_{bolts}}{I_{total}}\right) = 2272.63 \cdot kip \cdot ft$

Axial Reaction to Flange Bolts: $P_{bolts} := P = 93.77 \cdot kip$

Shear Reaction to Flange Bolts: $V_{bolts} := V = 41.57 \cdot kip$

Check Flange Connection in CCIplate with these Reactions

2. Existing Bridge Stiffener Checks

2.1 Maximum Axial Forces in Single Existing Bridge Stiffener

Outer Radius of Bolt Circle: $C := \frac{BC_{exist}}{2} = 30.63 \cdot in$

Critical Compression Bending Stress: $P_{comp} := \frac{M_{exist} \cdot C}{I_{exist}} \cdot A_{g_exist} + \frac{P_{exist}}{N_{exist}} = 276.48 \cdot kip$

Critical Tension Bending Stress: $P_{tens} := \frac{M_{exist} \cdot C}{I_{exist}} \cdot A_{g_exist} - \frac{P_{exist}}{N_{exist}} = 276.48 \cdot kip$

2.2 Available Compression Strength

[AISC 15th Edition E3-1]

Resistance Factor: $\phi_c := 0.9$

Unbraced Length: $L_u := 19.25in$

Effective Length Factor: $K := 1.0$

Effective Length of Member: $L_c := K \cdot L_u = 19.25 \cdot in$ [AISC 15th Edition E3-2]

Strength of Bridge Stiffener: $Fy_{Ex} = 65 \cdot ksi$ $Fu_{Ex} = 80 \cdot ksi$

Elastic Buckling Stress:
[AISC 15th Ed., Eq. E3-4]

$$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{L_c}{r_{x2}}\right)^2} = 100.57 \cdot ksi$$

Determination of Crticial Stress:
[AISC 15th Ed., Eqs. E3-2 and E3-3]

$$F_{cr} := \begin{cases} \left(0.658^{\frac{Fy_{Ex}}{F_e}} \cdot Fy_{Ex}\right) & \text{if } 4.71 \cdot \sqrt{\frac{E}{Fy_{Ex}}} \geq \frac{L_c}{r_{x2}} \\ \left(0.877 \cdot F_e\right) & \text{otherwise} \end{cases}$$

$F_{cr} = 49.59 \cdot ksi$

Allowable Compressive Strength:
[AISC 15th Ed., Eqs. J4-6 and E3-1]

$$\phi P_n := \begin{cases} \left(\phi_c \cdot Fy_{Ex} \cdot A_{g_exist}\right) & \text{if } \frac{L_c}{r_{x2}} \leq 25 \\ \left(\phi_c \cdot F_{cr} \cdot A_{g_exist}\right) & \text{otherwise} \end{cases}$$

$\phi P_n = 362.66 \cdot kip$

Check Compressive Strength: $Check_{comp} := \begin{cases} \text{"OK"} & \text{if } Capacity_{comp} \le 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$

$Check_{comp} = \text{"OK"}$

$Capacity_{comp} = 72.61\%$

2.3 Available Tension Strength

Gross Section Yield

[AISC 15th Edition Ch. D2]

Available Tension Yield Strength: $\phi P_{ty} := 0.9 \cdot Fy_{Ex} \cdot A_{g_exist} = 475.31 \cdot kip$

Net Section Fracture

Bolt Hole Diameter: $BH := 1.1875in$

Thickness: $T := t_{exist} = 1.25 \cdot in$

Net Area: $A_{net} := A_{g_exist} - \left(BH + \frac{1}{16}in\right) \cdot T = 6.56 \cdot in^2$

Net Area Limitation: $A_e := A_{net} = 6.56 \cdot in^2$

Available Fractile Strength: $\phi P_{tr} := 0.75 \cdot Fu_{Ex} \cdot A_e = 393.75 \cdot kip$

Tension Check

Controlling Mode of Failure: $Check_{mode} := \begin{cases} \text{"Fracture Controls"} & \text{if } \frac{P_{tens}}{\phi P_{tr}} > \frac{P_{tens}}{\phi P_{ty}} \\ \text{"Yield Controls"} & \text{otherwise} \end{cases}$

$Check_{mode} = \text{"Fracture Controls"}$

$\phi P_{nt} := \begin{cases} \phi P_{tr} & \text{if } Check_{mode} = \text{"Fracture Controls"} \\ \phi P_{ty} & \text{otherwise} \end{cases}$

Controlling Tension Mode Check: $Check_{tension} := \begin{cases} \text{"OK"} & \text{if } Capacity_{tension} \le 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$

$Check_{tension} = \text{"OK"}$

$Capacity_{tension} = 66.87\%$

SUMMARY

tnxTower Reactions: $M = 4389.46 \cdot kip \cdot ft$ $P = 93.77 \cdot kip$ $V = 41.57 \cdot kip$

Flange Bolts:

Diameter of Flange Bolts: $D_{bolts} = 1\frac{1}{4} \cdot in$

Bolt Circle of Flange Bolts: $BC_{bolts} = 50 \cdot in$

Loads to Flange Bolts: $M_{bolts} = 2272.63 \cdot ft \cdot kip$ $P = 93.77 \cdot kip$ $V = 41.57 \cdot kip$

See CCIPlate for Flange Bolt and Plate Capacities

Existing Jump Plates:

Moment to Proposed Bridge Stiffeners: $M_{exist} = 2116.83\ ft \cdot kip$

Number of Existing Bridge Stiffeners: $N_{exist} = 6$

Thickness: $t_{exist} = 1.25 \cdot in$

Width: $w_{exist} = 6.5 \cdot in$

Controlling Capacity of Existing Bridge Stiffeners: $Capacity_{exist} = 72.6\ \%$

Monopole Flange Plate Connection

BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

TIA-222 Revision	H

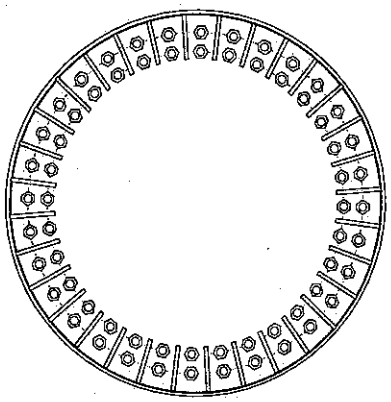
Elevation = 20 ft.

Applied Loads	
Moment (kip-ft)	2272.63
Axial Force (kips)	93.77
Shear Force (kips)	41.57

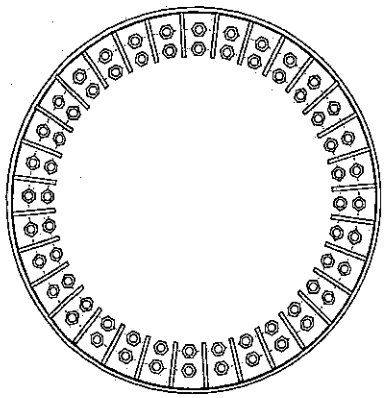
**TIA-222-H Section 15.5 Applied*

CROWN CASTLE

Top Plate - Internal



Bottom Plate - Internal



Connection Properties

Bolt Data

GROUP 1: (32) 1-1/4" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 47" BC
GROUP 2: (32) 1-1/4" ø bolts (A325 N; Fy=81 ksi, Fu=105 ksi) on 53" BC

Top Plate Data
60" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Bottom Plate Data
60" ID x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Top Stiffener Data
(32) 10"H x 7"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Bottom Stiffener Data
(32) 10"H x 7"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Top Pole Data
60" x 0.625" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Bottom Pole Data
60" x 0.75" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Bolt Capacity

Max Load (kips)	36.00	
Allowable (kips)	76.31	
Stress Rating:	**44.9%**	**Pass**

Top Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Bottom Plate Capacity

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**
Tension Side Stress Rating:	**Pirod OK**

Top Stiffener Capacity

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Bottom Stiffener Capacity

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Top Pole Capacity

Punching Shear:	**Pirod OK**

Bottom Pole Capacity

Punching Shear:	**Pirod OK**

Monopole Base Plate Connection

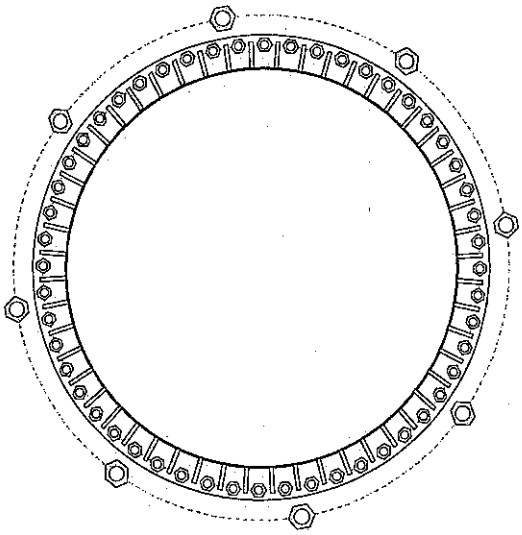
CROWN CASTLE

Site Info	
BU #	829046
Site Name	eston/ Rt-57/ Norfield
Order #	499102 Rev.0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1.375

Applied Loads	
Moment (kip-ft)	5180.31
Axial Force (kips)	107.57
Shear Force (kips)	43.91

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

GROUP 1: (52) 1-1/4" ø bolts (A687 N; Fy=105 ksi, Fu=125 ksi) on 67" BC
GROUP 2: (8) 2-1/4" ø bolts (F1554-105 N; Fy=105 ksi, Fu=125 ksi) on 76" BC

Base Plate Data

70" OD x 1.25" Plate (A36; Fy=36 ksi, Fu=58 ksi)

Stiffener Data

(52) 8"H x 4"W x 0.625"T, Notch: 0.5"
plate: Fy= 36 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.375" fillet
vert. weld: 0.375" fillet

Pole Data

60" x 0.75" round pole (A53-B-42; Fy=42 ksi, Fu=63 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

GROUP 1:

Pu_c = 44.95	ϕPn_c = 101.75	**Stress Rating**
Vu = 0.84	ϕVn = 30.52	**45.5%**
Mu = 0.75	ϕMn = 21.58	**Pass**

GROUP 2:

Pu_c = 163.15	ϕPn_c = 341.25	**Stress Rating**
Vu = 0	ϕVn = 102.38	**45.5%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**

Stiffener Summary

Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Pole Summary

Punching Shear:	**Pirod OK**

Additional Anchor Rod Calculations:

Base Reactions from tnxTower:

$Moment := 5180.31 \cdot kip \cdot ft$

$Axial := 107.57 \cdot kip$

$Shear := 43.91 \cdot kip$

Apply TIA-222-H Section 15.5? No

Original Anchor Rod Group:

$N_{existing} := 52$

$BC_{existing} := 67 \cdot in$

$D_{existing} := 1.25 \cdot in$

$A_{existing} := 0.969 in^2$

$Fu_{exisitng} := 125 ksi$

$Fy_{existing} := 105 ksi$

Other Anchor Rod Group:

$N_{gen1} := 0$

$BC_{gen1} := 0 \cdot in$

$D_{gen1} := 0 \cdot in$

$A_{gen1} := 0 \cdot in^2$

$Fu_{gen1} := 0 ksi$

$Fy_{gen1} := 0 ksi$

Existing Anchor Rod Group:

$N_{new} := 4$

$BC_{new} := 76 \cdot in$

$D_{new} := 2.25 \cdot in$

$A_{new} := 3.25 \cdot in^2$

$Fu_{rod} := 125 ksi$

$Fy_{rod} := 105 ksi$

--See attached CCIplate output for additional anchor rod group capacity and structural rating values--

Anchor Rod Bracket Calculations

Analyze the anchor rod bracket and all components to resist the full demand loading of the additional anchors.

Bracket Demand Load:
From CCI Plate

$Pu := 163.15 \cdot kip$

Tube Design (Square HSS)

Member Size: HSS 4" x 4" x 1/2"

Member Properties
(AISC 15th Ed., Table 1-12):

Outside Diameter: $OD_{HSS} := 4 \cdot in$

Area: $A_{HSS} := 6.02 \cdot in^2$ $\quad A_{e_HSS} := 0.75 \cdot A_{HSS} = 4.51 \cdot in^2$

Thickness: $t_{HSS} := 0.465 \cdot in$

Yield Strength: $F_{y_HSS} := 46 \cdot ksi$ $\quad F_{u_HSS} := 62 \cdot ksi$

Length: $L_{HSS} := 24 \cdot in$

Moment of Inertia: $I_{HSS} := 11.9 \cdot in^4$

Radius of Gyration: $r_{HSS} := 1.41 \cdot in$

Inside Dimension: $ID_{HSS} := OD_{HSS} - 2 \cdot t_{HSS} = 3.07 \cdot in$

Bearing Check
(AISC 15th Ed., Equation J7-1):

$\phi_b := 0.75$

$Pu_c = \phi_b \cdot R_n = \phi_b \cdot 1.8 \cdot F_{y_HSS} \cdot A_{pb}$

$$A_{pb} := \frac{Pu}{\phi_b \cdot 1.8 \cdot F_{y_HSS}} = 2.63 \cdot in^2$$

$$Check_{bear} := \begin{cases} \text{"OK"} & \text{if } A_{HSS} \geq A_{pb} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{bear} = \text{"OK"}$

Compression Check
(AISC 15th Ed., Eqs. E3-1 to E3-4):

$$\phi_c := 0.9$$

$$K := 1$$

$$\phi P_{u_comp} = \phi_c \cdot F_{cr} \cdot A_g$$

$$L_c := K \cdot L_{HSS} = 24 \cdot in$$

$$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{L_c}{r_{HSS}}\right)^2} = 987.9 \cdot ksi$$

$$\frac{L_c}{r_{HSS}} = 17.02 \quad < \quad 4.71 \cdot \sqrt{\frac{29000 \cdot ksi}{F_{y_HSS}}} = 118.26$$

$$\therefore \quad F_{cr} := 0.658^{\frac{F_{y_HSS}}{F_e}} \cdot F_{y_HSS} = 45.11 \cdot ksi$$

(AISC 15th Ed., Equation J4-6):

$$\phi P_{u_comp} := \begin{cases} \phi_c \cdot F_{y_HSS} \cdot A_{HSS} & \text{if } \frac{L_c}{r_{HSS}} \le 25 \\ \phi_c \cdot F_{cr} \cdot A_{HSS} & \text{otherwise} \end{cases}$$

$$\phi P_{u_comp} = 249.23 \cdot kip$$

$$Check_{comp} := \begin{cases} \text{"OK"} & \text{if } Rating_{comp} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$$Check_{comp} = \text{"OK"}$$

Gusset Plate Design

Gusset Plate width: $w_{plate} := 6.25 \cdot in$

Gusset Plate thickness: $t_{plate} := 1.25in$

$L_{plate1} := 30in$

$L_{plate2} := 24in$

Gusset Plate Strength: $Fy_{plate} := 50ksi$

$Fu_{plate} := 65ksi$

Pole thickness: $t_{pole} := 0.75in$

Shear Check
(AISC 15th Ed., Eqs. J4-3 and J4-4):

$A_g := t_{plate} \cdot L_{plate2} = 30 \cdot in^2$

$A_{nv} := A_g = 30 \cdot in^2$

Shear Yielding

$\phi_v := 1$

$\phi V_{plate} := \phi_v \cdot 0.6 \cdot A_g \cdot Fy_{plate} = 900 \cdot kip$

$$Check_{shear} := \begin{cases} \text{"OK"} & \text{if } Rating_{shear} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{shear} = \text{"OK"}$

Shear Rupture

$\phi_v := 0.75$

$\phi V_{plate} := \phi_v \cdot 0.6 \cdot A_{nv} \cdot Fu_{plate} = 877.5 \cdot kip$

$$Check_{shear} := \begin{cases} \text{"OK"} & \text{if } Rating_{shear} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{shear} = \text{"OK"}$

Gusset Plate to Pole and Base Plate Weld Design (Horizontal and Vertical Weld):
(AISC 15th Ed., Part 8)

Gusset plate thickness: $t_{plate} = 1.25 \cdot in$

Pole Grade: $Fy_{pole} := 42ksi$ $Fu_{pole} := 63ksi$

Base Plate Grade: $Fy_{base} := 36ksi$ $Fu_{base} := 58ksi$

Gussett Plate Grade: $Fy_{plate} = 50 \cdot ksi$ $Fu_{plate} = 65 \cdot ksi$

Height of vertical weld from base plate: $H := L_{plate1} = 30 \cdot in$

$Notch_{horiz} := 0.75 \cdot in$

$Notch_{vert} := 0.75 \cdot in$

Gap between Base Plate and HSS: $Gap := 0in$

Vertical fillet weld size to pole: (in sixteenths of an inch) $D_{vpole} := 5$

$weldsize_{pole} := \frac{D_{vpole}}{16} = \frac{5}{16}$

Weld Material Grade: $F_{EXX} := 80ksi$

$$Check := \begin{cases} \text{"OK"} & \text{if } Rating < 100\% \\ \text{"INSUFFICIENT"}, & \text{otherwise} \end{cases}$$

$Check = \text{"OK"}$

Gusset Plate to HSS Weld Design
(AISC 15th Ed., Table 8-4)

Electrode Strength: $F_{EXX} = 80ksi$

Weld Size (in sixteenths of an inch): $D_1 := 10$ $\quad weldsize_1 := \frac{D_1}{16} = \frac{5}{8}$

Assume the worst-case installation scenario where the rod is positioned directly against the far side of the HSS.

$$ecc_2 := OD_{HSS} - t_{HSS} - \frac{D_{new}}{2} = 2.41 \cdot in$$

Load not in plane with weld group: $k := 0$

$$a := \frac{ecc_2}{L_{plate2}} = 0.1$$

$$C_1 = 1.03$$

$$Coeff_1 := 3.67$$

$$\phi_w := 0.75$$

$$D_{min1} := ceil\left(\frac{Pu \cdot in}{\phi_w \cdot Coeff_1\, C_1 \cdot L_{plate2} \cdot kip}\right) = 3$$

$$minweldsize := \frac{D_{min1}}{16} = \frac{3}{16}$$

$$Check_{weld} := \begin{cases} \text{"OK"} & \text{if } D_1 \geq D_{min1} \wedge D_1 \geq Min_{weldsize} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$$Check_{weld} = \text{"OK"}$$

$$\phi Rn_{weld1} := \phi_w \cdot Coeff_1\, ksi \cdot in \cdot C_1 \cdot D_1 \cdot L_{plate2} = 680.42 \cdot kip$$

$$Check_{weld1} := \begin{cases} \text{"OK"} & \text{if } Rating_{weld1} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$$Check_{weld1} = \text{"OK"}$$

Gusset Plate to Pole Punching Shear Check (max per unit length): (AISC 15th Ed., Section J4.2)

Assume the worst-case installation scenario where the rod is positioned directly against the far side of the HSS.

$\phi_{sy} := 1.0$

$\phi_{sr} := 0.75$

$ecc_1 := w_{plate} + OD_{HSS} - t_{HSS} - \frac{D_{new}}{2} = 8.66 \cdot in$

$M_1 := Pu \cdot ecc_1 = 1412.88 \cdot kip \cdot in$

$S_1 := \frac{t_{plate} \cdot L_{plate1}^2}{6} = 187.5 \cdot in^3$

$f_v := \frac{M_1}{S_1} \cdot t_{plate} \cdot 1in = 9.42 \cdot kip$

AISC 15th Ed., Equation J4-3:

$\phi F_{sy} := \phi_{sy} \cdot 0.6 \cdot Fy_{pole} \cdot 2 \cdot t_{pole} \cdot 1in = 37.8 \cdot kip$

AISC 15th Ed., Equation J4-4:

$\phi F_{sr} := \phi_{sr} \cdot 0.6 \cdot Fu_{pole} \cdot 2 \cdot t_{pole} \cdot 1in = 42.52 \cdot kip$

$\phi F_v := \min(\phi F_{sy}, \phi F_{sr}) = 37.8 \cdot kip$

$$Check_{PS1} := \begin{cases} \text{"OK"} & \text{if } Rating_{PS1} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{PS1} = \text{"OK"}$

Gusset Plate to HSS Punching Shear Check (max per unit length): (AISC 15th Ed., Section J4.2)

Assume the worst-case installation scenario where the rod is positioned directly against the far side of the HSS.

$ecc_2 := OD_{HSS} - t_{HSS} - \frac{D_{new}}{2} = 2.41 \cdot in$

$M_2 := Pu \cdot ecc_2 = 393.19 \cdot kip \cdot in$

$S_2 := \frac{t_{plate} \cdot L_{plate2}^2}{6} = 120 \cdot in^3$

$f_v := \frac{M_2}{S_2} \cdot t_{plate} \cdot 1in = 4.1 \cdot kip$

AISC 15th Ed., Equation J4-3:

$\phi F_{sy} := \phi_{sy} \cdot 0.6 \cdot F_{y_HSS} \cdot 2 \cdot t_{HSS} \cdot 1in = 25.67 \cdot kip$

AISC 15th Ed., Equation J4-4:

$\phi F_{sr} := \phi_{sr} \cdot 0.6 \cdot F_{u_HSS} \cdot 2 \cdot t_{HSS} \cdot 1in = 25.95 \cdot kip$

$\phi F_v := \min(\phi F_{sy}, \phi F_{sr}) = 25.67 \cdot kip$

$$Check_{PS2} := \begin{cases} \text{"OK"} & \text{if } Rating_{PS2} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{PS2} = \text{"OK"}$

Embedment Depth Calculations

Projected Embedment Depth: $L_{em} := 6 \cdot ft$

Yield Strength of Rebar: $f_y := 60ksi$

Concrete Strength: $f'_c := 5000psi$

Transverse Reinforcement Index: $k_{tr} := 0$ Can be taken as 0 for design per ACI 318-14

Epoxy Factor: $\psi_e := 1$

Rebar Size Factor: $\psi_s := 1$

Casting Position Factor: $\psi_t := 1$

Concrete Weight Factor: $\lambda := 1 \cdot \sqrt{psi}$

Pier Diameter: $D_{pier} := 7.5ft$

Cover: $c_c := 3in$

Rebar Size: $d_s := 9$ $d_b := \text{vlookup}(d_s, \text{Rebar}, 2) \cdot in = 1.13 \cdot in$

Tie Size: $Tie := 4$

Number of Vertical Rebar: $n := 47$

The embedment depth shall be analyzed based on the design tension capacity of the anchor rods.

Design Load: $\phi P_{nt} := 0.75 \cdot Fu_{rod} \cdot A_{new} = 304.69 \cdot kip$

Development Length (ACI 318-14 Chapter 25):

$$BC_{rebar} := D_{pier} - 2 \cdot c_c - \frac{Tie \cdot in}{4} - d_b = 81.87 \cdot in$$

$$S_{rebar} := \frac{\pi \cdot BC_{rebar}}{n} = 5.473 \cdot in$$

$$c_b := \min\left(c_c + \frac{Tie}{8} in + \frac{d_b}{2}, S_{rebar} \cdot 0.5\right) = 2.74 \cdot in$$

ACI 318-14, Equation 25.4.2.3a:

$$l_d := \left[\frac{3}{40} \cdot \frac{f_y}{\lambda \cdot \sqrt{f'_c}} \cdot \frac{\psi_t \cdot \psi_e \cdot \psi_s}{\min\left[\left(\frac{c_b + k_{tr}}{d_b}\right), 2.5\right]}\right] \cdot d_b = 29.59 \cdot in$$

Calculate Max Distance Between Rebar and New Anchor Rods:

$$A := \frac{1}{2} \cdot S_{rebar} = 2.736 \cdot in$$

$$B := \frac{BC_{rebar}}{2} - \frac{BC_{new}}{2} = 2.936 \cdot in$$

$$G := \sqrt{A^2 + B^2} = 4.013 \cdot in$$

$$l'_d := l_d + \frac{G}{1.5} + 3in = 2.94\,ft$$

Epoxy Development Length:

Bond Strength:

Epoxy := Hilti Hit Re 500

$$\phi_{bond} := 0.65$$

$$S_b := \begin{cases} S_{bh} & \text{if } Epoxy = 0 \\ S_{bA} & \text{otherwise} \end{cases}$$

$$S_b = 1073\,psi$$

$$L_{be} := \frac{\phi P_{nt}}{\pi \cdot D_{new} \cdot S_b \cdot \phi_{bond}} = 61.8 \cdot in$$

Required Embedment Length:

Length of Breaker Tape: $L_{BT} := 0 \cdot in$

$$L_{min} := \max\left(L_{be} + L_{BT}, l'_d + 0.25 \cdot L_{be}\right) = 5.15\,ft$$

$$Check := \begin{cases} \text{"OK"} & \text{if } L_{min} \le L_{em} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

Check = "OK"

Anchor Rod Pullout Test:

$$\phi_p := 0.75$$

Is this a CA **DSA** site? ○ Yes ◉ No

$$Pullout := \begin{cases} \dfrac{\phi_p \cdot Fu_{rod} \cdot A_{new}}{1.6} & \text{if } CA = 0 \\ \left(0.8 \cdot Fy_{rod} \cdot A_{new}\right) & \text{otherwise} \end{cases} = 190 \cdot kip$$

Additional Anchor Rod Calculations:

Base Reactions from tnxTower:

$Moment := 5180.31 \cdot kip \cdot ft$

$Axial := 107.57 \cdot kip$

$Shear := 43.91 \cdot kip$

Apply TIA-222-H Section 15.5? No / Yes

Original Anchor Rod Group:

$N_{existing} := 52$

$BC_{existing} := 67 \cdot in$

$D_{existing} := 1.25 \cdot in$

$A_{existing} := 0.969 in^2$

$Fu_{exisitng} := 125ksi$

$Fy_{existing} := 105ksi$

Other Anchor Rod Group:

$N_{gen1} := 0$

$BC_{gen1} := 0 \cdot in$

$D_{gen1} := 0 \cdot in$

$A_{gen1} := 0 \cdot in^2$

$Fu_{gen1} := 0ksi$

$Fy_{gen1} := 0ksi$

Existing Anchor Rod Group:

$N_{new} := 4$

$BC_{new} := 76 \cdot in$

$D_{new} := 2.25 \cdot in$

$A_{new} := 3.25 \cdot in^2$

$Fu_{rod} := 125ksi$

$Fy_{rod} := 105ksi$

--See attached CCIplate output for additional anchor rod group capacity and structural rating values--

Anchor Rod Bracket Calculations

Analyze the anchor rod bracket and all components to resist the full demand loading of the additional anchors.

Bracket Demand Load:
From CCI Plate

$Pu := 163.15 \cdot kip$

Tube Design (Square HSS)

Member Size: HSS 4" x 4" x 1/2"

Member Properties
(AISC 15th Ed., Table 1-12):

Outside Diameter: $OD_{HSS} := 4 \cdot in$

Area: $A_{HSS} := 6.02 \cdot in^2$ $\quad A_{e_HSS} := 0.75 \cdot A_{HSS} = 4.51 \cdot in^2$

Thickness: $t_{HSS} := 0.465 \cdot in$

Yield Strength: $F_{y_HSS} := 46 \cdot ksi$ $\quad F_{u_HSS} := 62 \cdot ksi$

Length: $L_{HSS} := 24 \cdot in$

Moment of Inertia: $I_{HSS} := 11.9 \cdot in^4$

Radius of Gyration: $r_{HSS} := 1.41 \cdot in$

Inside Dimension: $ID_{HSS} := OD_{HSS} - 2 \cdot t_{HSS} = 3.07 \cdot in$

Bearing Check
(AISC 15th Ed., Equation J7-1):

$\phi_b := 0.75$

$Pu_c = \phi_b \cdot R_n = \phi_b \cdot 1.8 \cdot F_{y_HSS} \cdot A_{pb}$

$$A_{pb} := \frac{Pu}{\phi_b \cdot 1.8 \cdot F_{y_HSS}} = 2.63 \cdot in^2$$

$$Check_{bear} := \begin{cases} \text{"OK"} & \text{if } A_{HSS} \geq A_{pb} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{bear} = \text{"OK"}$

Compression Check
(AISC 15th Ed., Eqs. E3-1 to E3-4):

$\phi_c := 0.9$

$K := 1$

$\phi P_{u_comp} = \phi_c \cdot F_{cr} \cdot A_g$

$L_c := K \cdot L_{HSS} = 24 \cdot in$

$$F_e := \frac{\pi^2 \cdot 29000ksi}{\left(\frac{L_c}{r_{HSS}}\right)^2} = 987.9 \cdot ksi$$

$$\frac{L_c}{r_{HSS}} = 17.02 \quad < \quad 4.71 \cdot \sqrt{\frac{29000 \cdot ksi}{F_{y_HSS}}} = 118.26$$

$$\therefore \quad F_{cr} := 0.658^{\frac{F_{y_HSS}}{F_e}} \cdot F_{y_HSS} = 45.11 \cdot ksi$$

(AISC 15th Ed., Equation J4-6):

$$\phi P_{u_comp} := \begin{cases} \phi_c \cdot F_{y_HSS} \cdot A_{HSS} & \text{if } \frac{L_c}{r_{HSS}} \le 25 \\ \phi_c \cdot F_{cr} \cdot A_{HSS} & \text{otherwise} \end{cases}$$

$\phi P_{u_comp} = 249.23 \cdot kip$

$$Check_{comp} := \begin{cases} \text{"OK"} & \text{if } Rating_{comp} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{comp} = \text{"OK"}$

Gusset Plate Design

Gusset Plate width: $w_{plate} := 6.25 \cdot in$

Gusset Plate thickness: $t_{plate} := 1.25in$

$L_{plate1} := 75in$

$L_{plate2} := 24in$

Gusset Plate Strength: $Fy_{plate} := 50ksi$

$Fu_{plate} := 65ksi$

Pole thickness: $t_{pole} := 0.75in$

Shear Check
(AISC 15th Ed., Eqs. J4-3 and J4-4):

$A_g := t_{plate} \cdot L_{plate2} = 30 \cdot in^2$

$A_{nv} := A_g = 30 \cdot in^2$

Shear Yielding

$\phi_v := 1$

$\phi V_{plate} := \phi_v \cdot 0.6 \cdot A_g \cdot Fy_{plate} = 900 \cdot kip$

$$Check_{shear} := \begin{cases} \text{"OK"} & \text{if } Rating_{shear} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{shear} = \text{"OK"}$

Shear Rupture

$\phi_v := 0.75$

$\phi V_{plate} := \phi_v \cdot 0.6 \cdot A_{nv} \cdot Fu_{plate} = 877.5 \cdot kip$

$$Check_{shear} := \begin{cases} \text{"OK"} & \text{if } Rating_{shear} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{shear} = \text{"OK"}$

Gusset Plate to Pole and Base Plate Weld Design (Horizontal and Vertical Weld):
(AISC 15th Ed., Part 8)

Gusset plate thickness: $t_{plate} = 1.25 \cdot in$

Pole Grade: $Fy_{pole} := 42ksi$ $Fu_{pole} := 63ksi$

Base Plate Grade: $Fy_{base} := 36ksi$ $Fu_{base} := 58ksi$

Gussett Plate Grade: $Fy_{plate} = 50 \cdot ksi$ $Fu_{plate} = 65 \cdot ksi$

Height of vertical weld from base plate: $H := L_{plate1} = 75 \cdot in$

$Notch_{horiz} := 0.75 \cdot in$

$Notch_{vert} := 0.75 \cdot in$

Gap between Base Plate and HSS: $Gap := 0in$

Vertical fillet weld size to pole:
(in sixteenths of an inch) $D_{vpole} := 5$

$weldsize_{pole} := \frac{D_{vpole}}{16} = \frac{5}{16}$

Weld Material Grade: $F_{EXX} := 80ksi$

$$Check := \begin{cases} \text{"OK"} & \text{if } Rating < 100\% \\ \text{"INSUFFICIENT"} & \text{otherwise} \end{cases}$$

$Check = \text{"OK"}$

Gusset Plate to HSS Weld Design
(AISC 15th Ed., Table 8-4)

Electrode Strength: $F_{EXX} := 80ksi$

Weld Size (in sixteenths of an inch): $D_1 := 10$ $\quad weldsize_1 := \frac{D_1}{16} = \frac{5}{8}$

Assume the worst-case installation scenario where the rod is positioned directly against the far side of the HSS.

$$ecc_2 := OD_{HSS} - t_{HSS} - \frac{D_{new}}{2} = 2.41 \cdot in$$

Load not in plane with weld group: $k := 0$

$$a := \frac{ecc_2}{L_{plate2}} = 0.1$$

$$C_1 = 1.03$$

$$Coeff_1 := 3.67$$

$$\phi_w := 0.75$$

$$D_{min1} := ceil\left(\frac{Pu \cdot in}{\phi_w \cdot Coeff_1 \, C_1 \cdot L_{plate2} \cdot kip}\right) = 3$$

$$minweldsize := \frac{D_{min1}}{16} = \frac{3}{16}$$

$$Check_{weld} := \begin{cases} \text{"OK"} & \text{if } D_1 \geq D_{min1} \wedge D_1 \geq Min_{weldsize} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$$Check_{weld} = \text{"OK"}$$

$$\phi Rn_{weld1} := \phi_w \cdot Coeff_1 \, ksi \cdot in \cdot C_1 \cdot D_1 \cdot L_{plate2} = 680.42 \cdot kip$$

$$Check_{weld1} := \begin{cases} \text{"OK"} & \text{if } Rating_{weld1} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$$Check_{weld1} = \text{"OK"}$$

Gusset Plate to Pole Punching Shear Check (max per unit length): (AISC 15th Ed., Section J4.2)

Assume the worst-case installation scenario where the rod is positioned directly against the far side of the HSS.

$\phi_{sy} := 1.0$

$\phi_{sr} := 0.75$

$ecc_1 := w_{plate} + OD_{HSS} - t_{HSS} - \frac{D_{new}}{2} = 8.66 \cdot in$

$M_1 := Pu \cdot ecc_1 = 1412.88 \cdot kip \cdot in$

$S_1 := \frac{t_{plate} \cdot L_{plate1}^2}{6} = 1171.88 \cdot in^3$

$f_v := \frac{M_1}{S_1} \cdot t_{plate} \cdot 1in = 1.51 \cdot kip$

AISC 15th Ed., Equation J4-3:

$\phi F_{sy} := \phi_{sy} \cdot 0.6 \cdot Fy_{pole} \cdot 2 \cdot t_{pole} \cdot 1in = 37.8 \cdot kip$

AISC 15th Ed., Equation J4-4:

$\phi F_{sr} := \phi_{sr} \cdot 0.6 \cdot Fu_{pole} \cdot 2 \cdot t_{pole} \cdot 1in = 42.52 \cdot kip$

$\phi F_v := \min(\phi F_{sy}, \phi F_{sr}) = 37.8 \cdot kip$

$$Check_{PS1} := \begin{cases} \text{"OK"} & \text{if } Rating_{PS1} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{PS1} = \text{"OK"}$

Gusset Plate to HSS Punching Shear Check (max per unit length): (AISC 15th Ed., Section J4.2)

Assume the worst-case installation scenario where the rod is positioned directly against the far side of the HSS.

$ecc_2 := OD_{HSS} - t_{HSS} - \frac{D_{new}}{2} = 2.41 \cdot in$

$M_2 := Pu \cdot ecc_2 = 393.19 \cdot kip \cdot in$

$S_2 := \frac{t_{plate} \cdot L_{plate2}^2}{6} = 120 \cdot in^3$

$f_v := \frac{M_2}{S_2} \cdot t_{plate} \cdot 1in = 4.1 \cdot kip$

AISC 15th Ed., Equation J4-3:

$\phi F_{sy} := \phi_{sy} \cdot 0.6 \cdot F_{y_HSS} \cdot 2 \cdot t_{HSS} \cdot 1in = 25.67 \cdot kip$

AISC 15th Ed., Equation J4-4:

$\phi F_{sr} := \phi_{sr} \cdot 0.6 \cdot F_{u_HSS} \cdot 2 \cdot t_{HSS} \cdot 1in = 25.95 \cdot kip$

$\phi F_v := \min(\phi F_{sy}, \phi F_{sr}) = 25.67 \cdot kip$

$$Check_{PS2} := \begin{cases} \text{"OK"} & \text{if } Rating_{PS2} < 100\% \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$Check_{PS2} = \text{"OK"}$

Embedment Depth Calculations

Projected Embedment Depth: $L_{em} := 6 \cdot ft$

Yield Strength of Rebar: $f_y := 60ksi$

Concrete Strength: $f'_c := 5000psi$

Transverse Reinforcement Index: $k_{tr} := 0$ Can be taken as 0 for design per ACI 318-14

Epoxy Factor: $\psi_e := 1$

Rebar Size Factor: $\psi_s := 1$

Casting Position Factor: $\psi_t := 1$

Concrete Weight Factor: $\lambda := 1 \cdot \sqrt{psi}$

Pier Diameter: $D_{pier} := 7.5ft$

Cover: $c_c := 3in$

Rebar Size: $d_s := 9$ $d_b := \text{vlookup}(d_s, \text{Rebar}, 2) \cdot in = 1.13 \cdot in$

Tie Size: $Tie := 4$

Number of Vertical Rebar: $n := 47$

The embedment depth shall be analyzed based on the design tension capacity of the anchor rods.

Design Load: $\phi P_{nt} := 0.75 \cdot Fu_{rod} \cdot A_{new} = 304.69 \cdot kip$

Development Length (ACI 318-14 Chapter 25):

$$BC_{rebar} := D_{pier} - 2 \cdot c_c - \frac{Tie \cdot in}{4} - d_b = 81.87 \cdot in$$

$$S_{rebar} := \frac{\pi \cdot BC_{rebar}}{n} = 5.473 \cdot in$$

$$c_b := \min\left(c_c + \frac{Tie}{8} in + \frac{d_b}{2}, S_{rebar} \cdot 0.5\right) = 2.74 \cdot in$$

ACI 318-14, Equation 25.4.2.3a:

$$l_d := \left[\frac{3}{40} \cdot \frac{f_y}{\lambda \cdot \sqrt{f'_c}} \cdot \frac{\psi_t \cdot \psi_e \cdot \psi_s}{\min\left[\left(\frac{c_b + k_{tr}}{d_b}\right), 2.5\right]}\right] \cdot d_b = 29.59 \cdot in$$

Calculate Max Distance Between Rebar and New Anchor Rods:

$$A := \frac{1}{2} \cdot S_{rebar} = 2.736 \cdot in$$

$$B := \frac{BC_{rebar}}{2} - \frac{BC_{new}}{2} = 2.936 \cdot in$$

$$G := \sqrt{A^2 + B^2} = 4.013 \cdot in$$

$$l'_d := l_d + \frac{G}{1.5} + 3in = 2.94\,ft$$

Epoxy Development Length:

Bond Strength:

Epoxy := HilTi HIT-RE 500

$$\phi_{bond} := 0.65$$

$$S_b := \begin{cases} S_{bh} & \text{if } Epoxy = 0 \\ S_{bA} & \text{otherwise} \end{cases}$$

$$S_b = 1073\,psi$$

$$L_{be} := \frac{\phi P_{nt}}{\pi \cdot D_{new} \cdot S_b \cdot \phi_{bond}} = 61.8 \cdot in$$

Required Embedment Length:

Length of Breaker Tape: $L_{BT} := 0 \cdot in$

$$L_{min} := \max\left(L_{be} + L_{BT}, l'_d + 0.25 \cdot L_{be}\right) = 5.15\,ft$$

$$Check := \begin{cases} \text{"OK"} & \text{if } L_{min} \le L_{em} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

Check = "OK"

Anchor Rod Pullout Test:

$$\phi_p := 0.75$$

Is this a CA **DSA** site? ○ Yes ◉ No

$$Pullout := \begin{cases} \dfrac{\phi_p \cdot Fu_{rod} \cdot A_{new}}{1.6} & \text{if } CA = 0 \\ \left(0.8 \cdot Fy_{rod} \cdot A_{new}\right) & \text{otherwise} \end{cases} = 190 \cdot kip$$

BLACK & VEATCH Building a world of difference.	Client:	Crown Castle	Design:	AM
6800 W. 115th St., Suite 2292	Project:	400087 (829046.1765202)	Date:	7/22/2019
Overland Park, KS 66211	Site:	Weston/ Rt-57/ Norfield R	Verify:	AUC
Phone: (913) 458-6909	Title:	Foundation Design Reaction Comparison	Date:	7/22/2019
			Code:	TIA-222-H

Template Version 1.7

FOUNDATION ANALYSIS:

Original Tower Design Reactions:

Pad & Pier:

Shear:	52.8	Kip
Overturning Moment:	7052.7	Kip-ft

Note: Design reactions are multiplied by 1.35 for comparison as allowed by TIA-222-H Section 15.6.2.

TnxTower Reactions:

Drilled Caisson:

Shear:	44.0	Kip
Overturning Moment:	5180.0	Kip-ft

Stress Ratio:

Drilled Caisson:

Shear:	79.4%
Overturning Moment:	69.9%

Note: Ratings per TIA-222-H Section 15.5.

Conclusion:

When the calculated reactions are compared to the original design reactions, the existing foundation is considered to have been designed and constructed with adequate capacity to support the existing and proposed loads.

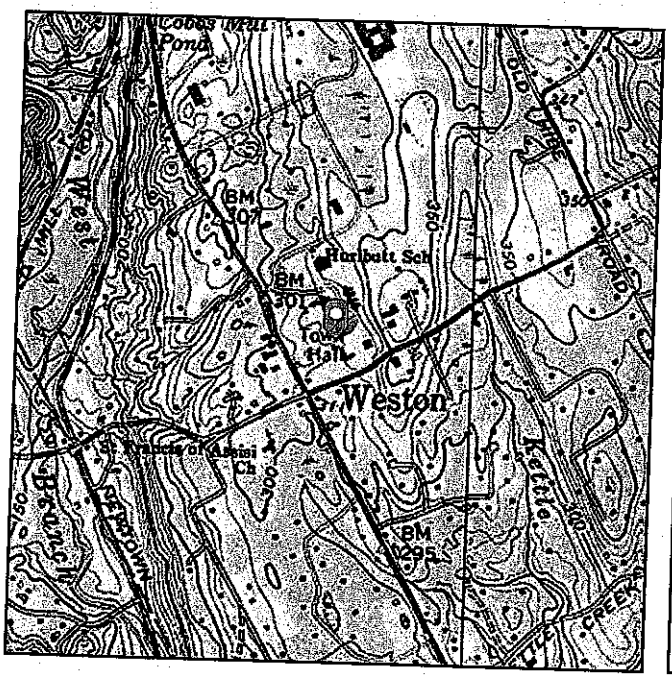
Controlling Foundation Stress Ratio: 79.4%

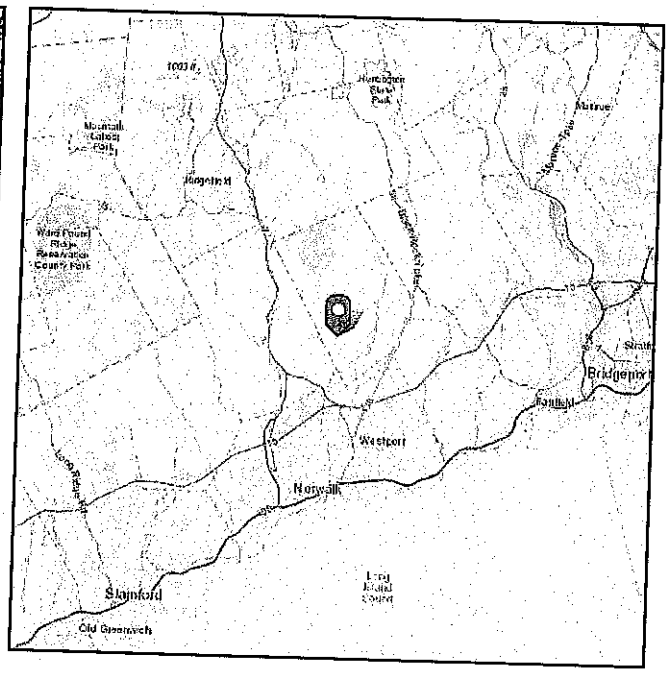
ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 321.79 ft (NAVD 88)
Latitude: 41.202333
Longitude: -73.379611





Wind

Results:

Wind Speed:	119 Vmph
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	91 Vmph
100-year MRI	98 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:	Thu Jul 18 2019

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.

ASCE
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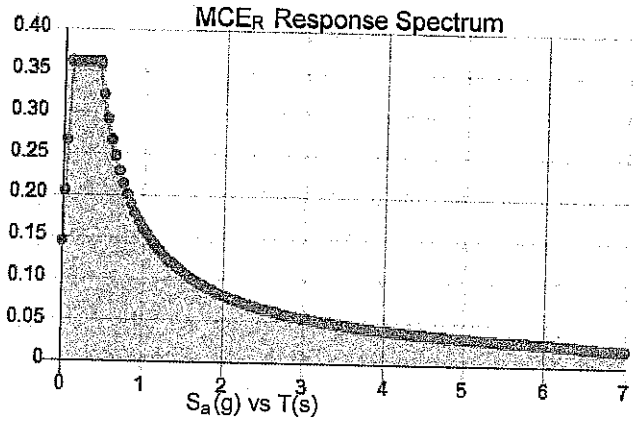
Seismic

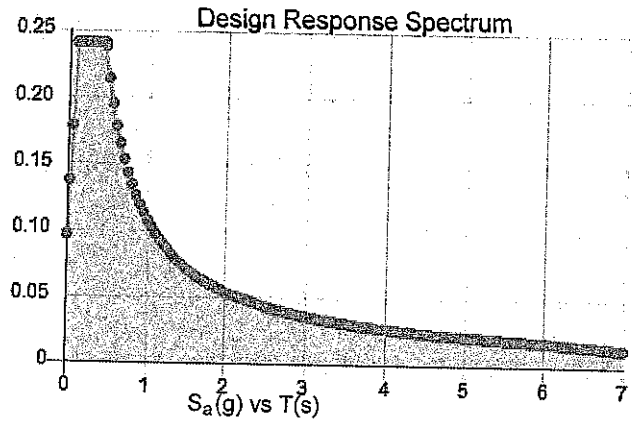
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.226	S_{DS} :	0.241
S_1 :	0.067	S_{D1} :	0.107
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.126
S_{MS} :	0.361	PGA_M :	0.195
S_{M1} :	0.16	F_{PGA} :	1.548
		I_e :	1

Seismic Design Category B





Data Accessed: Thu Jul 18 2019

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.

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Ice

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:	Thu Jul 18 2019

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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