



STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

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VIA ELECTRONIC MAIL

May 15, 2024

Jeffrey Barbadora
Permitting Specialist
Crown Castle
1800 West Park Drive
Westborough, MA 01581
Jeff.Barbadora@crowncastle.com

RE: **EM-VER-143-230823** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 136 Wright Road, Torrington, Connecticut.
Request for Project Change.

Dear Jeffrey Barbadora:

The Connecticut Siting Council (Council) is in receipt of the correspondence dated May 8, 2024 and the associated Structural Analysis dated April 29, 2024, regarding a project change for the above-referenced exempt modification request acknowledged by the Council on September 18, 2023.

Pursuant to Condition No. 1 of the Council's September 18, 2023 exempt modification approval, the request to increase the number of Kaelus interference mitigation filters to be installed from two to four is hereby approved.

This approval applies only to the project change in the correspondence dated May 8, 2024.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/ANM/laf

c: The Honorable Elinor C. Carbone, Mayor, City of Torrington (elinor_carbone@torringtonct.org)

From: Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
Sent: Wednesday, May 8, 2024 1:42 PM
To: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: EM-VER-143-230823 - 136 Wright Road Torrington CT - 876373

Good afternoon,

Would the CSC please update the approval for EM-VER-143-230823 to include a total of 4 filters?

The original SA submitted with the application and dated 7/25/2023 stated only 2 filters and should have stated 4 filters.

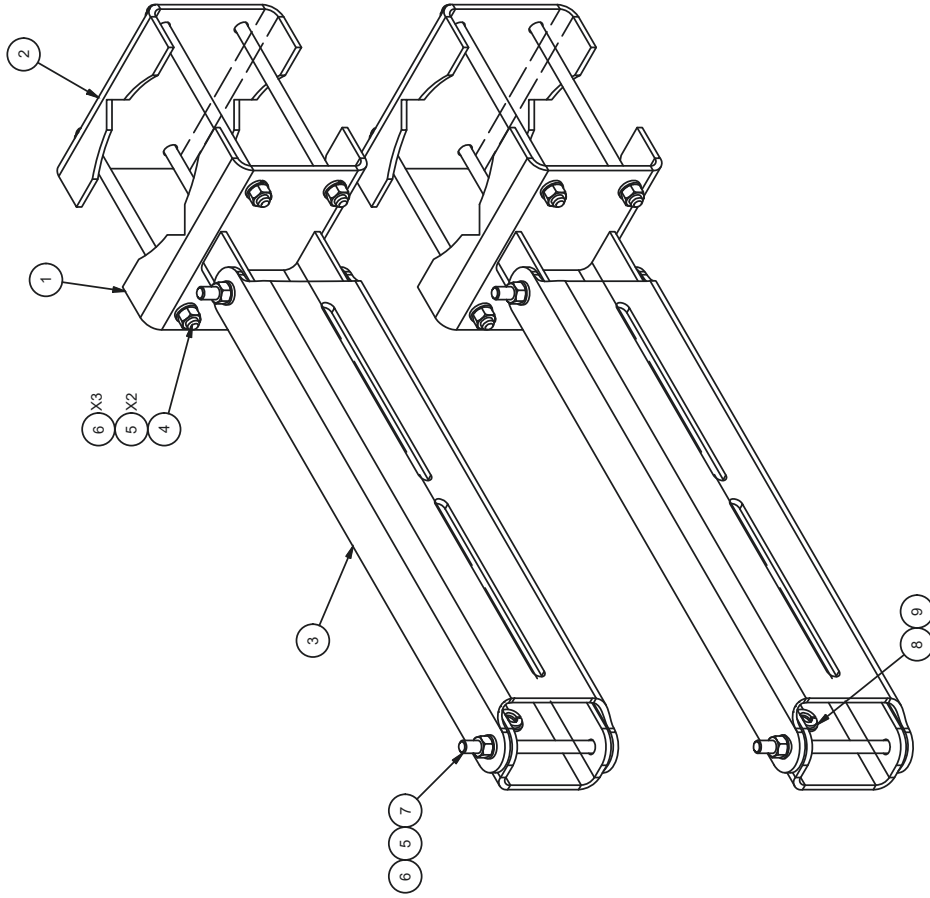
Please see updated SA stating a total of 4 filters and let me know if you have any questions.

Thanks,

Jeffrey Barbadora
Permitting Specialist
781-970-0053

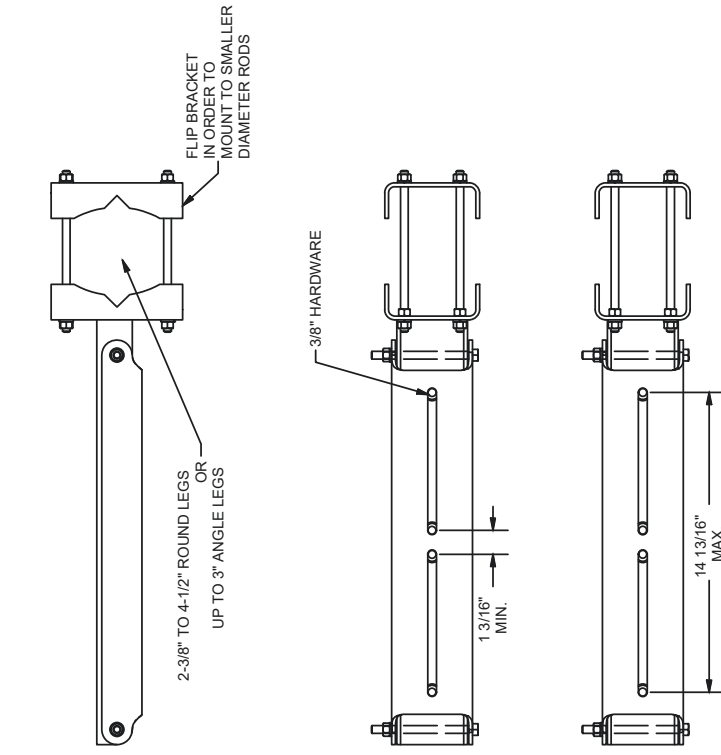
Crown Castle
1800 W. Park Drive, Suite 250
Westborough, MA 01581

83:2659A(8-479-4A1, *A), " (%AS&##AS0#A+++&A+,.80)*&--



PARTS LIST

ITEM	QTY	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	2	MOUNTING ARM		8.99	17.97
2	2	CLAMP PLATE		2.35	4.69
3	2	SWIVEL MOUNT		6.65	13.30
4	8	3/8"-16 UNC X 8" GALV. THREADED ROD		0.25	2.00
5	20	3/8" GALV LOCK WASHER		0.01	0.13
6	28	3/8"-16 UNC GALV HEX NUT		0.02	0.52
7	4	3/8" X 5" GALV BOLT		0.18	0.71
8	8	3/8" SS FLAT WASHER		0.01	0.08
9	8	3/8" SS LOCK WASHER		0.01	0.05
TOTAL WT. #				39.43	



TOLERANCE NOTES:
 TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
 SAWED, SHEARED AND GAS CUT EDGES ($\pm 0.030"$)
 DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES
 LASER CUT EDGES AND HOLES ($\pm 0.010"$) - NO CONING OF HOLES
 BENDS ARE $\pm 1/2$ DEGREE
 ALL OTHER MACHINING ($\pm 0.030"$)
 ALL OTHER ASSEMBLY ($\pm 0.060"$)
 PROPRIETARY NOTE: DIMENSIONS CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION
 RRU
 DUAL SWIVEL MOUNT

CPD NO.	DRAWN BY	ENG. APPROVAL
81	CEK	1/12/2015
CLASS	DRAWING USAGE	CHECKED BY
01	SHOP	BMC 2/3/2015



Locations:
 New York, NY
 Atlanta, GA
 Los Angeles, CA
 Plymouth, IN
 Salem, OR
 Dallas, TX

Engineering
 Support Team:
 1-888-753-7446

PART NO.	RRUDSM	PAGE	1 OF 1
DWG. NO.	RRUDSM		

Date: **April 29, 2024**



Black & Veatch Corp.
11401 Lamar Avenue
Overland Park, KS 66211
(913) 458-6963

Subject: **Structural Analysis Report**

Carrier Designation: **Verizon Wireless Co-Locate**
Site Number: 5000248022
Site Name: TORRINGTON W CT

Crown Castle Designation: **BU Number:** 876373
Site Name: LONG EDDY / WRIGHT PROPERTY
JDE Job Number: 2114227
Work Order Number: 2296741
Order Number: 669336 Rev. 0

Engineering Firm Designation: **Black & Veatch Corp. Project Number:** 406642

Site Data: **136 Wright Rd., Torrington, Litchfield County, CT**
Latitude 41° 49' 38.34", Longitude -73° 10' 13.97"
148 Foot - Monopole Tower

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

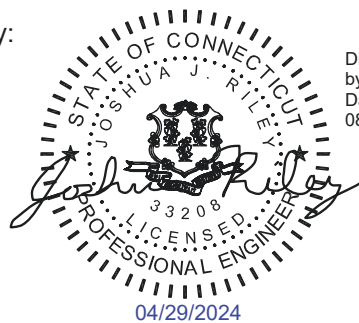
Sufficient Capacity - 72.7%

This analysis utilizes an ultimate 3-second gust wind speed of 115 mph as required by the 2022 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Wuttipat Thonphothong/ Suttinee Somchana

Respectfully submitted by:

Joshua J. Riley, P.E.
Professional Engineer



Digitally signed
by Joshua Riley
Date: 2024.04.29
08:33:23-05'00'

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1) INTRODUCTION

This tower is a 148 ft Monopole tower designed by Summit Manufacturing, LLC.

The tower has been modified per reinforcement drawings prepared by B + T Engineering, Inc., in February of 2014. Reinforcement consists of addition of reinforcement plates at elevation 0.5' - 100.5', transition stiffeners and addition of anchor rods with brackets. Refer to modification inspection report by Tower Engineering Professionals, Inc., in July 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:	115 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1 in
Wind Speed with Ice:	50 mph
Seismic Ss:	0.173
Seismic S1:	0.054
Service Wind Speed:	60 mph
Seismic Loading:	Does not control per engineering judgment

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)
138.0	140.0	1	sitepro1	PRK-SFS-L	7	1-5/8
		2	antel	LPA-80063/6CF w/ Mount Pipe		
		4	antel	LPA-80080/6CF w/ Mount Pipe		
		4	kaelus	BSF0020F3V1		
		6	quintel technology	QS6656-5 w/ Mount Pipe		
		1	rfs celwave	DB-C1-12C-24AB-0Z		
		3	samsung telecommunications	RFV01U-D1A		
		3	samsung telecommunications	RFV01U-D2A		
	3	vzw	Sub6 Antenna - VZS01 w/ Mount Pipe			
	138.0	1	cci tower mounts (v2.1)	Platform Mount [LP 1201-1]		
	1	vzsmart	PLK1			
16.0	16.0	1	cci tower mounts (v2.1)	Side Arm Mount [SO 701-1]	1	1/2
		1	gps	GPS_A		

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)
150.0	151.0	3	ericsson	RADIO 4424 B25_TMO	3	1-5/8
		3	ericsson	RADIO 4449 B71 B85A_T-MOBILE		
	150.0	1	cci tower mounts (v2.1)	Platform Mount [LP 1201-1]		
		3	commscope	VV-65A-R1_TMO w/ Mount Pipe		
		3	ericsson	AIR6449 B41_T-MOBILE w/ Mount Pipe		
		3	ericsson	RADIO 4415 B66A		
		1	sitepro1	HRK14-U		
149.0	3	rfs celwave	APXVAALL24_43-U-NA20_TMO w/ Mount Pipe			
128.0	128.0	3	cci antennas	DMP65R-BU8D w/ Mount Pipe	1 5 3	3/8 3/4 conduit
		3	cci antennas	HPA-65R-BUU-H8 w/ Mount Pipe		
		3	cci antennas	OPA65R-BU8D w/ Mount Pipe		
		3	ericsson	RADIO 4415 B30		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 8843 B2/B66A		
		1	raycap	DC6-48-60-18-8F		
		1	raycap	DC9-48-60-24-8C-EV		
		1	sitepro1	RMQP-xxx + HRK12 12.5' Platform with Handrails		
114.0	114.0	4	ericsson	AIR 32 B2A/B66AA w/ Mount Pipe	1 4	1/2 1-5/8
		8	ericsson	RADIO 4449 B12/B71		
		4	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
		1	rfs celwave	SC2-W100AB		
		1	sitepro1	F4P-12W 12' Fortress Quad Platform		
		1	sitepro1	F4P-HRK12 Hand Rail Kit		
79.0	84.0	1	rfs celwave	PD1109E	1	1/2
45.0	45.0	1	gps	GPS_A	1	1/2

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	1531964	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	1634518	CCISITES
4-TOWER MANUFACTURER DRAWINGS	1631601	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	4491592	CCISITES
4-POST-MODIFICATION INSPECTION	5215998	CCISITES

3.1) Analysis Method

tnxTower (version 8.2.4.3), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

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

This analysis may be affected if any assumptions are not valid or have been made in error. 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
148 - 143	Pole	TP24.87x24x0.2188	Pole	5.2%	Pass
143 - 138	Pole	TP25.74x24.87x0.2188	Pole	8.5%	Pass
138 - 133	Pole	TP26.61x25.74x0.2188	Pole	15.8%	Pass
133 - 128	Pole	TP27.479x26.61x0.2188	Pole	21.4%	Pass
128 - 123	Pole	TP28.349x27.479x0.2188	Pole	29.7%	Pass
123 - 120.25	Pole	TP29.48x28.349x0.2188	Pole	33.7%	Pass
120.25 - 115.25	Pole	TP29.26x28.39x0.25	Pole	35.1%	Pass
115.25 - 110.25	Pole	TP30.13x29.26x0.25	Pole	42.7%	Pass
110.25 - 105.25	Pole	TP31x30.13x0.25	Pole	49.4%	Pass
105.25 - 100.25	Pole	TP31.87x31x0.25	Pole	55.6%	Pass
100.25 - 98.75	Pole	TP32.131x31.87x0.25	Pole	57.4%	Pass
98.75 - 98.5	Pole + Reinf.	TP32.175x32.131x0.45	Reinf. 5 Tension Rupture	47.1%	Pass

98.5 - 93.5	Pole + Reinf.	TP33.045x32.175x0.4438	Reinf. 5 Tension Rupture	51.9%	Pass
93.5 - 88.5	Pole + Reinf.	TP33.915x33.045x0.4375	Reinf. 5 Tension Rupture	56.3%	Pass
88.5 - 84.75	Pole + Reinf.	TP35.35x33.915x0.4375	Reinf. 5 Tension Rupture	59.5%	Pass
84.75 - 79.75	Pole + Reinf.	TP34.937x34.067x0.5	Reinf. 5 Tension Rupture	56.7%	Pass
79.75 - 74.75	Pole + Reinf.	TP35.808x34.937x0.4875	Reinf. 5 Tension Rupture	60.0%	Pass
74.75 - 69.75	Pole + Reinf.	TP36.678x35.808x0.4875	Reinf. 5 Tension Rupture	63.0%	Pass
69.75 - 66.88	Pole + Reinf.	TP37.178x36.678x0.4875	Reinf. 5 Tension Rupture	64.6%	Pass
66.88 - 66.63	Pole + Reinf.	TP37.221x37.178x0.625	Reinf. 4 Bolt Shear	49.3%	Pass
66.63 - 61.63	Pole + Reinf.	TP38.091x37.221x0.6125	Reinf. 4 Compression	49.6%	Pass
61.63 - 56.63	Pole + Reinf.	TP38.962x38.091x0.6125	Reinf. 4 Compression	51.6%	Pass
56.63 - 51.63	Pole + Reinf.	TP39.832x38.962x0.6	Reinf. 4 Compression	53.5%	Pass
51.63 - 46.63	Pole + Reinf.	TP40.702x39.832x0.6	Reinf. 4 Compression	55.3%	Pass
46.63 - 45	Pole + Reinf.	TP41.9x40.702x0.5875	Reinf. 4 Compression	55.8%	Pass
45 - 38.75	Pole + Reinf.	TP41.448x40.361x0.65	Reinf. 4 Compression	53.6%	Pass
38.75 - 33.75	Pole + Reinf.	TP42.318x41.448x0.65	Reinf. 4 Compression	55.0%	Pass
33.75 - 31.75	Pole + Reinf.	TP42.666x42.318x0.65	Reinf. 4 Bolt Shear	57.7%	Pass
31.75 - 31.5	Pole + Reinf.	TP42.71x42.666x0.65	Reinf. 3 Bolt Shear	57.7%	Pass
31.5 - 26.5	Pole + Reinf.	TP43.58x42.71x0.6375	Reinf. 3 Compression	56.8%	Pass
26.5 - 21.5	Pole + Reinf.	TP44.45x43.58x0.625	Reinf. 3 Compression	57.9%	Pass
21.5 - 17.75	Pole + Reinf.	TP45.102x44.45x0.625	Reinf. 3 Compression	58.7%	Pass
17.75 - 17.5	Pole + Reinf.	TP45.145x45.102x0.725	Reinf. 3 Compression	55.0%	Pass
17.5 - 14.25	Pole + Reinf.	TP45.711x45.145x0.725	Reinf. 3 Compression	55.7%	Pass
14.25 - 14	Pole + Reinf.	TP45.754x45.711x0.6375	Reinf. 1 Tension Rupture	60.1%	Pass
14 - 9	Pole + Reinf.	TP46.624x45.754x0.625	Reinf. 1 Tension Rupture	61.1%	Pass
9 - 4	Pole + Reinf.	TP47.494x46.624x0.625	Reinf. 1 Tension Rupture	62.1%	Pass
4 - 0	Pole + Reinf.	TP48.19x47.494x0.625	Reinf. 1 Tension Rupture	62.8%	Pass
				Summary	
			Pole	57.4%	Pass
			Reinforcement	64.6%	Pass
			Overall	64.6%	Pass

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

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods (Original)	0	48.3	Pass
	Anchor Rods (Existing Modification)		44.9	Pass
	Anchor Rod Brackets		56.7	Pass
	Base Plate		48.0	Pass
1	Base Foundation (Structure)	0	35.3	Pass
	Base Foundation (Soil Interaction)		72.7	Pass

Structure Rating (max from all components) =	72.7%
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Note:

- 1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity. Rating per TIA-222-H Section 15.5.

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

Tower Input Data

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

- Tower is located in Litchfield County, Connecticut.
- Tower base elevation above sea level: 1095.00 ft.
- Basic wind speed of 115 mph.
- Risk Category II.
- Exposure Category B.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 1.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- TOWER RATING: 64.6%.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.05.
- 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 Appurtenances
✓ Alternative Appurt. EPA Calculation
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
<div style="background-color: #f0f0f0; text-align: center; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known |
|---|---|--|

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	148.00-143.00	5.00	0.00	18	24.0000	24.8698	0.2188	0.8750	A607-65 (65 ksi)
L2	143.00-138.00	5.00	0.00	18	24.8698	25.7397	0.2188	0.8750	A607-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	138.00-133.00	5.00	0.00	18	25.7397	26.6095	0.2188	0.8750	A607-65 (65 ksi)
L4	133.00-128.00	5.00	0.00	18	26.6095	27.4794	0.2188	0.8750	A607-65 (65 ksi)
L5	128.00-123.00	5.00	0.00	18	27.4794	28.3492	0.2188	0.8750	A607-65 (65 ksi)
L6	123.00-116.50	6.50	3.75	18	28.3492	29.4800	0.2188	0.8750	A607-65 (65 ksi)
L7	116.50-115.25	5.00	0.00	18	28.3901	29.2601	0.2500	1.0000	A607-65 (65 ksi)
L8	115.25-110.25	5.00	0.00	18	29.2601	30.1301	0.2500	1.0000	A607-65 (65 ksi)
L9	110.25-105.25	5.00	0.00	18	30.1301	31.0001	0.2500	1.0000	A607-65 (65 ksi)
L10	105.25-100.25	5.00	0.00	18	31.0001	31.8701	0.2500	1.0000	A607-65 (65 ksi)
L11	100.25-98.75	1.50	0.00	18	31.8701	32.1311	0.2500	1.0000	A607-65 (65 ksi)
L12	98.75-98.50	0.25	0.00	18	32.1311	32.1746	0.4500	1.8000	A607-65 (65 ksi)
L13	98.50-93.50	5.00	0.00	18	32.1746	33.0445	0.4437	1.7750	A607-65 (65 ksi)
L14	93.50-88.50	5.00	0.00	18	33.0445	33.9145	0.4375	1.7500	A607-65 (65 ksi)
L15	88.50-80.25	8.25	4.50	18	33.9145	35.3500	0.4375	1.7500	A607-65 (65 ksi)
L16	80.25-79.75	5.00	0.00	18	34.0670	34.9373	0.5000	2.0000	A607-65 (65 ksi)
L17	79.75-74.75	5.00	0.00	18	34.9373	35.8077	0.4875	1.9500	A607-65 (65 ksi)
L18	74.75-69.75	5.00	0.00	18	35.8077	36.6780	0.4875	1.9500	A607-65 (65 ksi)
L19	69.75-66.88	2.87	0.00	18	36.6780	37.1776	0.4875	1.9500	A607-65 (65 ksi)
L20	66.88-66.63	0.25	0.00	18	37.1776	37.2211	0.6250	2.5000	A607-65 (65 ksi)
L21	66.63-61.63	5.00	0.00	18	37.2211	38.0914	0.6125	2.4500	A607-65 (65 ksi)
L22	61.63-56.63	5.00	0.00	18	38.0914	38.9618	0.6125	2.4500	A607-65 (65 ksi)
L23	56.63-51.63	5.00	0.00	18	38.9618	39.8321	0.6000	2.4000	A607-65 (65 ksi)
L24	51.63-46.63	5.00	0.00	18	39.8321	40.7024	0.6000	2.4000	A607-65 (65 ksi)
L25	46.63-39.75	6.88	5.25	18	40.7024	41.9000	0.5875	2.3500	A607-65 (65 ksi)
L26	39.75-38.75	6.25	0.00	18	40.3612	41.4485	0.6500	2.6000	A607-65 (65 ksi)
L27	38.75-33.75	5.00	0.00	18	41.4485	42.3184	0.6500	2.6000	A607-65 (65 ksi)
L28	33.75-31.75	2.00	0.00	18	42.3184	42.6663	0.6500	2.6000	A607-65 (65 ksi)
L29	31.75-31.50	0.25	0.00	18	42.6663	42.7098	0.6500	2.6000	A607-65 (65 ksi)
L30	31.50-26.50	5.00	0.00	18	42.7098	43.5797	0.6375	2.5500	A607-65 (65 ksi)
L31	26.50-21.50	5.00	0.00	18	43.5797	44.4496	0.6250	2.5000	A607-65 (65 ksi)
L32	21.50-17.75	3.75	0.00	18	44.4496	45.1020	0.6250	2.5000	A607-65 (65 ksi)
L33	17.75-17.50	0.25	0.00	18	45.1020	45.1454	0.7250	2.9000	A607-65 (65 ksi)
L34	17.50-14.25	3.25	0.00	18	45.1454	45.7109	0.7250	2.9000	A607-65 (65 ksi)
L35	14.25-14.00	0.25	0.00	18	45.7109	45.7544	0.6375	2.5500	A607-65 (65 ksi)
L36	14.00-9.00	5.00	0.00	18	45.7544	46.6242	0.6250	2.5000	A607-65 (65 ksi)
L37	9.00-4.00	5.00	0.00	18	46.6242	47.4941	0.6250	2.5000	A607-65

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L38	4.00-0.00	4.00		18	47.4941	48.1900	0.6250	2.5000	(65 ksi) A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	24.3365	16.5116	1179.7676	8.4423	12.1920	96.7657	2361.0876	8.2574	3.8390	17.55
	25.2198	17.1156	1314.0167	8.7511	12.6339	104.0074	2629.7624	8.5594	3.9921	18.25
L2	25.2198	17.1156	1314.0167	8.7511	12.6339	104.0074	2629.7624	8.5594	3.9921	18.25
	26.1030	17.7195	1458.0824	9.0599	13.0758	111.5103	2918.0833	8.8614	4.1452	18.949
L3	26.1030	17.7195	1458.0824	9.0599	13.0758	111.5103	2918.0833	8.8614	4.1452	18.949
	26.9863	18.3234	1612.3110	9.3687	13.5176	119.2746	3226.7435	9.1635	4.2983	19.649
L4	26.9863	18.3234	1612.3110	9.3687	13.5176	119.2746	3226.7435	9.1635	4.2983	19.649
	27.8695	18.9274	1777.0489	9.6775	13.9595	127.3002	3556.4361	9.4655	4.4514	20.349
L5	27.8695	18.9274	1777.0489	9.6775	13.9595	127.3002	3556.4361	9.4655	4.4514	20.349
	28.7528	19.5313	1952.6426	9.9863	14.4014	135.5870	3907.8546	9.7675	4.6045	21.049
L6	28.7528	19.5313	1952.6426	9.9863	14.4014	135.5870	3907.8546	9.7675	4.6045	21.049
	29.6361	20.1352	2128.2363	10.2951	14.8513	144.0000	4226.7624	10.0695	4.7576	21.749
L7	29.6361	20.1352	2128.2363	10.2951	14.8513	144.0000	4226.7624	10.0695	4.7576	21.749
	30.5194	20.7391	2303.8300	10.6000	15.3012	152.0000	4545.6735	10.3795	4.9087	22.449
L8	30.5194	20.7391	2303.8300	10.6000	15.3012	152.0000	4545.6735	10.3795	4.9087	22.449
	31.4027	21.3430	2479.4237	10.9163	15.7511	160.0000	4864.5846	10.6895	5.0598	23.149
L9	31.4027	21.3430	2479.4237	10.9163	15.7511	160.0000	4864.5846	10.6895	5.0598	23.149
	32.2860	21.9469	2655.0174	11.2326	16.2010	168.0000	5183.4957	11.0000	5.2109	23.849
L10	32.2860	21.9469	2655.0174	11.2326	16.2010	168.0000	5183.4957	11.0000	5.2109	23.849
	33.1693	22.5508	2830.6111	11.5489	16.6509	176.0000	5502.4068	11.3105	5.3620	24.549
L11	33.1693	22.5508	2830.6111	11.5489	16.6509	176.0000	5502.4068	11.3105	5.3620	24.549
	34.0526	23.1547	3006.2048	11.8652	17.1008	184.0000	5821.3179	11.6210	5.5131	25.249
L12	34.0526	23.1547	3006.2048	11.8652	17.1008	184.0000	5821.3179	11.6210	5.5131	25.249
	34.9359	23.7586	3181.7985	12.1811	17.5507	192.0000	6140.2290	11.9315	5.6642	25.949
L13	34.9359	23.7586	3181.7985	12.1811	17.5507	192.0000	6140.2290	11.9315	5.6642	25.949
	35.8192	24.3625	3357.3922	12.5614	18.0006	200.0000	6459.1401	12.2420	5.8153	26.649
L14	35.8192	24.3625	3357.3922	12.5614	18.0006	200.0000	6459.1401	12.2420	5.8153	26.649
	36.7025	24.9664	3532.9859	12.9417	18.4505	208.0000	6778.0512	12.5525	5.9664	27.349
L15	36.7025	24.9664	3532.9859	12.9417	18.4505	208.0000	6778.0512	12.5525	5.9664	27.349
	37.5858	25.5703	3708.5796	13.3220	18.9004	216.0000	7096.9623	12.8630	6.1175	28.049
L16	37.5858	25.5703	3708.5796	13.3220	18.9004	216.0000	7096.9623	12.8630	6.1175	28.049
	38.4691	26.1742	3884.1733	13.7023	19.3503	224.0000	7415.8734	13.1735	6.2686	28.749
L17	38.4691	26.1742	3884.1733	13.7023	19.3503	224.0000	7415.8734	13.1735	6.2686	28.749
	39.3524	26.7781	4059.7670	14.0826	19.8002	232.0000	7734.7845	13.4840	6.4197	29.449
L18	39.3524	26.7781	4059.7670	14.0826	19.8002	232.0000	7734.7845	13.4840	6.4197	29.449
	40.2357	27.3820	4235.3607	14.4629	20.2501	240.0000	8053.6956	13.7945	6.5708	30.149
L19	40.2357	27.3820	4235.3607	14.4629	20.2501	240.0000	8053.6956	13.7945	6.5708	30.149
	41.1190	27.9859	4410.9544	14.8432	20.7000	248.0000	8372.6067	14.1050	6.7219	30.849
L20	41.1190	27.9859	4410.9544	14.8432	20.7000	248.0000	8372.6067	14.1050	6.7219	30.849
	42.0023	28.5898	4586.5481	15.2235	21.1500	256.0000	8691.5178	14.4155	6.8730	31.549
L21	42.0023	28.5898	4586.5481	15.2235	21.1500	256.0000	8691.5178	14.4155	6.8730	31.549
	42.8856	29.1937	4762.1418	15.6038	21.6000	264.0000	9010.4289	14.7260	7.0241	32.249
L22	42.8856	29.1937	4762.1418	15.6038	21.6000	264.0000	9010.4289	14.7260	7.0241	32.249
	43.7689	29.7976	4937.7355	15.9841	22.0500	272.0000	9329.3400	15.0365	7.1752	32.949
L23	43.7689	29.7976	4937.7355	15.9841	22.0500	272.0000	9329.3400	15.0365	7.1752	32.949
	44.6522	30.4015	5113.3292	16.3644	22.5000	280.0000	9648.2511	15.3470	7.3263	33.649
L24	44.6522	30.4015	5113.3292	16.3644	22.5000	280.0000	9648.2511	15.3470	7.3263	33.649
	45.5355	31.0054	5288.9229	16.7447	22.9500	288.0000	9967.1622	15.6575	7.4774	34.349
L25	45.5355	31.0054	5288.9229	16.7447	22.9500	288.0000	9967.1622	15.6575	7.4774	34.349
	46.4188	31.6093	5464.5166	17.1250	23.4000	296.0000	10286.0733	15.9680	7.6285	35.049
L26	46.4188	31.6093	5464.5166	17.1250	23.4000	296.0000	10286.0733	15.9680	7.6285	35.049
	47.3021	32.2132	5640.1103	17.5053	23.8500	304.0000	10605.0844	16.2785	7.7796	35.749
L27	47.3021	32.2132	5640.1103	17.5053	23.8500	304.0000	10605.0844	16.2785	7.7796	35.749
	48.1854	32.8171	5815.7040	17.8856	24.3000	312.0000	10924.0955	16.5890	7.9307	36.449
L28	48.1854	32.8171	5815.7040	17.8856	24.3000	312.0000	10924.0955	16.5890	7.9307	36.449
	49.0687	33.4210	5991.2977	18.2659	24.7500	320.0000	11243.1066	16.9000	8.0818	37.149
L29	49.0687	33.4210	5991.2977	18.2659	24.7500	320.0000	11243.1066	16.9000	8.0818	37.149
	49.9520	34.0249	6166.8914	18.6462	25.2000	328.0000	11562.1177	17.2105	8.2329	37.849
L30	49.9520	34.0249	6166.8914	18.6462	25.2000	328.0000	11562.1177	17.2105	8.2329	37.849
	50.8353	34.6288	6342.4851	19.0265	25.6500	336.0000	11881.1288	17.5210	8.3840	38.549
L31	50.8353	34.6288	6342.4851	19.0265	25.6500	336.0000	11881.1288	17.5210	8.3840	38.549
	51.7186	35.2327	6518.0788	19.4068	26.1000	344.0000	12200.1399	17.8315	8.5351	39.249
L32	51.7186	35.2327	6518.0788	19.4068	26.1000	344.0000	12200.1399	17.8315	8.5351	39.249
	52.6019	35.8366	6693.6725	19.7871	26.5500	352.0000	12519.1510	18.1420	8.6862	39.949
L33	52.6019	35.8366	6693.6725	19.7871	26.5500	352.0000	12519.1510	18.1420	8.6862	39.949
	53.4852	36.4405	6869.2662	20.1674	27.0000	360.0000	12838.1621	18.4525	8.8373	40.649
L34	53.4852	36.4405	6869.2662	20.1674	27.0000	360.0000	12838.1621	18.4525	8.8373	40.649
	54.3685	37.0444	7044.8599	20.5477	27.4500	368.0000	13157.1732	18.7630	8.9884	41.349
L35	54.3685	37.0444	7044.8599	20.5477	27.4500	368.0000	13157.1732	18.7630	8.9884	41.349
	55.2518	37.6483	7220.4536	20.9280	27.9000	376.0000	13476.1843	19.0735	9.1395	42.049
L36	55.2518	37.6483	7220.4536	20.9280	27.9000	376.0000	13476.1843	19.0735	9.1395	42.049
	56.1351	38.2522	7396.0473	21.3083	28.3500	384.0000	13795.1954	19.3840	9.2906	42.749
L37	56.1351	38.2522	7396.0473	21.3083	28.3500	384.0000	13795.1954	19.3840	9.2906	42.749
	57.0184	38.8561	7571.6410	21.6886	28.8000	392.0000	14114.2065	19.6945	9.4417	43.449
L38	57.0184	38.8561	7571.6410	21.6886	28.8000	392.0000	14114.2065	19.6945	9.4417	43.449
	57.9017	39.4600	7747.2347	22.0689	29.2500	400.0000	14433.2176	19.9995	9.5928	44.149
L39	57.9017	39.4600	7747.2347	22.0689	29.2500	400.0000	14433.2176	19.9995	9.5928	44.149
	58.7850	40.0639	7922.8284	22.4492	29.7000	408.0000	14752.2287	20.3045	9.7439	44.849
L40	58.7850	40.0639	7922.8284	22.4492	29.7000	408.0000	14752.2287	20.3045	9.7439	44.849
	59.6683	40.6678	8098.4221	22.8295	30.1500	416.0000	15071.2398	20.6095	9.8950	45.549
L41	59.6683	40.6678	8098.4221	22.8295	30.1500	416.0000	15071.2398	20.6095	9.8950	45.549
	60.5516	41.2717	8274.0158	23.2098	30.6000	424.0000	15390.2509	20.9145	10.0461	46.249
L42	60.5516	41.2717	8274.0158	23.2098	30.6000	424.0000	15390.2509	20.9145	10.0461	46.249
	61.4349	41.8756	8449.6095	23.5901	31.0500	432.0000	15709.2620	21.2195	10.1972	46.949
L43	61.4349	41.8756	8449.6095	23.5901	31.0500	432.0000	15709.2620	21.2195	10.1972	46.949
	62.3182	42.4795	8625.2032	23.9704	31.5000	440.0000	16028.2731	21.5245	10.3483	47.649
L44	62.3182	42.4795	8625.2032	23.9704	31.5000	440.0000	16028.2731	21.5245	10.3483	47.649
	63.2015	43.0834	8800.7969	24.3507						

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L21	37.7008	71.1699	12050.350 7	12.9961	18.9083	637.3043	24116.557 5	35.5917	5.4729	8.935
	38.5846	72.8618	12930.399 4	13.3050	19.3504	668.2223	25877.813 1	36.4378	5.6261	9.185
L22	38.5846	72.8618	12930.399 4	13.3050	19.3504	668.2223	25877.813 1	36.4378	5.6261	9.185
	39.4683	74.5538	13852.285 0	13.6140	19.7926	699.8728	27722.797 3	37.2840	5.7793	9.436
L23	39.4702	73.0561	13582.858 7	13.6184	19.7926	686.2604	27183.590 2	36.5350	5.8013	9.669
	40.3540	74.7136	14528.474 3	13.9274	20.2347	717.9979	29076.065 5	37.3639	5.9544	9.924
L24	40.3540	74.7136	14528.474 3	13.9274	20.2347	717.9979	29076.065 5	37.3639	5.9544	9.924
	41.2378	76.3711	15516.989 9	14.2364	20.6768	750.4530	31054.397 4	38.1928	6.1076	10.179
L25	41.2397	74.8033	15207.931 4	14.2408	20.6768	735.5059	30435.873 8	37.4088	6.1296	10.433
	42.4557	77.0365	16611.034 3	14.6659	21.2852	780.4030	33243.925 8	38.5255	6.3404	10.792
L26	41.8110	81.9281	16322.819 3	14.0975	20.5035	796.1005	32667.116 6	40.9718	5.9596	9.169
	41.9876	84.1714	17700.684 0	14.4835	21.0558	840.6546	35424.659 1	42.0937	6.1509	9.463
L27	41.9876	84.1714	17700.684 0	14.4835	21.0558	840.6546	35424.659 1	42.0937	6.1509	9.463
	42.8709	85.9660	18857.193 9	14.7923	21.4977	877.1715	37739.200 6	42.9912	6.3040	9.699
L28	42.8709	85.9660	18857.193 9	14.7923	21.4977	877.1715	37739.200 6	42.9912	6.3040	9.699
	43.2242	86.6839	19333.546 7	14.9158	21.6745	891.9956	38692.533 0	43.3502	6.3653	9.793
L29	43.2242	86.6839	19333.546 7	14.9158	21.6745	891.9956	38692.533 0	43.3502	6.3653	9.793
	43.2684	86.7736	19393.648 8	14.9312	21.6966	893.8574	38812.816 4	43.3950	6.3729	9.805
L30	43.2703	85.1302	19037.657 7	14.9357	21.6966	877.4496	38100.365 7	42.5732	6.3949	10.031
	44.1536	86.8903	20243.088 3	15.2445	22.1385	914.3849	40512.813 0	43.4534	6.5480	10.271
L31	44.1555	85.2113	19863.501 0	15.2489	22.1385	897.2388	39753.139 0	42.6138	6.5700	10.512
	45.0388	86.9370	21094.867 0	15.5577	22.5804	934.2126	42217.491 2	43.4767	6.7231	10.757
L32	45.0388	86.9370	21094.867 0	15.5577	22.5804	934.2126	42217.491 2	43.4767	6.7231	10.757
	45.7013	88.2312	22051.061 9	15.7893	22.9118	962.4328	44131.139 1	44.1240	6.8379	10.941
L33	45.6859	102.1180	25407.085 8	15.7538	22.9118	1108.9087	50847.602 8	51.0687	6.6619	9.189
	45.7300	102.2181	25481.863 0	15.7693	22.9339	1111.1009	50997.255 8	51.1188	6.6696	9.199
L34	45.7300	102.2181	25481.863 0	15.7693	22.9339	1111.1009	50997.255 8	51.1188	6.6696	9.199
	46.3042	103.5192	26467.358 3	15.9700	23.2211	1139.7968	52969.543 0	51.7694	6.7691	9.337
L35	46.3177	91.2026	23409.088 2	16.0010	23.2211	1008.0947	46848.978 7	45.6100	6.9231	10.86
	46.3618	91.2906	23476.919 5	16.0165	23.2432	1010.0548	46984.730 5	45.6540	6.9308	10.872
L36	46.3638	89.5254	23035.723 9	16.0209	23.2432	991.0731	46101.758 7	44.7712	6.9528	11.124
	47.2471	91.2510	24393.610 5	16.3297	23.6851	1029.9134	48819.318 7	45.6342	7.1059	11.369
L37	47.2471	91.2510	24393.610 5	16.3297	23.6851	1029.9134	48819.318 7	45.6342	7.1059	11.369
	48.1304	92.9766	25803.837 5	16.6385	24.1270	1069.5003	51641.628 3	46.4971	7.2590	11.614
L38	48.1304	92.9766	25803.837 5	16.6385	24.1270	1069.5003	51641.628 3	46.4971	7.2590	11.614

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
	48.8370	94.3571	26970.369 3	16.8856	24.4805	1101.7074	53976.226 9	47.1875	7.3814	11.81

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
L1 148.00-143.00				1	1	1			
L2 143.00-138.00				1	1	1			
L3 138.00-133.00				1	1	1			
L4 133.00-128.00				1	1	1			
L5 128.00-123.00				1	1	1			
L6 123.00-116.50				1	1	1			
L7 116.50-115.25				1	1	1			
L8 115.25-110.25				1	1	1			
L9 110.25-105.25				1	1	1			
L10 105.25-100.25				1	1	1			
L11 100.25-98.75				1	1	1			
L12 98.75-98.50				1	1	0.956316			
L13 98.50-93.50				1	1	0.958754			
L14 93.50-88.50				1	1	0.961848			
L15 88.50-80.25				1	1	0.954384			
L16 80.25-79.75				1	1	0.957771			
L17 79.75-74.75				1	1	0.973571			
L18 74.75-69.75				1	1	0.965574			
L19 69.75-66.88				1	1	0.961155			
L20 66.88-66.63				1	1	0.94335			
L21 66.63-61.63				1	1	0.951776			
L22 61.63-56.63				1	1	0.941754			
L23 56.63-51.63				1	1	0.951295			
L24 51.63-46.63				1	1	0.941952			
L25 46.63-39.75				1	1	0.958676			
L26 39.75-38.75				1	1	0.959517			
L27 38.75-33.75				1	1	0.95153			
L28 33.75-31.75				1	1	0.948428			
L29 31.75-31.50				1	1	0.948044			
L30 31.50-26.50				1	1	0.958686			
L31 26.50-				1	1	0.970081			

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_r	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
ft	ft ²	in							
21.50									
L32 21.50-17.75				1	1	0.964652			
L33 17.75-17.50				1	1	0.992141			
L34 17.50-14.25				1	1	0.986172			
L35 14.25-14.00				1	1	1.00245			
L36 14.00-9.00				1	1	1.01423			
L37 9.00-4.00				1	1	1.00654			
L38 4.00-0.00				1	1	1.00059			

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	A	No	Surface Ar (CaAa)	128.00 - 11.00	1	1	0.490 0.500	0.3750		0.22

LDF7-50A(1-5/8)	B	No	Surface Ar (CaAa)	138.00 - 8.00	6	6	0.000 0.313	1.9800		0.82

LDF4-50A(1/2)	A	No	Surface Ar (CaAa)	45.00 - 0.00	1	1	-0.040 -0.030	0.6250		0.15

CCI-SFP-060100	A	No	Surface Af (CaAa)	100.75 - 70.63	1	1	0.000 0.000	6.0000	14.0000	0.00
CCI-SFP-060100	B	No	Surface Af (CaAa)	100.75 - 70.63	1	1	0.000 0.000	6.0000	14.0000	0.00
CCI-SFP-060100	C	No	Surface Af (CaAa)	100.75 - 70.63	1	1	0.000 0.000	6.0000	14.0000	0.00
**										
CCI-SFP-065125	A	No	Surface Af (CaAa)	20.50 - 0.50	1	1	0.000 0.000	6.5000	15.5000	0.00
CCI-SFP-065125	C	No	Surface Af (CaAa)	20.50 - 0.50	1	1	0.000 0.000	6.5000	15.5000	0.00
**										
CCI-SFP-085125	A	No	Surface Af (CaAa)	70.63 - 10.50	1	1	0.000 0.000	8.5000	19.5000	0.00
CCI-SFP-085125	B	No	Surface Af (CaAa)	70.63 - 0.50	1	1	0.000 0.000	8.5000	19.5000	0.00
CCI-SFP-085125	C	No	Surface Af (CaAa)	70.63 - 0.50	1	1	0.000 0.000	8.5000	19.5000	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		$C_A A_A$ ft ² /ft	Weight plf

HB158-21U6S24-xxM_TMO(1-5/8)	C	No	No	Inside Pole	148.00 - 0.00	3	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	2.50 2.50 2.50
HB158-1-13U6-S6F18(1-5/8)	C	No	No	Inside Pole	138.00 - 0.00	1	No Ice 1/2" Ice	0.00 0.00	1.90 1.90

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight plf
***							1" Ice	0.00	1.90
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	128.00 - 0.00	5	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
L98B-002-XXX_DB(3/8)	C	No	No	Inside Pole	128.00 - 0.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
2" innerduct conduit	C	No	No	Inside Pole	128.00 - 0.00	3	No Ice	0.00	0.20
							1/2" Ice	0.00	0.20
							1" Ice	0.00	0.20

HCS 6X12 4AWG(1-5/8)	C	No	No	Inside Pole	114.00 - 0.00	4	No Ice	0.00	2.40
							1/2" Ice	0.00	2.40
							1" Ice	0.00	2.40
LDF4-50A(1/2)	C	No	No	Inside Pole	114.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15

LDF4-50A(1/2)	C	No	No	Inside Pole	79.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15

LDF4-50A(1/2)	C	No	No	Inside Pole	16.00 - 0.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	148.00-143.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.04
L2	143.00-138.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.04
L3	138.00-133.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	5.940	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.05
L4	133.00-128.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	5.940	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.05
L5	128.00-123.00	A	0.000	0.000	0.188	0.000	0.00
		B	0.000	0.000	5.940	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.06
L6	123.00-116.50	A	0.000	0.000	0.244	0.000	0.00
		B	0.000	0.000	7.722	0.000	0.03
		C	0.000	0.000	0.000	0.000	0.08
L7	116.50-115.25	A	0.000	0.000	0.047	0.000	0.00
		B	0.000	0.000	1.485	0.000	0.01
		C	0.000	0.000	0.000	0.000	0.02
L8	115.25-110.25	A	0.000	0.000	0.188	0.000	0.00
		B	0.000	0.000	5.940	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.10
L9	110.25-105.25	A	0.000	0.000	0.188	0.000	0.00
		B	0.000	0.000	5.940	0.000	0.02
		C	0.000	0.000	0.000	0.000	0.11
L10	105.25-100.25	A	0.000	0.000	0.688	0.000	0.00
		B	0.000	0.000	6.440	0.000	0.02
		C	0.000	0.000	0.500	0.000	0.11
L11	100.25-98.75	A	0.000	0.000	1.556	0.000	0.00
		B	0.000	0.000	3.282	0.000	0.01

Tower Sectio n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L12	98.75-98.50	C	0.000	0.000	1.500	0.000	0.03
		A	0.000	0.000	0.259	0.000	0.00
		B	0.000	0.000	0.547	0.000	0.00
L13	98.50-93.50	C	0.000	0.000	0.250	0.000	0.01
		A	0.000	0.000	5.188	0.000	0.00
		B	0.000	0.000	10.940	0.000	0.02
L14	93.50-88.50	C	0.000	0.000	5.000	0.000	0.11
		A	0.000	0.000	5.188	0.000	0.00
		B	0.000	0.000	10.940	0.000	0.02
L15	88.50-80.25	C	0.000	0.000	5.000	0.000	0.11
		A	0.000	0.000	8.559	0.000	0.00
		B	0.000	0.000	18.051	0.000	0.04
L16	80.25-79.75	C	0.000	0.000	8.250	0.000	0.19
		A	0.000	0.000	0.519	0.000	0.00
		B	0.000	0.000	1.094	0.000	0.00
L17	79.75-74.75	C	0.000	0.000	0.500	0.000	0.01
		A	0.000	0.000	5.188	0.000	0.00
		B	0.000	0.000	10.940	0.000	0.02
L18	74.75-69.75	C	0.000	0.000	5.000	0.000	0.11
		A	0.000	0.000	5.554	0.000	0.00
		B	0.000	0.000	11.307	0.000	0.02
L19	69.75-66.88	C	0.000	0.000	5.367	0.000	0.11
		A	0.000	0.000	4.173	0.000	0.00
		B	0.000	0.000	7.475	0.000	0.01
L20	66.88-66.63	C	0.000	0.000	4.066	0.000	0.07
		A	0.000	0.000	0.364	0.000	0.00
		B	0.000	0.000	0.651	0.000	0.00
L21	66.63-61.63	C	0.000	0.000	0.354	0.000	0.01
		A	0.000	0.000	7.271	0.000	0.00
		B	0.000	0.000	13.023	0.000	0.02
L22	61.63-56.63	C	0.000	0.000	7.083	0.000	0.11
		A	0.000	0.000	7.271	0.000	0.00
		B	0.000	0.000	13.023	0.000	0.02
L23	56.63-51.63	C	0.000	0.000	7.083	0.000	0.11
		A	0.000	0.000	7.271	0.000	0.00
		B	0.000	0.000	13.023	0.000	0.02
L24	51.63-46.63	C	0.000	0.000	7.083	0.000	0.11
		A	0.000	0.000	7.271	0.000	0.00
		B	0.000	0.000	13.023	0.000	0.02
L25	46.63-39.75	C	0.000	0.000	7.083	0.000	0.11
		A	0.000	0.000	10.333	0.000	0.00
		B	0.000	0.000	17.920	0.000	0.03
L26	39.75-38.75	C	0.000	0.000	9.747	0.000	0.16
		A	0.000	0.000	1.517	0.000	0.00
		B	0.000	0.000	2.605	0.000	0.00
L27	38.75-33.75	C	0.000	0.000	1.417	0.000	0.02
		A	0.000	0.000	7.583	0.000	0.00
		B	0.000	0.000	13.023	0.000	0.02
L28	33.75-31.75	C	0.000	0.000	7.083	0.000	0.11
		A	0.000	0.000	3.033	0.000	0.00
		B	0.000	0.000	5.209	0.000	0.01
L29	31.75-31.50	C	0.000	0.000	2.833	0.000	0.05
		A	0.000	0.000	0.379	0.000	0.00
		B	0.000	0.000	0.651	0.000	0.00
L30	31.50-26.50	C	0.000	0.000	0.354	0.000	0.01
		A	0.000	0.000	7.583	0.000	0.00
		B	0.000	0.000	13.023	0.000	0.02
L31	26.50-21.50	C	0.000	0.000	7.083	0.000	0.11
		A	0.000	0.000	7.583	0.000	0.00
		B	0.000	0.000	13.023	0.000	0.02
L32	21.50-17.75	C	0.000	0.000	7.083	0.000	0.11
		A	0.000	0.000	8.667	0.000	0.00
		B	0.000	0.000	9.768	0.000	0.02
L33	17.75-17.50	C	0.000	0.000	8.292	0.000	0.09
		A	0.000	0.000	0.650	0.000	0.00
		B	0.000	0.000	0.651	0.000	0.00
L34	17.50-14.25	C	0.000	0.000	0.625	0.000	0.01
		A	0.000	0.000	8.450	0.000	0.00
		B	0.000	0.000	8.465	0.000	0.02

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L35	14.25-14.00	C	0.000	0.000	8.125	0.000	0.07
		A	0.000	0.000	0.650	0.000	0.00
		B	0.000	0.000	0.651	0.000	0.00
L36	14.00-9.00	C	0.000	0.000	0.625	0.000	0.01
		A	0.000	0.000	10.800	0.000	0.00
		B	0.000	0.000	13.023	0.000	0.02
L37	9.00-4.00	C	0.000	0.000	12.500	0.000	0.12
		A	0.000	0.000	5.729	0.000	0.00
		B	0.000	0.000	8.271	0.000	0.00
L38	4.00-0.00	C	0.000	0.000	12.500	0.000	0.12
		A	0.000	0.000	4.042	0.000	0.00
		B	0.000	0.000	4.958	0.000	0.00
		C	0.000	0.000	8.750	0.000	0.09

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	148.00-143.00	A	0.986	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.04
L2	143.00-138.00	A	0.982	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.04
L3	138.00-133.00	A	0.979	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	8.649	0.000	0.09
		C		0.000	0.000	0.000	0.000	0.05
L4	133.00-128.00	A	0.975	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	8.644	0.000	0.09
		C		0.000	0.000	0.000	0.000	0.05
L5	128.00-123.00	A	0.971	0.000	0.000	1.159	0.000	0.01
		B		0.000	0.000	8.639	0.000	0.09
		C		0.000	0.000	0.000	0.000	0.06
L6	123.00-116.50	A	0.967	0.000	0.000	1.501	0.000	0.01
		B		0.000	0.000	11.224	0.000	0.11
		C		0.000	0.000	0.000	0.000	0.08
L7	116.50-115.25	A	0.964	0.000	0.000	0.289	0.000	0.00
		B		0.000	0.000	2.158	0.000	0.02
		C		0.000	0.000	0.000	0.000	0.02
L8	115.25-110.25	A	0.961	0.000	0.000	1.149	0.000	0.01
		B		0.000	0.000	8.626	0.000	0.09
		C		0.000	0.000	0.000	0.000	0.10
L9	110.25-105.25	A	0.957	0.000	0.000	1.144	0.000	0.01
		B		0.000	0.000	8.621	0.000	0.09
		C		0.000	0.000	0.000	0.000	0.11
L10	105.25-100.25	A	0.952	0.000	0.000	1.735	0.000	0.01
		B		0.000	0.000	9.211	0.000	0.09
		C		0.000	0.000	0.595	0.000	0.12
L11	100.25-98.75	A	0.949	0.000	0.000	2.126	0.000	0.01
		B		0.000	0.000	4.368	0.000	0.04
		C		0.000	0.000	1.785	0.000	0.04
L12	98.75-98.50	A	0.948	0.000	0.000	0.354	0.000	0.00
		B		0.000	0.000	0.728	0.000	0.01
		C		0.000	0.000	0.297	0.000	0.01
L13	98.50-93.50	A	0.946	0.000	0.000	7.079	0.000	0.04
		B		0.000	0.000	14.553	0.000	0.12
		C		0.000	0.000	5.946	0.000	0.15
L14	93.50-88.50	A	0.941	0.000	0.000	7.069	0.000	0.04
		B		0.000	0.000	14.542	0.000	0.12
		C		0.000	0.000	5.941	0.000	0.15
L15	88.50-80.25	A	0.934	0.000	0.000	11.640	0.000	0.07
		B		0.000	0.000	23.967	0.000	0.19
		C		0.000	0.000	9.790	0.000	0.24
L16	80.25-79.75	A	0.929	0.000	0.000	0.705	0.000	0.00
		B		0.000	0.000	1.453	0.000	0.01

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L17	79.75-74.75	C	0.925	0.000	0.000	0.593	0.000	0.01
		A		0.000	0.000	7.038	0.000	0.04
		B		0.000	0.000	14.507	0.000	0.12
L18	74.75-69.75	C	0.919	0.000	0.000	5.925	0.000	0.15
		A		0.000	0.000	7.393	0.000	0.04
		B		0.000	0.000	14.860	0.000	0.12
L19	69.75-66.88	C	0.914	0.000	0.000	6.286	0.000	0.15
		A		0.000	0.000	5.223	0.000	0.03
		B		0.000	0.000	9.508	0.000	0.07
L20	66.88-66.63	C	0.912	0.000	0.000	4.591	0.000	0.09
		A		0.000	0.000	0.455	0.000	0.00
		B		0.000	0.000	0.828	0.000	0.01
L21	66.63-61.63	C	0.908	0.000	0.000	0.400	0.000	0.01
		A		0.000	0.000	9.088	0.000	0.05
		B		0.000	0.000	16.552	0.000	0.12
L22	61.63-56.63	C	0.901	0.000	0.000	7.992	0.000	0.15
		A		0.000	0.000	9.073	0.000	0.05
		B		0.000	0.000	16.536	0.000	0.12
L23	56.63-51.63	C	0.893	0.000	0.000	7.984	0.000	0.15
		A		0.000	0.000	9.057	0.000	0.05
		B		0.000	0.000	16.518	0.000	0.12
L24	51.63-46.63	C	0.884	0.000	0.000	7.976	0.000	0.15
		A		0.000	0.000	9.040	0.000	0.05
		B		0.000	0.000	16.498	0.000	0.12
L25	46.63-39.75	C	0.873	0.000	0.000	7.968	0.000	0.15
		A		0.000	0.000	13.653	0.000	0.07
		B		0.000	0.000	22.667	0.000	0.17
L26	39.75-38.75	C	0.865	0.000	0.000	10.948	0.000	0.21
		A		0.000	0.000	2.041	0.000	0.01
		B		0.000	0.000	3.295	0.000	0.02
L27	38.75-33.75	C	0.858	0.000	0.000	1.591	0.000	0.03
		A		0.000	0.000	10.157	0.000	0.05
		B		0.000	0.000	16.439	0.000	0.12
L28	33.75-31.75	C	0.849	0.000	0.000	7.941	0.000	0.15
		A		0.000	0.000	4.053	0.000	0.02
		B		0.000	0.000	6.568	0.000	0.05
L29	31.75-31.50	C	0.846	0.000	0.000	3.173	0.000	0.06
		A		0.000	0.000	0.506	0.000	0.00
		B		0.000	0.000	0.821	0.000	0.01
L30	31.50-26.50	C	0.839	0.000	0.000	0.396	0.000	0.01
		A		0.000	0.000	10.101	0.000	0.05
		B		0.000	0.000	16.396	0.000	0.12
L31	26.50-21.50	C	0.823	0.000	0.000	7.922	0.000	0.15
		A		0.000	0.000	10.053	0.000	0.05
		B		0.000	0.000	16.361	0.000	0.11
L32	21.50-17.75	C	0.807	0.000	0.000	7.907	0.000	0.15
		A		0.000	0.000	10.926	0.000	0.05
		B		0.000	0.000	12.243	0.000	0.08
L33	17.75-17.50	C	0.798	0.000	0.000	9.341	0.000	0.13
		A		0.000	0.000	0.810	0.000	0.00
		B		0.000	0.000	0.815	0.000	0.01
L34	17.50-14.25	C	0.790	0.000	0.000	0.705	0.000	0.01
		A		0.000	0.000	10.504	0.000	0.05
		B		0.000	0.000	10.586	0.000	0.07
L35	14.25-14.00	C	0.781	0.000	0.000	9.152	0.000	0.12
		A		0.000	0.000	0.806	0.000	0.00
		B		0.000	0.000	0.813	0.000	0.01
L36	14.00-9.00	C	0.765	0.000	0.000	0.703	0.000	0.01
		A		0.000	0.000	13.324	0.000	0.06
		B		0.000	0.000	16.229	0.000	0.11
L37	9.00-4.00	C	0.722	0.000	0.000	14.030	0.000	0.18
		A		0.000	0.000	7.174	0.000	0.03
		B		0.000	0.000	9.471	0.000	0.05
L38	4.00-0.00	C	0.642	0.000	0.000	13.945	0.000	0.17
		A		0.000	0.000	5.005	0.000	0.02
		B		0.000	0.000	5.408	0.000	0.02
		C		0.000	0.000	9.649	0.000	0.13

Feed Line Center of Pressure

Section	Elevation	CP _x	CP _z	CP _x	CP _z
	ft	in	in	Ice in	Ice in
L1	148.00-143.00	0.0000	0.0000	0.0000	0.0000
L2	143.00-138.00	0.0000	0.0000	0.0000	0.0000
L3	138.00-133.00	5.8528	-1.1610	4.7089	-0.9341
L4	133.00-128.00	5.9201	-1.1744	4.7711	-0.9464
L5	128.00-123.00	5.9069	-1.3521	4.6204	-1.5165
L6	123.00-116.50	5.9793	-1.3689	4.6884	-1.5380
L7	116.50-115.25	5.9965	-1.3730	4.7050	-1.5437
L8	115.25-110.25	6.0342	-1.3818	4.7403	-1.5532
L9	110.25-105.25	6.0929	-1.3955	4.7957	-1.5703
L10	105.25-100.25	5.6171	-1.2867	4.5688	-1.4949
L11	100.25-98.75	3.1924	-0.7314	3.0367	-0.9930
L12	98.75-98.50	3.2028	-0.7338	3.0464	-0.9960
L13	98.50-93.50	3.2309	-0.7403	3.0721	-1.0040
L14	93.50-88.50	3.2839	-0.7525	3.1205	-1.0188
L15	88.50-80.25	3.3526	-0.7685	3.1833	-1.0377
L16	80.25-79.75	3.3684	-0.7721	3.1979	-1.0426
L17	79.75-74.75	3.3963	-0.7786	3.2231	-1.0486
L18	74.75-69.75	3.3330	-0.7641	3.1971	-1.0386
L19	69.75-66.88	2.9234	-0.6703	2.9330	-0.9517
L20	66.88-66.63	2.9379	-0.6737	2.9467	-0.9556
L21	66.63-61.63	2.9614	-0.6791	2.9686	-0.9618
L22	61.63-56.63	3.0057	-0.6893	3.0097	-0.9734
L23	56.63-51.63	3.0493	-0.6994	3.0501	-0.9844
L24	51.63-46.63	3.0924	-0.7094	3.0898	-0.9950
L25	46.63-39.75	3.0123	-0.7709	2.7945	-1.1328
L26	39.75-38.75	2.9756	-0.7868	2.6948	-1.1719
L27	38.75-33.75	2.9994	-0.7932	2.7185	-1.1741
L28	33.75-31.75	3.0270	-0.8006	2.7440	-1.1807
L29	31.75-31.50	3.0358	-0.8030	2.7521	-1.1826
L30	31.50-26.50	3.0562	-0.8084	2.7712	-1.1870
L31	26.50-21.50	3.0947	-0.8187	2.8077	-1.1941
L32	21.50-17.75	1.0208	0.2317	1.1457	-0.2787
L33	17.75-17.50	0.4192	0.5379	0.6439	-0.0004
L34	17.50-14.25	0.4209	0.5405	0.6486	0.0027
L35	14.25-14.00	0.4226	0.5431	0.6535	0.0061
L36	14.00-9.00	1.3129	1.1071	1.3847	0.5420
L37	9.00-4.00	1.3785	3.4653	0.9431	2.6947
L38	4.00-0.00	0.6540	3.5420	0.2031	2.7587

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
L3	5	LDF7-50A(1-5/8)	133.00 - 138.00	1.0000	1.0000
L4	5	LDF7-50A(1-5/8)	128.00 - 133.00	1.0000	1.0000
L5	1	Safety Line 3/8	123.00 - 128.00	1.0000	1.0000
L5	5	LDF7-50A(1-5/8)	123.00 - 128.00	1.0000	1.0000
L6	1	Safety Line 3/8	116.50 - 123.00	1.0000	1.0000
L6	5	LDF7-50A(1-5/8)	116.50 - 123.00	1.0000	1.0000
L7	1	Safety Line 3/8	115.25 - 116.50	1.0000	1.0000
L7	5	LDF7-50A(1-5/8)	115.25 - 116.50	1.0000	1.0000
L8	1	Safety Line 3/8	110.25 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L8	5	LDF7-50A(1-5/8)	115.25 - 110.25	1.0000	1.0000
L9	1	Safety Line 3/8	115.25 - 110.25	1.0000	1.0000
L9	5	LDF7-50A(1-5/8)	105.25 - 110.25	1.0000	1.0000
L10	1	Safety Line 3/8	105.25 - 100.25	1.0000	1.0000
L10	5	LDF7-50A(1-5/8)	100.25 - 105.25	1.0000	1.0000
L10	21	CCI-SFP-060100	100.25 - 100.75	1.0000	1.0000
L10	22	CCI-SFP-060100	100.25 - 100.75	1.0000	1.0000
L10	23	CCI-SFP-060100	100.25 - 100.75	1.0000	1.0000
L11	1	Safety Line 3/8	98.75 - 100.25	1.0000	1.0000
L11	5	LDF7-50A(1-5/8)	98.75 - 100.25	1.0000	1.0000
L11	21	CCI-SFP-060100	98.75 - 100.25	1.0000	1.0000
L11	22	CCI-SFP-060100	98.75 - 100.25	1.0000	1.0000
L11	23	CCI-SFP-060100	98.75 - 100.25	1.0000	1.0000
L12	1	Safety Line 3/8	98.50 - 98.75	1.0000	1.0000
L12	5	LDF7-50A(1-5/8)	98.50 - 98.75	1.0000	1.0000
L12	21	CCI-SFP-060100	98.50 - 98.75	1.0000	1.0000
L12	22	CCI-SFP-060100	98.50 - 98.75	1.0000	1.0000
L12	23	CCI-SFP-060100	98.50 - 98.75	1.0000	1.0000
L13	1	Safety Line 3/8	93.50 - 98.50	1.0000	1.0000
L13	5	LDF7-50A(1-5/8)	93.50 - 98.50	1.0000	1.0000
L13	21	CCI-SFP-060100	93.50 - 98.50	1.0000	1.0000
L13	22	CCI-SFP-060100	93.50 - 98.50	1.0000	1.0000
L13	23	CCI-SFP-060100	93.50 - 98.50	1.0000	1.0000
L14	1	Safety Line 3/8	88.50 - 93.50	1.0000	1.0000
L14	5	LDF7-50A(1-5/8)	88.50 - 93.50	1.0000	1.0000
L14	21	CCI-SFP-060100	88.50 - 93.50	1.0000	1.0000
L14	22	CCI-SFP-060100	88.50 - 93.50	1.0000	1.0000
L14	23	CCI-SFP-060100	88.50 - 93.50	1.0000	1.0000
L15	1	Safety Line 3/8	80.25 - 88.50	1.0000	1.0000
L15	5	LDF7-50A(1-5/8)	80.25 - 88.50	1.0000	1.0000
L15	21	CCI-SFP-060100	80.25 - 88.50	1.0000	1.0000
L15	22	CCI-SFP-060100	80.25 - 88.50	1.0000	1.0000
L15	23	CCI-SFP-060100	80.25 - 88.50	1.0000	1.0000
L16	1	Safety Line 3/8	79.75 - 80.25	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L16	5	LDF7-50A(1-5/8)	79.75 - 80.25	1.0000	1.0000
L16	21	CCI-SFP-060100	79.75 - 80.25	1.0000	1.0000
L16	22	CCI-SFP-060100	79.75 - 80.25	1.0000	1.0000
L16	23	CCI-SFP-060100	79.75 - 80.25	1.0000	1.0000
L17	1	Safety Line 3/8	74.75 - 79.75	1.0000	1.0000
L17	5	LDF7-50A(1-5/8)	74.75 - 79.75	1.0000	1.0000
L17	21	CCI-SFP-060100	74.75 - 79.75	1.0000	1.0000
L17	22	CCI-SFP-060100	74.75 - 79.75	1.0000	1.0000
L17	23	CCI-SFP-060100	74.75 - 79.75	1.0000	1.0000
L18	1	Safety Line 3/8	69.75 - 74.75	1.0000	1.0000
L18	5	LDF7-50A(1-5/8)	69.75 - 74.75	1.0000	1.0000
L18	21	CCI-SFP-060100	70.63 - 74.75	1.0000	1.0000
L18	22	CCI-SFP-060100	70.63 - 74.75	1.0000	1.0000
L18	23	CCI-SFP-060100	70.63 - 74.75	1.0000	1.0000
L18	28	CCI-SFP-085125	69.75 - 70.63	1.0000	1.0000
L18	29	CCI-SFP-085125	69.75 - 70.63	1.0000	1.0000
L18	30	CCI-SFP-085125	69.75 - 70.63	1.0000	1.0000
L19	1	Safety Line 3/8	66.88 - 69.75	1.0000	1.0000
L19	5	LDF7-50A(1-5/8)	66.88 - 69.75	1.0000	1.0000
L19	28	CCI-SFP-085125	66.88 - 69.75	1.0000	1.0000
L19	29	CCI-SFP-085125	66.88 - 69.75	1.0000	1.0000
L19	30	CCI-SFP-085125	66.88 - 69.75	1.0000	1.0000
L20	1	Safety Line 3/8	66.63 - 66.88	1.0000	1.0000
L20	5	LDF7-50A(1-5/8)	66.63 - 66.88	1.0000	1.0000
L20	28	CCI-SFP-085125	66.63 - 66.88	1.0000	1.0000
L20	29	CCI-SFP-085125	66.63 - 66.88	1.0000	1.0000
L20	30	CCI-SFP-085125	66.63 - 66.88	1.0000	1.0000
L21	1	Safety Line 3/8	61.63 - 66.63	1.0000	1.0000
L21	5	LDF7-50A(1-5/8)	61.63 - 66.63	1.0000	1.0000
L21	28	CCI-SFP-085125	61.63 - 66.63	1.0000	1.0000
L21	29	CCI-SFP-085125	61.63 - 66.63	1.0000	1.0000
L21	30	CCI-SFP-085125	61.63 - 66.63	1.0000	1.0000
L22	1	Safety Line 3/8	56.63 - 61.63	1.0000	1.0000
L22	5	LDF7-50A(1-5/8)	56.63 - 61.63	1.0000	1.0000
L22	28	CCI-SFP-085125	56.63 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L22	29	CCI-SFP-085125	61.63 56.63 -	1.0000	1.0000
L22	30	CCI-SFP-085125	61.63 56.63 -	1.0000	1.0000
L23	1	Safety Line 3/8	61.63 51.63 -	1.0000	1.0000
L23	5	LDF7-50A(1-5/8)	56.63 51.63 -	1.0000	1.0000
L23	28	CCI-SFP-085125	56.63 51.63 -	1.0000	1.0000
L23	29	CCI-SFP-085125	56.63 51.63 -	1.0000	1.0000
L23	30	CCI-SFP-085125	56.63 51.63 -	1.0000	1.0000
L24	1	Safety Line 3/8	46.63 - 51.63	1.0000	1.0000
L24	5	LDF7-50A(1-5/8)	46.63 - 51.63	1.0000	1.0000
L24	28	CCI-SFP-085125	46.63 - 51.63	1.0000	1.0000
L24	29	CCI-SFP-085125	46.63 - 51.63	1.0000	1.0000
L24	30	CCI-SFP-085125	46.63 - 51.63	1.0000	1.0000
L25	1	Safety Line 3/8	39.75 - 46.63	1.0000	1.0000
L25	5	LDF7-50A(1-5/8)	39.75 - 46.63	1.0000	1.0000
L25	17	LDF4-50A(1/2)	39.75 - 45.00	1.0000	1.0000
L25	28	CCI-SFP-085125	39.75 - 46.63	1.0000	1.0000
L25	29	CCI-SFP-085125	39.75 - 46.63	1.0000	1.0000
L25	30	CCI-SFP-085125	39.75 - 46.63	1.0000	1.0000
L26	1	Safety Line 3/8	38.75 - 39.75	1.0000	1.0000
L26	5	LDF7-50A(1-5/8)	38.75 - 39.75	1.0000	1.0000
L26	17	LDF4-50A(1/2)	38.75 - 39.75	1.0000	1.0000
L26	28	CCI-SFP-085125	38.75 - 39.75	1.0000	1.0000
L26	29	CCI-SFP-085125	38.75 - 39.75	1.0000	1.0000
L26	30	CCI-SFP-085125	38.75 - 39.75	1.0000	1.0000
L27	1	Safety Line 3/8	33.75 - 38.75	1.0000	1.0000
L27	5	LDF7-50A(1-5/8)	33.75 - 38.75	1.0000	1.0000
L27	17	LDF4-50A(1/2)	33.75 - 38.75	1.0000	1.0000
L27	28	CCI-SFP-085125	33.75 - 38.75	1.0000	1.0000
L27	29	CCI-SFP-085125	33.75 - 38.75	1.0000	1.0000
L27	30	CCI-SFP-085125	33.75 - 38.75	1.0000	1.0000
L28	1	Safety Line 3/8	31.75 - 33.75	1.0000	1.0000
L28	5	LDF7-50A(1-5/8)	31.75 - 33.75	1.0000	1.0000
L28	17	LDF4-50A(1/2)	31.75 - 33.75	1.0000	1.0000
L28	28	CCI-SFP-085125	31.75 - 33.75	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L28	29	CCI-SFP-085125	31.75 - 33.75	1.0000	1.0000
L28	30	CCI-SFP-085125	31.75 - 33.75	1.0000	1.0000
L29	1	Safety Line 3/8	31.50 - 31.75	1.0000	1.0000
L29	5	LDF7-50A(1-5/8)	31.50 - 31.75	1.0000	1.0000
L29	17	LDF4-50A(1/2)	31.50 - 31.75	1.0000	1.0000
L29	28	CCI-SFP-085125	31.50 - 31.75	1.0000	1.0000
L29	29	CCI-SFP-085125	31.50 - 31.75	1.0000	1.0000
L29	30	CCI-SFP-085125	31.50 - 31.75	1.0000	1.0000
L30	1	Safety Line 3/8	26.50 - 31.50	1.0000	1.0000
L30	5	LDF7-50A(1-5/8)	26.50 - 31.50	1.0000	1.0000
L30	17	LDF4-50A(1/2)	26.50 - 31.50	1.0000	1.0000
L30	28	CCI-SFP-085125	26.50 - 31.50	1.0000	1.0000
L30	29	CCI-SFP-085125	26.50 - 31.50	1.0000	1.0000
L30	30	CCI-SFP-085125	26.50 - 31.50	1.0000	1.0000
L31	1	Safety Line 3/8	21.50 - 26.50	1.0000	1.0000
L31	5	LDF7-50A(1-5/8)	21.50 - 26.50	1.0000	1.0000
L31	17	LDF4-50A(1/2)	21.50 - 26.50	1.0000	1.0000
L31	28	CCI-SFP-085125	21.50 - 26.50	1.0000	1.0000
L31	29	CCI-SFP-085125	21.50 - 26.50	1.0000	1.0000
L31	30	CCI-SFP-085125	21.50 - 26.50	1.0000	1.0000
L32	1	Safety Line 3/8	17.75 - 21.50	1.0000	1.0000
L32	5	LDF7-50A(1-5/8)	17.75 - 21.50	1.0000	1.0000
L32	17	LDF4-50A(1/2)	17.75 - 21.50	1.0000	1.0000
L32	25	CCI-SFP-065125	17.75 - 20.50	1.0000	1.0000
L32	26	CCI-SFP-065125	17.75 - 20.50	1.0000	1.0000
L32	28	CCI-SFP-085125	17.75 - 21.50	1.0000	1.0000
L32	29	CCI-SFP-085125	17.75 - 21.50	1.0000	1.0000
L32	30	CCI-SFP-085125	17.75 - 21.50	1.0000	1.0000
L33	1	Safety Line 3/8	17.50 - 17.75	1.0000	1.0000
L33	5	LDF7-50A(1-5/8)	17.50 - 17.75	1.0000	1.0000
L33	17	LDF4-50A(1/2)	17.50 - 17.75	1.0000	1.0000
L33	25	CCI-SFP-065125	17.50 - 17.75	1.0000	1.0000
L33	26	CCI-SFP-065125	17.50 - 17.75	1.0000	1.0000
L33	28	CCI-SFP-085125	17.50 - 17.75	1.0000	1.0000
L33	29	CCI-SFP-085125	17.50 - 17.75	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L33	30	CCI-SFP-085125	17.75 - 17.50	1.0000	1.0000
L34	1	Safety Line 3/8	17.75 - 14.25	1.0000	1.0000
L34	5	LDF7-50A(1-5/8)	17.50 - 14.25	1.0000	1.0000
L34	17	LDF4-50A(1/2)	17.50 - 14.25	1.0000	1.0000
L34	25	CCI-SFP-065125	17.50 - 14.25	1.0000	1.0000
L34	26	CCI-SFP-065125	14.25 - 17.50	1.0000	1.0000
L34	28	CCI-SFP-085125	14.25 - 17.50	1.0000	1.0000
L34	29	CCI-SFP-085125	14.25 - 17.50	1.0000	1.0000
L34	30	CCI-SFP-085125	14.25 - 17.50	1.0000	1.0000
L35	1	Safety Line 3/8	14.00 - 14.25	1.0000	1.0000
L35	5	LDF7-50A(1-5/8)	14.00 - 14.25	1.0000	1.0000
L35	17	LDF4-50A(1/2)	14.00 - 14.25	1.0000	1.0000
L35	25	CCI-SFP-065125	14.00 - 14.25	1.0000	1.0000
L35	26	CCI-SFP-065125	14.00 - 14.25	1.0000	1.0000
L35	28	CCI-SFP-085125	14.00 - 14.25	1.0000	1.0000
L35	29	CCI-SFP-085125	14.00 - 14.25	1.0000	1.0000
L35	30	CCI-SFP-085125	14.00 - 14.25	1.0000	1.0000
L36	1	Safety Line 3/8	11.00 - 14.00	1.0000	1.0000
L36	5	LDF7-50A(1-5/8)	9.00 - 14.00	1.0000	1.0000
L36	17	LDF4-50A(1/2)	9.00 - 14.00	1.0000	1.0000
L36	25	CCI-SFP-065125	9.00 - 14.00	1.0000	1.0000
L36	26	CCI-SFP-065125	9.00 - 14.00	1.0000	1.0000
L36	28	CCI-SFP-085125	10.50 - 14.00	1.0000	1.0000
L36	29	CCI-SFP-085125	9.00 - 14.00	1.0000	1.0000
L36	30	CCI-SFP-085125	9.00 - 14.00	1.0000	1.0000
L37	5	LDF7-50A(1-5/8)	8.00 - 9.00	1.0000	1.0000
L37	17	LDF4-50A(1/2)	4.00 - 9.00	1.0000	1.0000
L37	25	CCI-SFP-065125	4.00 - 9.00	1.0000	1.0000
L37	26	CCI-SFP-065125	4.00 - 9.00	1.0000	1.0000
L37	29	CCI-SFP-085125	4.00 - 9.00	1.0000	1.0000
L37	30	CCI-SFP-085125	4.00 - 9.00	1.0000	1.0000
L38	17	LDF4-50A(1/2)	0.00 - 4.00	1.0000	1.0000
L38	25	CCI-SFP-065125	0.50 - 4.00	1.0000	1.0000
L38	26	CCI-SFP-065125	0.50 - 4.00	1.0000	1.0000
L38	29	CCI-SFP-085125	0.50 - 4.00	1.0000	1.0000
L38	30	CCI-SFP-085125	0.50 - 4.00	1.0000	1.0000

Effective Width of Flat Linear Attachments / Feed Lines

Tower Section	Attachment Record No.	Description	Attachment Segment Elev.	Ratio Calculation Method	Effective Width Ratio
L10	21	CCI-SFP-060100	100.25 - 100.75	Auto	0.1398
L10	22	CCI-SFP-060100	100.25 -	Auto	0.1398

Tower Section	Attachment Record No.	Description	Attachment Segment Elev.	Ratio Calculation Method	Effective Width Ratio
L10	23	CCI-SFP-060100	100.75 100.25 - 100.75	Auto	0.1398
L11	21	CCI-SFP-060100	98.75 - 100.25	Auto	0.1347
L11	22	CCI-SFP-060100	98.75 - 100.25	Auto	0.1347
L11	23	CCI-SFP-060100	98.75 - 100.25	Auto	0.1347
L12	21	CCI-SFP-060100	98.50 - 98.75	Auto	0.1889
L12	22	CCI-SFP-060100	98.50 - 98.75	Auto	0.1889
L12	23	CCI-SFP-060100	98.50 - 98.75	Auto	0.1889
L13	21	CCI-SFP-060100	93.50 - 98.50	Auto	0.1736
L13	22	CCI-SFP-060100	93.50 - 98.50	Auto	0.1736
L13	23	CCI-SFP-060100	93.50 - 98.50	Auto	0.1736
L14	21	CCI-SFP-060100	88.50 - 93.50	Auto	0.1463
L14	22	CCI-SFP-060100	88.50 - 93.50	Auto	0.1463
L14	23	CCI-SFP-060100	88.50 - 93.50	Auto	0.1463
L15	21	CCI-SFP-060100	80.25 - 88.50	Auto	0.1125
L15	22	CCI-SFP-060100	80.25 - 88.50	Auto	0.1125
L15	23	CCI-SFP-060100	80.25 - 88.50	Auto	0.1125
L16	21	CCI-SFP-060100	79.75 - 80.25	Auto	0.1231
L16	22	CCI-SFP-060100	79.75 - 80.25	Auto	0.1231
L16	23	CCI-SFP-060100	79.75 - 80.25	Auto	0.1231
L17	21	CCI-SFP-060100	74.75 - 79.75	Auto	0.1054
L17	22	CCI-SFP-060100	74.75 - 79.75	Auto	0.1054
L17	23	CCI-SFP-060100	74.75 - 79.75	Auto	0.1054
L18	21	CCI-SFP-060100	70.63 - 74.75	Auto	0.0821
L18	22	CCI-SFP-060100	70.63 - 74.75	Auto	0.0821
L18	23	CCI-SFP-060100	70.63 - 74.75	Auto	0.0821
L18	28	CCI-SFP-085125	69.75 - 70.63	Auto	0.3431
L18	29	CCI-SFP-085125	69.75 - 70.63	Auto	0.3431
L18	30	CCI-SFP-085125	69.75 - 70.63	Auto	0.3431
L19	28	CCI-SFP-085125	66.88 - 69.75	Auto	0.3363
L19	29	CCI-SFP-085125	66.88 - 69.75	Auto	0.3363
L19	30	CCI-SFP-085125	66.88 - 69.75	Auto	0.3363
L20	28	CCI-SFP-085125	66.63 - 66.88	Auto	0.3592
L20	29	CCI-SFP-085125	66.63 - 66.88	Auto	0.3592
L20	30	CCI-SFP-085125	66.63 -	Auto	0.3592

Tower Section	Attachment Record No.	Description	Attachment Segment Elev.	Ratio Calculation Method	Effective Width Ratio
L21	28	CCI-SFP-085125	66.88 61.63 - 66.63	Auto	0.3471
L21	29	CCI-SFP-085125	61.63 - 66.63	Auto	0.3471
L21	30	CCI-SFP-085125	61.63 - 66.63	Auto	0.3471
L22	28	CCI-SFP-085125	56.63 - 61.63	Auto	0.3291
L22	29	CCI-SFP-085125	56.63 - 61.63	Auto	0.3291
L22	30	CCI-SFP-085125	56.63 - 61.63	Auto	0.3291
L23	28	CCI-SFP-085125	51.63 - 56.63	Auto	0.3085
L23	29	CCI-SFP-085125	51.63 - 56.63	Auto	0.3085
L23	30	CCI-SFP-085125	51.63 - 56.63	Auto	0.3085
L24	28	CCI-SFP-085125	46.63 - 51.63	Auto	0.2905
L24	29	CCI-SFP-085125	46.63 - 51.63	Auto	0.2905
L24	30	CCI-SFP-085125	46.63 - 51.63	Auto	0.2905
L25	28	CCI-SFP-085125	39.75 - 46.63	Auto	0.2665
L25	29	CCI-SFP-085125	39.75 - 46.63	Auto	0.2665
L25	30	CCI-SFP-085125	39.75 - 46.63	Auto	0.2665
L26	28	CCI-SFP-085125	38.75 - 39.75	Auto	0.2782
L26	29	CCI-SFP-085125	38.75 - 39.75	Auto	0.2782
L26	30	CCI-SFP-085125	38.75 - 39.75	Auto	0.2782
L27	28	CCI-SFP-085125	33.75 - 38.75	Auto	0.2674
L27	29	CCI-SFP-085125	33.75 - 38.75	Auto	0.2674
L27	30	CCI-SFP-085125	33.75 - 38.75	Auto	0.2674
L28	28	CCI-SFP-085125	31.75 - 33.75	Auto	0.2547
L28	29	CCI-SFP-085125	31.75 - 33.75	Auto	0.2547
L28	30	CCI-SFP-085125	31.75 - 33.75	Auto	0.2547
L29	28	CCI-SFP-085125	31.50 - 31.75	Auto	0.2507
L29	29	CCI-SFP-085125	31.50 - 31.75	Auto	0.2507
L29	30	CCI-SFP-085125	31.50 - 31.75	Auto	0.2507
L30	28	CCI-SFP-085125	26.50 - 31.50	Auto	0.2387
L30	29	CCI-SFP-085125	26.50 - 31.50	Auto	0.2387
L30	30	CCI-SFP-085125	26.50 - 31.50	Auto	0.2387
L31	28	CCI-SFP-085125	21.50 - 26.50	Auto	0.2181
L31	29	CCI-SFP-085125	21.50 - 26.50	Auto	0.2181
L31	30	CCI-SFP-085125	21.50 - 26.50	Auto	0.2181
L32	25	CCI-SFP-065125	17.75 -	Auto	0.0000

Tower Section	Attachment Record No.	Description	Attachment Segment Elev.	Ratio Calculation Method	Effective Width Ratio
L32	26	CCI-SFP-065125	20.50 17.75 - 20.50	Auto	0.0000
L32	28	CCI-SFP-085125	17.75 - 21.50	Auto	0.2023
L32	29	CCI-SFP-085125	17.75 - 21.50	Auto	0.2023
L32	30	CCI-SFP-085125	17.75 - 21.50	Auto	0.2023
L33	25	CCI-SFP-065125	17.50 - 17.75	Auto	0.0000
L33	26	CCI-SFP-065125	17.50 - 17.75	Auto	0.0000
L33	28	CCI-SFP-085125	17.50 - 17.75	Auto	0.2158
L33	29	CCI-SFP-085125	17.50 - 17.75	Auto	0.2158
L33	30	CCI-SFP-085125	17.50 - 17.75	Auto	0.2158
L34	25	CCI-SFP-065125	14.25 - 17.50	Auto	0.0000
L34	26	CCI-SFP-065125	14.25 - 17.50	Auto	0.0000
L34	28	CCI-SFP-085125	14.25 - 17.50	Auto	0.2095
L34	29	CCI-SFP-085125	14.25 - 17.50	Auto	0.2095
L34	30	CCI-SFP-085125	14.25 - 17.50	Auto	0.2095
L35	25	CCI-SFP-065125	14.00 - 14.25	Auto	0.0000
L35	26	CCI-SFP-065125	14.00 - 14.25	Auto	0.0000
L35	28	CCI-SFP-085125	14.00 - 14.25	Auto	0.1851
L35	29	CCI-SFP-085125	14.00 - 14.25	Auto	0.1851
L35	30	CCI-SFP-085125	14.00 - 14.25	Auto	0.1851
L36	25	CCI-SFP-065125	9.00 - 14.00	Auto	0.0000
L36	26	CCI-SFP-065125	9.00 - 14.00	Auto	0.0000
L36	28	CCI-SFP-085125	10.50 - 14.00	Auto	0.1757
L36	29	CCI-SFP-085125	9.00 - 14.00	Auto	0.1730
L36	30	CCI-SFP-085125	9.00 - 14.00	Auto	0.1730
L37	25	CCI-SFP-065125	4.00 - 9.00	Auto	0.0000
L37	26	CCI-SFP-065125	4.00 - 9.00	Auto	0.0000
L37	29	CCI-SFP-085125	4.00 - 9.00	Auto	0.1550
L37	30	CCI-SFP-085125	4.00 - 9.00	Auto	0.1550
L38	25	CCI-SFP-065125	0.50 - 4.00	Auto	0.0000
L38	26	CCI-SFP-065125	0.50 - 4.00	Auto	0.0000
L38	29	CCI-SFP-085125	0.50 - 4.00	Auto	0.1397
L38	30	CCI-SFP-085125	0.50 - 4.00	Auto	0.1397

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
Top Hat	C	None		0.00	149.50	No Ice	5.50	5.50	0.78
						1/2" Ice	8.20	8.20	1.01
						1" Ice	11.40	11.40	1.25

Platform Mount [LP 1201-1_HR-1]	C	None		0.00	150.00	No Ice	26.39	26.39	2.36
						1/2" Ice	31.40	31.40	3.06
						1" Ice	36.20	36.20	3.86
sitepro1 HRK14-U	C	None		0.00	150.00	No Ice	0.00	0.00	0.00
						1/2" Ice	0.00	0.00	0.00
						1" Ice	0.00	0.00	0.00
6'x2" Mount Pipe	A	From Leg	1.00	0.00	150.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			1.00			1" Ice	2.29	2.29	0.05
6'x2" Mount Pipe	B	From Leg	1.00	0.00	150.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			1.00			1" Ice	2.29	2.29	0.05
6'x2" Mount Pipe	C	From Leg	1.00	0.00	150.00	No Ice	1.43	1.43	0.02
			0.00			1/2" Ice	1.92	1.92	0.03
			1.00			1" Ice	2.29	2.29	0.05
2.5'x2" Mount Pipe	A	From Leg	4.00	0.00	150.00	No Ice	0.46	0.46	0.01
			0.00			1/2" Ice	0.62	0.62	0.01
			0.00			1" Ice	0.78	0.78	0.02
2.5'x2" Mount Pipe	B	From Leg	4.00	0.00	150.00	No Ice	0.46	0.46	0.01
			0.00			1/2" Ice	0.62	0.62	0.01
			0.00			1" Ice	0.78	0.78	0.02
2.5'x2" Mount Pipe	C	From Leg	4.00	0.00	150.00	No Ice	0.46	0.46	0.01
			0.00			1/2" Ice	0.62	0.62	0.01
			0.00			1" Ice	0.78	0.78	0.02
4'x2" Mount Pipe	A	From Leg	4.00	0.00	150.00	No Ice	0.87	0.87	0.01
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			1" Ice	1.36	1.36	0.03
4'x2" Mount Pipe	B	From Leg	4.00	0.00	150.00	No Ice	0.87	0.87	0.01
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			1" Ice	1.36	1.36	0.03
4'x2" Mount Pipe	C	From Leg	4.00	0.00	150.00	No Ice	0.87	0.87	0.01
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			1" Ice	1.36	1.36	0.03
VV-65A-R1_TMO w/ Mount Pipe	A	From Leg	4.00	0.00	150.00	No Ice	4.46	2.69	0.05
			0.00			1/2" Ice	4.91	3.10	0.10
			0.00			1" Ice	5.36	3.52	0.15
VV-65A-R1_TMO w/ Mount Pipe	B	From Leg	4.00	0.00	150.00	No Ice	4.46	2.69	0.05
			0.00			1/2" Ice	4.91	3.10	0.10
			0.00			1" Ice	5.36	3.52	0.15
VV-65A-R1_TMO w/ Mount Pipe	C	From Leg	4.00	0.00	150.00	No Ice	4.46	2.69	0.05
			0.00			1/2" Ice	4.91	3.10	0.10
			0.00			1" Ice	5.36	3.52	0.15
APXVAALL24_43-U-	A	From Leg	4.00	0.00	150.00	No Ice	14.69	6.87	0.18

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
NA20_TMO w/ Mount Pipe			0.00 -1.00			1/2" Ice 16.23	7.55 8.25	0.31 0.45
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	B	From Leg	4.00 0.00 -1.00	0.00	150.00	No Ice 1/2" Ice 16.23	6.87 7.55 8.25	0.18 0.31 0.45
APXVAALL24_43-U-NA20_TMO w/ Mount Pipe	C	From Leg	4.00 0.00 -1.00	0.00	150.00	No Ice 1/2" Ice 16.23	6.87 7.55 8.25	0.18 0.31 0.45
AIR6449 B41_T-MOBILE w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 6.02	2.71 3.04 3.38	0.13 0.17 0.23
AIR6449 B41_T-MOBILE w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 6.02	2.71 3.04 3.38	0.13 0.17 0.23
AIR6449 B41_T-MOBILE w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 6.02	2.71 3.04 3.38	0.13 0.17 0.23
RADIO 4415 B66A	A	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 2.20	0.87 1.00 1.13	0.05 0.06 0.08
RADIO 4415 B66A	B	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 2.20	0.87 1.00 1.13	0.05 0.06 0.08
RADIO 4415 B66A	C	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 2.20	0.87 1.00 1.13	0.05 0.06 0.08
RADIO 4424 B25_TMO	A	From Leg	4.00 0.00 1.00	0.00	150.00	No Ice 1/2" Ice 2.42	1.61 1.77 1.94	0.09 0.11 0.13
RADIO 4424 B25_TMO	B	From Leg	4.00 0.00 1.00	0.00	150.00	No Ice 1/2" Ice 2.42	1.61 1.77 1.94	0.09 0.11 0.13
RADIO 4424 B25_TMO	C	From Leg	4.00 0.00 1.00	0.00	150.00	No Ice 1/2" Ice 2.42	1.61 1.77 1.94	0.09 0.11 0.13
RADIO 4449 B71 B85A_T-MOBILE	A	From Leg	4.00 0.00 1.00	0.00	150.00	No Ice 1/2" Ice 2.33	1.59 1.75 1.92	0.07 0.09 0.12
RADIO 4449 B71 B85A_T-MOBILE	B	From Leg	4.00 0.00 1.00	0.00	150.00	No Ice 1/2" Ice 2.33	1.59 1.75 1.92	0.07 0.09 0.12
RADIO 4449 B71 B85A_T-MOBILE	C	From Leg	4.00 0.00 1.00	0.00	150.00	No Ice 1/2" Ice 2.33	1.59 1.75 1.92	0.07 0.09 0.12
***						1" Ice		
Platform Mount [LP 1201-1_KCKR-HR-1]	C	None		0.00	138.00	No Ice 1/2" Ice 52.00	35.30 43.80 52.00	2.63 3.48 4.46
PRK-SFS-L	C	None		0.00	140.00	No Ice	0.00	0.00

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA} _{Front}	C _{AA} _{Side}	Weight K	
			Horz ft	Lateral ft			Vert ft	ft ²		ft ²
							1/2"	0.00	0.00	0.00
							Ice	0.00	0.00	0.00
							1" Ice			
PLK1	C	None			0.00	138.00	No Ice	0.00	0.00	0.00
							1/2"	0.00	0.00	0.00
							Ice	0.00	0.00	0.00
							1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	138.00	No Ice	3.02	7.80	0.06
			0.00				1/2"	3.57	8.42	0.12
			2.00				Ice	4.14	9.06	0.19
							1" Ice			
(2) LPA-80063/6CF w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	138.00	No Ice	7.19	7.30	0.06
			0.00				1/2"	7.77	7.88	0.15
			2.00				Ice	8.36	8.47	0.25
							1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	138.00	No Ice	3.02	7.80	0.06
			0.00				1/2"	3.57	8.42	0.12
			2.00				Ice	4.14	9.06	0.19
							1" Ice			
QS6656-5 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	138.00	No Ice	4.04	4.18	0.09
			0.00				1/2"	4.42	4.57	0.16
			2.00				Ice	4.82	4.97	0.24
							1" Ice			
QS6656-5 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	138.00	No Ice	4.04	4.18	0.09
			0.00				1/2"	4.42	4.57	0.16
			2.00				Ice	4.82	4.97	0.24
							1" Ice			
QS6656-5 w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	138.00	No Ice	4.04	4.18	0.09
			0.00				1/2"	4.42	4.57	0.16
			2.00				Ice	4.82	4.97	0.24
							1" Ice			
QS6656-5	A	From Leg	4.00	0.00	0.00	138.00	No Ice	4.01	3.37	0.07
			0.00				1/2"	4.41	3.76	0.12
			2.00				Ice	4.81	4.15	0.19
							1" Ice			
QS6656-5	B	From Leg	4.00	0.00	0.00	138.00	No Ice	4.01	3.37	0.07
			0.00				1/2"	4.41	3.76	0.12
			2.00				Ice	4.81	4.15	0.19
							1" Ice			
QS6656-5	C	From Leg	4.00	0.00	0.00	138.00	No Ice	4.01	3.37	0.07
			0.00				1/2"	4.41	3.76	0.12
			2.00				Ice	4.81	4.15	0.19
							1" Ice			
Sub6 Antenna - VZS01 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	138.00	No Ice	5.91	3.74	0.12
			0.00				1/2"	6.72	4.79	0.17
			2.00				Ice	7.44	5.70	0.22
							1" Ice			
Sub6 Antenna - VZS01 w/ Mount Pipe	B	From Leg	4.00	0.00	0.00	138.00	No Ice	5.91	3.74	0.12
			0.00				1/2"	6.72	4.79	0.17
			2.00				Ice	7.44	5.70	0.22
							1" Ice			
Sub6 Antenna - VZS01 w/ Mount Pipe	C	From Leg	4.00	0.00	0.00	138.00	No Ice	5.91	3.74	0.12
			0.00				1/2"	6.72	4.79	0.17
			2.00				Ice	7.44	5.70	0.22
							1" Ice			
BSF0020F3V1	A	From Leg	4.00	0.00	0.00	138.00	No Ice	0.96	0.29	0.02
			0.00				1/2"	1.09	0.36	0.02
			2.00				Ice	1.22	0.45	0.03
							1" Ice			
BSF0020F3V1	B	From Leg	4.00	0.00	0.00	138.00	No Ice	0.96	0.29	0.02
			0.00				1/2"	1.09	0.36	0.02
			2.00				Ice	1.22	0.45	0.03
							1" Ice			
(2) BSF0020F3V1	C	From Leg	4.00	0.00	0.00	138.00	No Ice	0.96	0.29	0.02
			0.00				1/2"	1.09	0.36	0.02

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _A A _{Front}	C _A A _{Side}	Weight	
			Horz	Lateral	Vert						ft
					2.00						
RFV01U-D2A	A	From Leg			4.00	0.00	138.00	Ice	1.22	0.45	0.03
					0.00			1" Ice	1.88	1.01	0.07
					2.00			No Ice	2.05	1.14	0.09
					2.00			1/2"	2.22	1.28	0.11
RFV01U-D2A	B	From Leg			4.00	0.00	138.00	1" Ice	1.88	1.01	0.07
					0.00			No Ice	2.05	1.14	0.09
					2.00			1/2"	2.22	1.28	0.11
					2.00			Ice	2.22	1.28	0.11
RFV01U-D2A	C	From Leg			4.00	0.00	138.00	1" Ice	1.88	1.01	0.07
					0.00			No Ice	2.05	1.14	0.09
					2.00			1/2"	2.22	1.28	0.11
					2.00			Ice	2.22	1.28	0.11
RFV01U-D1A	A	From Leg			4.00	0.00	138.00	1" Ice	1.88	1.25	0.08
					0.00			No Ice	2.05	1.39	0.10
					2.00			1/2"	2.22	1.54	0.12
					2.00			Ice	2.22	1.54	0.12
RFV01U-D1A	B	From Leg			4.00	0.00	138.00	1" Ice	1.88	1.25	0.08
					0.00			No Ice	2.05	1.39	0.10
					2.00			1/2"	2.22	1.54	0.12
					2.00			Ice	2.22	1.54	0.12
RFV01U-D1A	C	From Leg			4.00	0.00	138.00	1" Ice	1.88	1.25	0.08
					0.00			No Ice	2.05	1.39	0.10
					2.00			1/2"	2.22	1.54	0.12
					2.00			Ice	2.22	1.54	0.12
DB-C1-12C-24AB-0Z	C	From Leg			4.00	0.00	138.00	1" Ice	4.06	3.10	0.03
					0.00			No Ice	4.32	3.34	0.07
					2.00			1/2"	4.58	3.58	0.11
					2.00			Ice	4.58	3.58	0.11

Site Pro 1 RMQP-xxx + HRK12 12.5' Platform with Handrails	C	None				0.00	128.00	No Ice	21.17	19.65	1.49
								1/2"	25.84	24.18	1.82
								Ice	30.51	28.79	2.29
8'x2" Mount Pipe	A	From Leg			4.00	0.00	128.00	1" Ice	0.00	1.90	0.03
					0.00			No Ice	0.00	2.73	0.04
					0.00			1/2"	0.00	3.40	0.06
8'x2" Mount Pipe	B	From Leg			4.00	0.00	128.00	1" Ice	0.00	1.90	0.03
					0.00			No Ice	0.00	2.73	0.04
					0.00			1/2"	0.00	3.40	0.06
8'x2" Mount Pipe	C	From Leg			4.00	0.00	128.00	1" Ice	0.00	1.90	0.03
					0.00			No Ice	0.00	2.73	0.04
					0.00			1/2"	0.00	3.40	0.06
HPA-65R-BUU-H8 w/ Mount Pipe	A	From Leg			4.00	0.00	128.00	1" Ice	12.25	8.33	0.10
					0.00			No Ice	13.19	9.23	0.19
					0.00			1/2"	14.16	10.15	0.30
HPA-65R-BUU-H8 w/ Mount Pipe	B	From Leg			4.00	0.00	128.00	1" Ice	12.25	8.33	0.10
					0.00			No Ice	13.19	9.23	0.19
					0.00			1/2"	14.16	10.15	0.30
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Leg			4.00	0.00	128.00	1" Ice	12.25	8.33	0.10
					0.00			No Ice	13.19	9.23	0.19
					0.00			1/2"	14.16	10.15	0.30
OPA65R-BU8D w/ Mount Pipe	A	From Leg			4.00	0.00	128.00	1" Ice	17.46	8.58	0.11
					0.00			No Ice	18.46	9.49	0.22
					0.00			1/2"	19.48	10.42	0.35
OPA65R-BU8D w/ Mount Pipe	B	From Leg			4.00	0.00	128.00	1" Ice	17.46	8.58	0.11
					0.00			No Ice	18.46	9.49	0.22

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight	
			Horz	Lateral						ft
			ft	ft	°	ft	ft ²	ft ²	K	
			0.00							
OPA65R-BU8D w/ Mount Pipe	C	From Leg					Ice	19.48	10.42	0.35
			4.00	0.00	128.00	1" Ice				
			0.00	0.00		No Ice	17.46	8.58	0.11	
DMP65R-BU8D w/ Mount Pipe	A	From Leg	4.00	0.00	128.00	1/2"	18.46	9.49	0.22	
			0.00	0.00		Ice	19.48	10.42	0.35	
			0.00	0.00		1" Ice				
DMP65R-BU8D w/ Mount Pipe	A	From Leg	4.00	0.00	128.00	No Ice	15.89	7.89	0.14	
			0.00	0.00		1/2"	16.81	8.74	0.25	
			0.00	0.00		Ice	17.76	9.60	0.38	
DMP65R-BU8D w/ Mount Pipe	B	From Leg	4.00	0.00	128.00	1" Ice				
			0.00	0.00		No Ice	15.89	7.89	0.14	
			0.00	0.00		1/2"	16.81	8.74	0.25	
DMP65R-BU8D w/ Mount Pipe	C	From Leg	4.00	0.00	128.00	Ice	17.76	9.60	0.38	
			0.00	0.00		1" Ice				
			0.00	0.00		No Ice	15.89	7.89	0.14	
RRUS 8843 B2/B66A	A	From Leg	4.00	0.00	128.00	1/2"	16.81	8.74	0.25	
			0.00	0.00		Ice	17.76	9.60	0.38	
			0.00	0.00		1" Ice				
RRUS 8843 B2/B66A	B	From Leg	4.00	0.00	128.00	No Ice	1.64	1.35	0.07	
			0.00	0.00		1/2"	1.80	1.50	0.09	
			0.00	0.00		Ice	1.97	1.65	0.11	
RRUS 8843 B2/B66A	B	From Leg	4.00	0.00	128.00	1" Ice				
			0.00	0.00		No Ice	1.64	1.35	0.07	
			0.00	0.00		1/2"	1.80	1.50	0.09	
RRUS 8843 B2/B66A	C	From Leg	4.00	0.00	128.00	Ice	1.97	1.65	0.11	
			0.00	0.00		1" Ice				
			0.00	0.00		No Ice	1.64	1.35	0.07	
DC6-48-60-18-8F	A	From Leg	1.00	0.00	128.00	1/2"	1.46	1.46	0.04	
			0.00	0.00		Ice	1.64	1.64	0.06	
			0.00	0.00		1" Ice				
DC9-48-60-24-8C-EV	B	From Leg	1.00	0.00	128.00	No Ice	2.74	4.78	0.03	
			0.00	0.00		1/2"	2.96	5.06	0.06	
			0.00	0.00		Ice	3.20	5.35	0.10	
RRUS 4449 B5/B12	A	From Leg	4.00	0.00	128.00	1" Ice				
			0.00	0.00		No Ice	1.97	1.41	0.07	
			0.00	0.00		1/2"	2.14	1.56	0.09	
RRUS 4449 B5/B12	B	From Leg	4.00	0.00	128.00	Ice	2.33	1.73	0.11	
			0.00	0.00		1" Ice				
			0.00	0.00		No Ice	1.97	1.41	0.07	
RRUS 4449 B5/B12	C	From Leg	4.00	0.00	128.00	1/2"	2.14	1.56	0.09	
			0.00	0.00		Ice	2.33	1.73	0.11	
			0.00	0.00		1" Ice				
RADIO 4415 B30	A	From Leg	4.00	0.00	128.00	No Ice	1.64	0.64	0.04	
			0.00	0.00		1/2"	1.80	0.75	0.05	
			0.00	0.00		Ice	1.97	0.87	0.07	
RADIO 4415 B30	B	From Leg	4.00	0.00	128.00	1" Ice				
			0.00	0.00		No Ice	1.64	0.64	0.04	
			0.00	0.00		1/2"	1.80	0.75	0.05	
RADIO 4415 B30	C	From Leg	4.00	0.00	128.00	Ice	1.97	0.87	0.07	
			0.00	0.00		1" Ice				
			0.00	0.00		No Ice	1.64	0.64	0.04	
*** Site Pro 1 F4P-12W 12' Fortress Quad Platform	C	None			0.00	114.00	No Ice	34.66	34.66	2.64
							1/2"	44.06	44.06	3.48

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _A A _{Front}	C _A A _{Side}	Weight	
			Horz	Lateral	Vert						ft
			ft	ft	ft	°	ft	ft ²	ft ²	K	
								Ice	56.66	53.47	4.64
Site Pro 1 F4P-HRK12 Hand Rail Kit	C	None				0.00	114.00	1" Ice			
								No Ice	5.68	5.44	0.51
								1/2"	7.91	7.39	0.62
(2) 6'x2" Mount Pipe	A	From Leg	4.00	0.00	0.00	0.00	114.00	Ice	10.22	8.82	0.77
								1" Ice			
								No Ice	1.43	1.43	0.02
(2) 6'x2" Mount Pipe	A	From Face	4.00	0.00	0.00	0.00	114.00	1/2"	1.92	1.92	0.03
								Ice	2.29	2.29	0.05
								No Ice	1.43	1.43	0.02
(2) 6'x2" Mount Pipe	A	From Face	4.00	0.00	0.00	0.00	114.00	1/2"	1.92	1.92	0.03
								Ice	2.29	2.29	0.05
								No Ice	1.43	1.43	0.02
(2) 6'x2" Mount Pipe	B	From Face	4.00	0.00	0.00	0.00	114.00	1/2"	1.92	1.92	0.03
								Ice	2.29	2.29	0.05
								No Ice	1.43	1.43	0.02
(2) 6'x2" Mount Pipe	C	From Face	4.00	0.00	0.00	0.00	114.00	1/2"	1.92	1.92	0.03
								Ice	2.29	2.29	0.05
								No Ice	1.43	1.43	0.02
AIR 32 B2A/B66AA w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	0.00	114.00	1" Ice			
								No Ice	3.76	3.15	0.19
								1/2"	4.12	3.49	0.25
AIR 32 B2A/B66AA w/ Mount Pipe	A	From Face	4.00	-30.00	0.00	0.00	114.00	Ice	4.48	3.84	0.32
								1" Ice			
								No Ice	3.76	3.15	0.19
AIR 32 B2A/B66AA w/ Mount Pipe	A	From Face	4.00	-30.00	0.00	0.00	114.00	1/2"	4.12	3.49	0.25
								Ice	4.48	3.84	0.32
								No Ice	3.76	3.15	0.19
AIR 32 B2A/B66AA w/ Mount Pipe	B	From Face	4.00	30.00	0.00	0.00	114.00	1/2"	4.12	3.49	0.25
								Ice	4.48	3.84	0.32
								No Ice	3.76	3.15	0.19
AIR 32 B2A/B66AA w/ Mount Pipe	C	From Face	4.00	0.00	0.00	0.00	114.00	1" Ice			
								No Ice	3.76	3.15	0.19
								1/2"	4.12	3.49	0.25
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.00	0.00	0.00	0.00	114.00	Ice	4.48	3.84	0.32
								1" Ice			
								No Ice	14.69	6.87	0.19
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Face	4.00	-30.00	0.00	0.00	114.00	1/2"	15.46	7.55	0.31
								Ice	16.23	8.25	0.46
								No Ice	14.69	6.87	0.19
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Face	4.00	-30.00	0.00	0.00	114.00	1/2"	15.46	7.55	0.31
								Ice	16.23	8.25	0.46
								No Ice	14.69	6.87	0.19
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Face	4.00	30.00	0.00	0.00	114.00	1" Ice			
								No Ice	14.69	6.87	0.19
								1/2"	15.46	7.55	0.31
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Face	4.00	30.00	0.00	0.00	114.00	Ice	16.23	8.25	0.46
								1" Ice			
								No Ice	14.69	6.87	0.19
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Face	4.00	0.00	0.00	0.00	114.00	1/2"	15.46	7.55	0.31
								Ice	16.23	8.25	0.46
								No Ice	14.69	6.87	0.19
(2) RADIO 4449 B12/B71	A	From Leg	4.00	0.00	0.00	0.00	114.00	1" Ice			
								No Ice	1.65	1.30	0.08
								1/2"	1.81	1.44	0.09
(2) RADIO 4449 B12/B71	A	From Face	4.00	-30.00	0.00	0.00	114.00	Ice	1.98	1.60	0.11
								1" Ice			
								No Ice	1.65	1.30	0.08
(2) RADIO 4449 B12/B71	A	From Face	4.00	-30.00	0.00	0.00	114.00	1/2"	1.81	1.44	0.09
								Ice	1.98	1.60	0.11
								No Ice	1.65	1.30	0.08
(2) RADIO 4449 B12/B71	B	From Face	4.00	30.00	0.00	0.00	114.00	1" Ice			
								No Ice	1.65	1.30	0.08
								1/2"	1.81	1.44	0.09
(2) RADIO 4449 B12/B71	B	From Face	4.00	30.00	0.00	0.00	114.00	Ice	1.98	1.60	0.11
								1" Ice			
								No Ice	1.65	1.30	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	Ice	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(2) RADIO 4449 B12/B71	C	From Face	4.00 0.00 0.00	0.00	114.00	1" Ice No Ice 1/2" Ice 1" Ice	1.65 1.81 1.98	1.30 1.44 1.60	0.08 0.09 0.11

3'x3" Horizontal Pipe	A	From Leg	1.50 0.00 0.00	90.00	79.00	No Ice 1/2" Ice 1" Ice	1.05 1.27 1.49	0.10 0.14 0.19	0.02 0.03 0.05
2'x2" Mount Pipe	A	From Leg	1.50 0.00 1.00	0.00	79.00	No Ice 1/2" Ice 1" Ice	0.34 0.47 0.61	0.34 0.47 0.61	0.01 0.01 0.02
PD1109E	A	From Leg	1.50 0.00 5.00	0.00	79.00	No Ice 1/2" Ice 1" Ice	2.85 3.92 5.01	2.85 3.92 5.01	0.02 0.04 0.07

3'x3" Horizontal Pipe	C	From Leg	1.50 0.00 0.00	90.00	45.00	No Ice 1/2" Ice 1" Ice	1.05 1.27 1.49	0.10 0.14 0.19	0.02 0.03 0.05
GPS_A	C	From Leg	3.00 0.00 0.00	0.00	45.00	No Ice 1/2" Ice 1" Ice	0.26 0.32 0.39	0.26 0.32 0.39	0.00 0.00 0.01

Side Arm Mount [SO 701-1]	A	From Leg	1.50 0.00 0.00	0.00	16.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
3'x2" Mount Pipe	A	From Leg	3.00 0.00 0.00	0.00	16.00	No Ice 1/2" Ice 1" Ice	0.58 0.77 0.97	0.58 0.77 0.97	0.01 0.02 0.02
GPS_A	A	From Leg	3.00 0.00 0.00	0.00	16.00	No Ice 1/2" Ice 1" Ice	0.26 0.32 0.39	0.26 0.32 0.39	0.00 0.00 0.01

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K	
SC2-W100AB	A	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 0.00	0.00		114.00	2.20	No Ice 1/2" Ice 1" Ice	3.80 4.09 4.39	0.02 0.04 0.06
*											

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
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	148 - 143	Pole	Max Tension	26	0.00	0.00	-0.00
			Max. Compression	26	-10.37	-0.00	0.02
			Max. Mx	8	-5.99	-29.90	0.01
			Max. My	2	-5.99	0.01	29.89
			Max. Vy	8	4.69	-29.90	0.01
			Max. Vx	2	-4.69	0.01	29.89
			Max. Torque	20			0.00
L2	143 - 138	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L3	138 - 133	Pole	Max. Compression	26	-10.93	-0.01	0.05
			Max. Mx	8	-6.37	-54.12	0.01
			Max. My	2	-6.37	0.03	54.10
			Max. Vy	8	5.00	-54.12	0.01
			Max. Vx	2	-4.99	0.03	54.10
			Max. Torque	20			0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-21.00	0.03	-0.52
			Max. Mx	20	-11.74	106.24	0.61
			Max. My	14	-11.76	-0.58	-105.08
L4	133 - 128	Pole	Max. Vy	8	9.51	-105.92	-0.79
			Max. Vx	2	-9.35	0.82	104.80
			Max. Torque	24			0.59
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-21.70	-0.08	-0.42
			Max. Mx	20	-12.21	154.50	1.15
			Max. My	14	-12.22	-1.10	-152.54
			Max. Vy	8	9.81	-154.25	-1.23
			Max. Vx	2	-9.65	1.28	152.33
			Max. Torque	24			0.59
L5	128 - 123	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-29.59	-0.38	-0.27
			Max. Mx	20	-16.26	226.40	1.61
			Max. My	14	-16.28	-1.56	-223.82
			Max. Vy	8	14.55	-226.34	-1.53
			Max. Vx	2	-14.42	1.58	223.70
			Max. Torque	24			0.59
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-30.01	-0.44	-0.19
			Max. Mx	20	-16.56	266.58	1.85
L6	123 - 116.5	Pole	Max. My	14	-16.57	-1.78	-263.63
			Max. Vy	8	14.71	-266.56	-1.70
			Max. Vx	2	-14.58	1.77	263.56
			Max. Torque	24			0.42
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-31.27	-0.55	-0.05
			Max. Mx	8	-17.44	-340.93	-2.01
			Max. My	2	-17.45	2.12	337.27
			Max. Vy	8	15.03	-340.93	-2.01
			Max. Vx	2	-14.90	2.12	337.27
L7	116.5 - 115.25	Pole	Max. Torque	24			0.42
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-42.92	-0.66	6.69
			Max. Mx	8	-24.44	-431.66	1.25
			Max. My	2	-24.45	2.47	431.29
			Max. Vy	8	19.27	-431.66	1.25
			Max. Vx	14	19.21	-2.60	-423.77
			Max. Torque	21			-3.56
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-43.84	-0.77	6.84
L8	115.25 - 110.25	Pole	Max. Mx	8	-25.16	-528.61	1.01
			Max. My	2	-25.17	2.81	527.82
			Max. Vy	8	19.51	-528.61	1.01
			Max. Vx	14	19.46	-3.02	-520.37
			Max. Torque	21			-3.56
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-44.78	-0.89	6.99
			Max. Mx	8	-25.91	-626.74	0.76
			Max. My	2	-25.92	3.16	625.53
			Max. Vy	8	19.75	-626.74	0.76
L9	110.25 - 105.25	Pole	Max. Vx	14	19.69	-3.44	-618.15
			Max. Torque	21			-3.56
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.09	-0.92	7.03
			Max. Mx	8	-25.91	-626.74	0.76
			Max. My	2	-25.92	3.16	625.53
			Max. Vy	8	19.75	-626.74	0.76
			Max. Vx	14	19.69	-3.44	-618.15
			Max. Torque	21			-3.56
			Max Tension	1	0.00	0.00	0.00
L10	105.25 - 100.25	Pole	Max. Compression	26	-44.78	-0.89	6.99
			Max. Mx	8	-25.91	-626.74	0.76
			Max. My	2	-25.92	3.16	625.53
			Max. Vy	8	19.75	-626.74	0.76
			Max. Vx	14	19.69	-3.44	-618.15
			Max. Torque	21			-3.56
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.09	-0.92	7.03
			Max. Mx	8	-25.91	-626.74	0.76
			Max. My	2	-25.92	3.16	625.53
L11	100.25 - 98.75	Pole	Max. Vy	8	19.75	-626.74	0.76
			Max. Vx	14	19.69	-3.44	-618.15
			Max. Torque	21			-3.56
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.09	-0.92	7.03
			Max. Mx	8	-25.91	-626.74	0.76
			Max. My	2	-25.92	3.16	625.53
			Max. Vy	8	19.75	-626.74	0.76
			Max. Vx	14	19.69	-3.44	-618.15
			Max. Torque	21			-3.56

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L12	98.75 - 98.5	Pole	Max. Mx	8	-26.13	-656.40	0.69
			Max. My	2	-26.14	3.26	655.06
			Max. Vy	8	19.82	-656.40	0.69
			Max. Vx	14	19.76	-3.56	-647.71
			Max. Torque	21			-3.55
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-45.16	-0.93	7.04
			Max. Mx	8	-26.20	-661.35	0.67
			Max. My	2	-26.21	3.28	659.99
			Max. Vy	8	19.82	-661.35	0.67
L13	98.5 - 93.5	Pole	Max. Vx	14	19.77	-3.58	-652.64
			Max. Torque	21			-3.55
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-46.58	-1.05	7.18
			Max. Mx	8	-27.29	-761.20	0.42
			Max. My	2	-27.30	3.62	759.42
			Max. Vy	8	20.12	-761.20	0.42
			Max. Vx	14	20.06	-4.00	-752.14
			Max. Torque	21			-3.55
			L14	93.5 - 88.5	Pole	Max Tension	1
Max. Compression	26	-48.01				-1.17	7.32
Max. Mx	8	-28.40				-862.49	0.17
Max. My	2	-28.41				3.96	860.29
Max. Vy	8	20.40				-862.49	0.17
Max. Vx	14	20.35				-4.41	-853.09
Max. Torque	21						-3.55
Max Tension	1	0.00				0.00	0.00
Max. Compression	26	-49.10				-1.26	7.41
L15	88.5 - 80.25	Pole				Max. Mx	8
			Max. My	2	-29.26	4.22	936.86
			Max. Vy	8	20.61	-939.38	-0.02
			Max. Vx	14	20.56	-4.72	-929.72
			Max. Torque	21			-3.55
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-49.10	-1.26	7.41
			Max. Mx	8	-29.25	-939.38	-0.02
			Max. My	2	-29.26	4.22	936.86
			L16	80.25 - 79.75	Pole	Max. Vy	8
Max. Vx	14	20.56				-4.72	-929.72
Max. Torque	21						-3.55
Max Tension	1	0.00				0.00	0.00
Max. Compression	26	-51.71				-1.38	7.55
Max. Mx	8	-31.34				-1043.36	-0.27
Max. My	2	-31.35				4.55	1040.41
Max. Vy	8	20.97				-1043.36	-0.27
Max. Vx	14	20.92				-5.14	-1033.36
L17	79.75 - 74.75	Pole				Max. Torque	21
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-53.46	-1.50	8.06
			Max. Mx	8	-32.68	-1149.89	-0.37
			Max. My	2	-32.69	4.89	1146.57
			Max. Vy	8	21.38	-1149.89	-0.37
			Max. Vx	14	21.29	-5.55	-1139.27
			Max. Torque	21			-3.93
			Max Tension	1	0.00	0.00	0.00
			L18	74.75 - 69.75	Pole	Max. Compression	26
Max. Mx	8	-34.00				-1257.42	-0.63
Max. My	2	-34.01				5.22	1253.54
Max. Vy	8	21.64				-1257.42	-0.63
Max. Vx	14	21.56				-5.97	-1246.31
Max. Torque	21						-3.93
Max Tension	1	0.00				0.00	0.00
Max. Compression	26	-56.05				-1.70	8.26
Max. Mx	8	-34.76				-1319.73	-0.77
L19	69.75 - 66.88	Pole				Max. My	2
			Max. Vy	8	21.79	-1319.73	-0.77
			Max. Vx	14	21.71	-6.20	-1308.34
			Max. Torque	21			-3.93
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-56.05	-1.70	8.26
			Max. Mx	8	-34.76	-1319.73	-0.77
			Max. My	2	-34.77	5.41	1315.52
			Max. Vy	8	21.79	-1319.73	-0.77
			L20	66.88 - 66.63	Pole	Max. Vx	14
Max. Torque	21						-3.93
Max Tension	1	0.00				0.00	0.00
			Max. Compression	26	-56.15	-1.71	8.27
			Max. Mx	8	-34.85	-1325.17	-0.79

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L21	66.63 - 61.63	Pole	Max. My	2	-34.86	5.43	1320.94
			Max. Vy	8	21.79	-1325.17	-0.79
			Max. Vx	14	21.71	-6.23	-1313.77
			Max. Torque	21			-3.93
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-58.12	-1.83	8.39
L22	61.63 - 56.63	Pole	Max. Mx	8	-36.46	-1434.86	-1.04
			Max. My	2	-36.47	5.76	1430.06
			Max. Vy	8	22.08	-1434.86	-1.04
			Max. Vx	14	22.00	-6.64	-1422.98
			Max. Torque	21			-3.93
			Max Tension	1	0.00	0.00	0.00
L23	56.63 - 51.63	Pole	Max. Compression	26	-60.11	-1.96	8.51
			Max. Mx	8	-38.10	-1545.94	-1.30
			Max. My	2	-38.11	6.09	1540.58
			Max. Vy	8	22.35	-1545.94	-1.30
			Max. Vx	14	22.27	-7.05	-1533.57
			Max. Torque	21			-3.93
L24	51.63 - 46.63	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-62.12	-2.09	8.63
			Max. Mx	8	-39.76	-1658.34	-1.55
			Max. My	2	-39.76	6.42	1652.42
			Max. Vy	8	22.61	-1658.34	-1.55
			Max. Vx	14	22.53	-7.47	-1645.50
L25	46.63 - 39.75	Pole	Max. Torque	21			-3.93
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-64.15	-2.22	8.74
			Max. Mx	8	-41.43	-1772.02	-1.81
			Max. My	2	-41.44	6.74	1765.54
			Max. Vy	8	22.86	-1772.02	-1.81
L26	39.75 - 38.75	Pole	Max. Vx	14	22.78	-7.88	-1758.70
			Max. Torque	21			-3.93
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-64.82	-2.26	8.77
			Max. Mx	8	-41.98	-1809.35	-1.89
			Max. My	2	-41.99	6.85	1802.68
L27	38.75 - 33.75	Pole	Max. Vy	8	22.95	-1809.35	-1.89
			Max. Vx	14	22.87	-8.01	-1795.87
			Max. Torque	21			-3.93
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-69.44	-2.23	8.79
			Max. Mx	8	-45.86	-1954.01	-2.32
L28	33.75 - 31.75	Pole	Max. My	2	-45.87	7.39	1946.75
			Max. Vy	8	23.35	-1954.01	-2.32
			Max. Vx	14	23.28	-8.52	-1940.14
			Max. Torque	21			-3.87
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-71.67	-2.34	8.89
L29	31.75 - 31.5	Pole	Max. Mx	8	-47.74	-2071.28	-2.63
			Max. My	2	-47.74	7.76	2063.52
			Max. Vy	8	23.57	-2071.28	-2.63
			Max. Vx	14	23.50	-8.98	-2057.00
			Max. Torque	21			-3.87
			Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L30	31.5 - 26.5	Pole	Max. Compression	26	-72.68	-2.39	8.93
			Max. Mx	8	-48.60	-2124.40	-2.76
			Max. My	2	-48.60	7.93	2116.42
			Max. Vy	8	23.65	-2124.40	-2.76
			Max. Vx	14	23.59	-9.19	-2109.93
			Max. Torque	21			-3.87
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-74.94	-2.50	9.02
			Max. Mx	8	-50.51	-2243.15	-3.07
			Max. My	2	-50.51	8.30	2234.68
L31	26.5 - 21.5	Pole	Max. Vy	8	23.85	-2243.15	-3.07
			Max. Vx	14	23.79	-9.65	-2228.28
			Max. Torque	21			-3.87
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-77.22	-2.62	9.12
			Max. Mx	8	-52.45	-2362.86	-3.37
			Max. My	2	-52.45	8.67	2353.89
			Max. Vy	8	24.04	-2362.86	-3.37
			Max. Vx	14	23.97	-10.11	-2347.57
			Max. Torque	21			-3.86
L32	21.5 - 17.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-78.97	-2.68	9.17
			Max. Mx	8	-53.91	-2453.25	-3.60
			Max. My	2	-53.91	8.94	2443.91
			Max. Vy	8	24.18	-2453.25	-3.60
			Max. Vx	14	24.12	-10.45	-2437.66
			Max. Torque	21			-3.86
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-79.11	-2.68	9.18
			Max. Mx	8	-54.03	-2459.29	-3.62
L33	17.75 - 17.5	Pole	Max. My	2	-54.03	8.96	2449.93
			Max. Vy	8	24.18	-2459.29	-3.62
			Max. Vx	14	24.11	-10.47	-2443.68
			Max. Torque	21			-3.86
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-79.11	-2.68	9.18
			Max. Mx	8	-54.03	-2459.29	-3.62
			Max. My	2	-54.03	8.96	2449.93
			Max. Vy	8	24.18	-2459.29	-3.62
			Max. Vx	14	24.11	-10.47	-2443.68
L34	17.5 - 14.25	Pole	Max. Torque	21			-3.86
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-80.99	-2.72	9.71
			Max. Mx	8	-55.61	-2538.20	-3.49
			Max. My	2	-55.61	9.19	2528.82
			Max. Vy	8	24.38	-2538.20	-3.49
			Max. Vx	14	24.30	-10.77	-2521.97
			Max. Torque	21			-4.08
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-81.11	-2.73	9.71
L35	14.25 - 14	Pole	Max. Mx	8	-55.72	-2544.30	-3.51
			Max. My	2	-55.72	9.21	2534.88
			Max. Vy	8	24.38	-2544.30	-3.51
			Max. Vx	14	24.30	-10.79	-2528.04
			Max. Torque	21			-4.08
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-83.58	-2.82	9.77
			Max. Mx	8	-57.82	-2666.66	-3.81
			Max. My	2	-57.82	9.57	2656.66
			Max. Vy	8	24.57	-2666.66	-3.81
L36	14 - 9	Pole	Max. Vx	14	24.49	-11.25	-2649.91
			Max. Torque	21			-4.08
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-85.96	-2.84	9.73
			Max. Mx	8	-59.92	-2789.88	-4.14
			Max. My	2	-59.93	9.96	2779.32
			Max. Vy	8	24.75	-2789.88	-4.14
			Max. Vx	14	24.66	-11.66	-2772.70
			Max. Torque	21			-4.08
			Max Tension	1	0.00	0.00	0.00
L37	9 - 4	Pole	Max. Compression	26	-87.83	-2.84	9.70
			Max. Mx	8	-61.62	-2889.07	-4.40
			Max. My	2	-61.62	10.28	2878.06
			Max. Vy	8	24.88	-2889.07	-4.40
			Max. Vx	14	24.80	-11.98	-2871.57
			Max. Torque	21			-4.08
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-87.83	-2.84	9.70
			Max. Mx	8	-61.62	-2889.07	-4.40
			Max. My	2	-61.62	10.28	2878.06
L38	4 - 0	Pole	Max. Vy	8	24.88	-2889.07	-4.40
			Max. Vx	14	24.80	-11.98	-2871.57
			Max. Torque	21			-4.08
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-87.83	-2.84	9.70
			Max. Mx	8	-61.62	-2889.07	-4.40
			Max. My	2	-61.62	10.28	2878.06
			Max. Vy	8	24.88	-2889.07	-4.40
			Max. Vx	14	24.80	-11.98	-2871.57
			Max. Torque	21			-4.08

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
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Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	87.83	-0.00	0.00
	Max. H _x	21	46.22	24.87	0.09
	Max. H _z	2	61.63	0.08	24.76
	Max. M _x	2	2878.06	0.08	24.76
	Max. M _z	8	2889.07	-24.87	-0.07
	Max. Torsion	9	4.06	-24.87	-0.07
	Min. Vert	5	46.22	-12.35	21.41
	Min. H _x	9	46.22	-24.87	-0.07
	Min. H _z	14	61.63	-0.08	-24.79
	Min. M _x	14	-2871.57	-0.08	-24.79
	Min. M _z	20	-2887.39	24.87	0.09
	Min. Torsion	21	-4.08	24.87	0.09

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	51.36	0.00	-0.00	-4.09	-0.68	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	61.63	-0.08	-24.76	-2878.06	10.28	-0.42
0.9 Dead+1.0 Wind 0 deg - No Ice	46.22	-0.08	-24.76	-2836.93	10.33	-0.41
1.2 Dead+1.0 Wind 30 deg - No Ice	61.63	12.35	-21.41	-2488.77	-1433.29	-2.29
0.9 Dead+1.0 Wind 30 deg - No Ice	46.22	12.35	-21.41	-2453.03	-1413.23	-2.30
1.2 Dead+1.0 Wind 60 deg - No Ice	61.63	21.48	-12.33	-1434.99	-2495.03	-3.64
0.9 Dead+1.0 Wind 60 deg - No Ice	46.22	21.48	-12.33	-1413.85	-2460.25	-3.66
1.2 Dead+1.0 Wind 90 deg - No Ice	61.63	24.87	0.07	4.40	-2889.07	-4.05
0.9 Dead+1.0 Wind 90 deg - No Ice	46.22	24.87	0.07	5.61	-2848.84	-4.06
1.2 Dead+1.0 Wind 120 deg - No Ice	61.63	21.55	12.50	1447.61	-2505.05	-3.18
0.9 Dead+1.0 Wind 120 deg - No Ice	46.22	21.55	12.50	1428.85	-2470.12	-3.19
1.2 Dead+1.0 Wind 150 deg - No Ice	61.63	12.49	21.52	2493.50	-1453.42	-1.61
0.9 Dead+1.0 Wind 150 deg - No Ice	46.22	12.49	21.52	2460.27	-1433.06	-1.62
1.2 Dead+1.0 Wind 180 deg - No Ice	61.63	0.08	24.79	2871.57	-11.98	0.40
0.9 Dead+1.0 Wind 180 deg - No Ice	46.22	0.08	24.79	2833.11	-11.59	0.39
1.2 Dead+1.0 Wind 210 deg - No Ice	61.63	-12.35	21.44	2482.41	1432.46	2.31
0.9 Dead+1.0 Wind 210 deg - No Ice	46.22	-12.35	21.44	2449.34	1412.84	2.31
1.2 Dead+1.0 Wind 240 deg - No Ice	61.63	-21.47	12.36	1428.36	2492.26	3.60
0.9 Dead+1.0 Wind 240 deg - No Ice	46.22	-21.47	12.36	1409.89	2457.95	3.61

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 270 deg - No Ice	61.63	-24.87	-0.09	-17.86	2887.39	4.07
0.9 Dead+1.0 Wind 270 deg - No Ice	46.22	-24.87	-0.09	-16.31	2847.59	4.08
1.2 Dead+1.0 Wind 300 deg - No Ice	61.63	-21.56	-12.47	-1454.25	2504.44	3.25
0.9 Dead+1.0 Wind 300 deg - No Ice	46.22	-21.56	-12.47	-1432.82	2469.93	3.26
1.2 Dead+1.0 Wind 330 deg - No Ice	61.63	-12.49	-21.49	-2499.87	1450.86	1.58
0.9 Dead+1.0 Wind 330 deg - No Ice	46.22	-12.49	-21.49	-2463.97	1430.95	1.59
1.2 Dead+1.0 Ice+1.0 Temp	87.83	0.00	-0.00	-9.70	-2.84	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	87.83	-0.02	-6.83	-799.93	-0.65	-0.10
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	87.83	3.41	-5.91	-693.22	-397.09	-0.54
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	87.83	5.92	-3.40	-403.64	-688.35	-0.85
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	87.83	6.85	0.01	-7.99	-796.08	-0.94
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	87.83	5.94	3.44	388.59	-690.34	-0.74
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	87.83	3.44	5.93	676.59	-401.16	-0.37
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	87.83	0.02	6.83	781.03	-5.13	0.10
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	87.83	-3.41	5.91	674.35	391.51	0.54
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	87.83	-5.92	3.41	384.71	682.33	0.84
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	87.83	-6.85	-0.02	-12.47	790.31	0.94
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	87.83	-5.94	-3.43	-407.52	684.81	0.75
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	87.83	-3.44	-5.92	-695.46	395.19	0.37
Dead+Wind 0 deg - Service	51.36	-0.02	-6.35	-734.65	2.13	-0.11
Dead+Wind 30 deg - Service	51.36	3.17	-5.49	-635.68	-364.89	-0.59
Dead+Wind 60 deg - Service	51.36	5.51	-3.16	-367.76	-634.84	-0.95
Dead+Wind 90 deg - Service	51.36	6.38	0.02	-1.80	-735.04	-1.05
Dead+Wind 120 deg - Service	51.36	5.53	3.21	365.15	-637.40	-0.82
Dead+Wind 150 deg - Service	51.36	3.20	5.52	631.07	-370.01	-0.42
Dead+Wind 180 deg - Service	51.36	0.02	6.36	727.19	-3.53	0.10
Dead+Wind 210 deg - Service	51.36	-3.17	5.50	628.24	363.72	0.60
Dead+Wind 240 deg - Service	51.36	-5.51	3.17	360.25	633.18	0.93
Dead+Wind 270 deg - Service	51.36	-6.38	-0.02	-7.45	733.64	1.05
Dead+Wind 300 deg - Service	51.36	-5.53	-3.20	-372.66	636.27	0.84
Dead+Wind 330 deg - Service	51.36	-3.20	-5.51	-638.51	368.40	0.41

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-51.36	0.00	-0.00	51.36	0.00	0.000%
2	-0.08	-61.63	-24.76	0.08	61.63	24.76	0.000%
3	-0.08	-46.22	-24.76	0.08	46.22	24.76	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
4	12.35	-61.63	-21.41	-12.35	61.63	21.41	0.000%
5	12.35	-46.22	-21.41	-12.35	46.22	21.41	0.000%
6	21.48	-61.63	-12.33	-21.48	61.63	12.33	0.000%
7	21.48	-46.22	-12.33	-21.48	46.22	12.33	0.000%
8	24.87	-61.63	0.07	-24.87	61.63	-0.07	0.000%
9	24.87	-46.22	0.07	-24.87	46.22	-0.07	0.000%
10	21.55	-61.63	12.50	-21.55	61.63	-12.50	0.000%
11	21.55	-46.22	12.50	-21.55	46.22	-12.50	0.000%
12	12.49	-61.63	21.52	-12.49	61.63	-21.52	0.000%
13	12.49	-46.22	21.52	-12.49	46.22	-21.52	0.000%
14	0.08	-61.63	24.79	-0.08	61.63	-24.79	0.000%
15	0.08	-46.22	24.79	-0.08	46.22	-24.79	0.000%
16	-12.35	-61.63	21.44	12.35	61.63	-21.44	0.000%
17	-12.35	-46.22	21.44	12.35	46.22	-21.44	0.000%
18	-21.47	-61.63	12.36	21.47	61.63	-12.36	0.000%
19	-21.47	-46.22	12.36	21.47	46.22	-12.36	0.000%
20	-24.87	-61.63	-0.09	24.87	61.63	0.09	0.000%
21	-24.87	-46.22	-0.09	24.87	46.22	0.09	0.000%
22	-21.56	-61.63	-12.47	21.56	61.63	12.47	0.000%
23	-21.56	-46.22	-12.47	21.56	46.22	12.47	0.000%
24	-12.49	-61.63	-21.49	12.49	61.63	21.49	0.000%
25	-12.49	-46.22	-21.49	12.49	46.22	21.49	0.000%
26	0.00	-87.83	0.00	-0.00	87.83	0.00	0.000%
27	-0.02	-87.83	-6.83	0.02	87.83	6.83	0.000%
28	3.41	-87.83	-5.91	-3.41	87.83	5.91	0.000%
29	5.92	-87.83	-3.40	-5.92	87.83	3.40	0.000%
30	6.85	-87.83	0.01	-6.85	87.83	-0.01	0.000%
31	5.94	-87.83	3.44	-5.94	87.83	-3.44	0.000%
32	3.44	-87.83	5.93	-3.44	87.83	-5.93	0.000%
33	0.02	-87.83	6.83	-0.02	87.83	-6.83	0.000%
34	-3.41	-87.83	5.91	3.41	87.83	-5.91	0.000%
35	-5.92	-87.83	3.41	5.92	87.83	-3.41	0.000%
36	-6.85	-87.83	-0.02	6.85	87.83	0.02	0.000%
37	-5.94	-87.83	-3.43	5.94	87.83	3.43	0.000%
38	-3.44	-87.83	-5.92	3.44	87.83	5.92	0.000%
39	-0.02	-51.36	-6.35	0.02	51.36	6.35	0.000%
40	3.17	-51.36	-5.49	-3.17	51.36	5.49	0.000%
41	5.51	-51.36	-3.16	-5.51	51.36	3.16	0.000%
42	6.38	-51.36	0.02	-6.38	51.36	-0.02	0.000%
43	5.53	-51.36	3.21	-5.53	51.36	-3.21	0.000%
44	3.20	-51.36	5.52	-3.20	51.36	-5.52	0.000%
45	0.02	-51.36	6.36	-0.02	51.36	-6.36	0.000%
46	-3.17	-51.36	5.50	3.17	51.36	-5.50	0.000%
47	-5.51	-51.36	3.17	5.51	51.36	-3.17	0.000%
48	-6.38	-51.36	-0.02	6.38	51.36	0.02	0.000%
49	-5.53	-51.36	-3.20	5.53	51.36	3.20	0.000%
50	-3.20	-51.36	-5.51	3.20	51.36	5.51	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000806
2	Yes	5	0.00000001	0.00035835
3	Yes	5	0.00000001	0.00016130
4	Yes	6	0.00000001	0.00066800
5	Yes	6	0.00000001	0.00024089
6	Yes	6	0.00000001	0.00075642
7	Yes	6	0.00000001	0.00027554
8	Yes	6	0.00000001	0.00010888
9	Yes	5	0.00000001	0.00081899
10	Yes	6	0.00000001	0.00066959
11	Yes	6	0.00000001	0.00024143
12	Yes	6	0.00000001	0.00073044
13	Yes	6	0.00000001	0.00026543
14	Yes	5	0.00000001	0.00026309

15	Yes	5	0.00000001	0.00010343
16	Yes	6	0.00000001	0.00072413
17	Yes	6	0.00000001	0.00026400
18	Yes	6	0.00000001	0.00064884
19	Yes	6	0.00000001	0.00023433
20	Yes	6	0.00000001	0.00012298
21	Yes	5	0.00000001	0.00092277
22	Yes	6	0.00000001	0.00076480
23	Yes	6	0.00000001	0.00027795
24	Yes	6	0.00000001	0.00069088
25	Yes	6	0.00000001	0.00024900
26	Yes	4	0.00000001	0.00079586
27	Yes	6	0.00000001	0.00051333
28	Yes	6	0.00000001	0.00057125
29	Yes	6	0.00000001	0.00057569
30	Yes	6	0.00000001	0.00050903
31	Yes	6	0.00000001	0.00055684
32	Yes	6	0.00000001	0.00055626
33	Yes	6	0.00000001	0.00049251
34	Yes	6	0.00000001	0.00054865
35	Yes	6	0.00000001	0.00054804
36	Yes	6	0.00000001	0.00050476
37	Yes	6	0.00000001	0.00057473
38	Yes	6	0.00000001	0.00057167
39	Yes	4	0.00000001	0.00082986
40	Yes	5	0.00000001	0.00017068
41	Yes	5	0.00000001	0.00023012
42	Yes	5	0.00000001	0.00010321
43	Yes	5	0.00000001	0.00016725
44	Yes	5	0.00000001	0.00019987
45	Yes	4	0.00000001	0.00080660
46	Yes	5	0.00000001	0.00020287
47	Yes	5	0.00000001	0.00016253
48	Yes	5	0.00000001	0.00010567
49	Yes	5	0.00000001	0.00022828
50	Yes	5	0.00000001	0.00017698

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	148 - 143	18.6956	50	1.16	0.00
L2	143 - 138	17.4852	50	1.15	0.00
L3	138 - 133	16.2833	50	1.14	0.00
L4	133 - 128	15.0968	50	1.12	0.00
L5	128 - 123	13.9349	50	1.10	0.00
L6	123 - 116.5	12.8062	50	1.06	0.00
L7	120.25 - 115.25	12.2032	50	1.03	0.00
L8	115.25 - 110.25	11.1330	50	1.00	0.00
L9	110.25 - 105.25	10.1091	50	0.95	0.00
L10	105.25 - 100.25	9.1473	50	0.89	0.00
L11	100.25 - 98.75	8.2550	50	0.82	0.00
L12	98.75 - 98.5	8.0017	50	0.80	0.00
L13	98.5 - 93.5	7.9601	50	0.79	0.00
L14	93.5 - 88.5	7.1523	50	0.75	0.00
L15	88.5 - 80.25	6.3918	50	0.70	0.00
L16	84.75 - 79.75	5.8542	50	0.67	0.00
L17	79.75 - 74.75	5.1688	50	0.64	0.00
L18	74.75 - 69.75	4.5234	50	0.59	0.00
L19	69.75 - 66.88	3.9287	50	0.54	0.00
L20	66.88 - 66.63	3.6107	49	0.51	0.00
L21	66.63 - 61.63	3.5838	49	0.51	0.00
L22	61.63 - 56.63	3.0677	49	0.47	0.00
L23	56.63 - 51.63	2.5937	49	0.43	0.00
L24	51.63 - 46.63	2.1625	49	0.39	0.00
L25	46.63 - 39.75	1.7746	49	0.35	0.00
L26	45 - 38.75	1.6576	49	0.34	0.00
L27	38.75 - 33.75	1.2350	49	0.31	0.00

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L28	33.75 - 31.75	0.9351	49	0.27	0.00
L29	31.75 - 31.5	0.8269	49	0.25	0.00
L30	31.5 - 26.5	0.8138	49	0.25	0.00
L31	26.5 - 21.5	0.5748	49	0.21	0.00
L32	21.5 - 17.75	0.3782	49	0.17	0.00
L33	17.75 - 17.5	0.2586	49	0.14	0.00
L34	17.5 - 14.25	0.2515	49	0.14	0.00
L35	14.25 - 14	0.1672	49	0.11	0.00
L36	14 - 9	0.1613	49	0.11	0.00
L37	9 - 4	0.0664	49	0.07	0.00
L38	4 - 0	0.0131	49	0.03	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Platform Mount [LP 1201-1_HR-1]	50	18.6956	1.16	0.00	35264
149.50	Top Hat	50	18.6956	1.16	0.00	35264
140.00	PRK-SFS-L	50	16.7626	1.15	0.00	23898
138.00	Platform Mount [LP 1201-1_KCKR-HR-1]	50	16.2833	1.14	0.00	19353
128.00	Site Pro 1 RMQP-xxx + HRK12 12.5' Platform with Handrails	50	13.9349	1.10	0.00	8965
114.00	SC2-W100AB	50	10.8719	0.99	0.00	5891
79.00	3'x3" Horizontal Pipe	50	5.0692	0.63	0.00	7200
45.00	3'x3" Horizontal Pipe	49	1.6576	0.34	0.00	9432
16.00	Side Arm Mount [SO 701-1]	49	0.2107	0.13	0.00	7695

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	148 - 143	73.3889	22	4.55	0.02
L2	143 - 138	68.6389	22	4.53	0.02
L3	138 - 133	63.9224	22	4.49	0.02
L4	133 - 128	59.2667	22	4.41	0.02
L5	128 - 123	54.7083	22	4.30	0.02
L6	123 - 116.5	50.2818	22	4.16	0.02
L7	120.25 - 115.25	47.9179	22	4.06	0.02
L8	115.25 - 110.25	43.7230	22	3.94	0.02
L9	110.25 - 105.25	39.7103	22	3.73	0.02
L10	105.25 - 100.25	35.9383	22	3.48	0.01
L11	100.25 - 98.75	32.4367	22	3.21	0.01
L12	98.75 - 98.5	31.4426	22	3.12	0.01
L13	98.5 - 93.5	31.2793	22	3.12	0.01
L14	93.5 - 88.5	28.1073	22	2.94	0.01
L15	88.5 - 80.25	25.1207	22	2.76	0.01
L16	84.75 - 79.75	23.0086	22	2.62	0.01
L17	79.75 - 74.75	20.3160	22	2.52	0.01
L18	74.75 - 69.75	17.7798	22	2.33	0.01
L19	69.75 - 66.88	15.4429	22	2.14	0.01
L20	66.88 - 66.63	14.1927	22	2.02	0.01
L21	66.63 - 61.63	14.0870	22	2.02	0.01
L22	61.63 - 56.63	12.0579	22	1.86	0.00
L23	56.63 - 51.63	10.1945	22	1.70	0.00
L24	51.63 - 46.63	8.4994	22	1.54	0.00
L25	46.63 - 39.75	6.9746	22	1.37	0.00
L26	45 - 38.75	6.5146	22	1.32	0.00
L27	38.75 - 33.75	4.8534	22	1.20	0.00

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L28	33.75 - 31.75	3.6748	22	1.05	0.00
L29	31.75 - 31.5	3.2493	22	0.98	0.00
L30	31.5 - 26.5	3.1980	22	0.98	0.00
L31	26.5 - 21.5	2.2584	22	0.82	0.00
L32	21.5 - 17.75	1.4858	22	0.66	0.00
L33	17.75 - 17.5	1.0161	22	0.54	0.00
L34	17.5 - 14.25	0.9881	22	0.53	0.00
L35	14.25 - 14	0.6568	22	0.44	0.00
L36	14 - 9	0.6338	22	0.43	0.00
L37	9 - 4	0.2610	22	0.28	0.00
L38	4 - 0	0.0514	22	0.12	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	Platform Mount [LP 1201-1_HR-1]	22	73.3889	4.55	0.02	9037
149.50	Top Hat	22	73.3889	4.55	0.02	9037
140.00	PRK-SFS-L	22	65.8033	4.51	0.02	6129
138.00	Platform Mount [LP 1201-1_KCKR-HR-1]	22	63.9224	4.49	0.02	4967
128.00	Site Pro 1 RMQP-xxx + HRK12 12.5' Platform with Handrails	22	54.7083	4.30	0.02	2295
114.00	SC2-W100AB	22	42.7000	3.90	0.02	1515
79.00	3'x3" Horizontal Pipe	22	19.9245	2.50	0.01	1841
45.00	3'x3" Horizontal Pipe	22	6.5146	1.32	0.00	2401
16.00	Side Arm Mount [SO 701-1]	22	0.8277	0.49	0.00	1958

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L1	148 - 143 (1)	TP24.8698x24x0.2188	5.00	0.00	0.0	17.115 6	-5.99	1001.26	0.006
L2	143 - 138 (2)	TP25.7397x24.8698x0.21 88	5.00	0.00	0.0	17.719 5	-6.37	1036.59	0.006
L3	138 - 133 (3)	TP26.6095x25.7397x0.21 88	5.00	0.00	0.0	18.323 4	-11.74	1071.92	0.011
L4	133 - 128 (4)	TP27.4794x26.6095x0.21 88	5.00	0.00	0.0	18.927 4	-12.20	1107.25	0.011
L5	128 - 123 (5)	TP28.3492x27.4794x0.21 88	5.00	0.00	0.0	19.531 3	-16.26	1142.58	0.014
L6	123 - 116.5 (6)	TP29.48x28.3492x0.2188	6.50	0.00	0.0	19.863 5	-16.55	1162.01	0.014
L7	116.5 - 115.25 (7)	TP29.2601x28.3901x0.25	5.00	0.00	0.0	23.019 5	-17.44	1346.64	0.013
L8	115.25 - 110.25 (8)	TP30.1301x29.2601x0.25	5.00	0.00	0.0	23.709 9	-24.44	1387.03	0.018
L9	110.25 - 105.25 (9)	TP31.0001x30.1301x0.25	5.00	0.00	0.0	24.400 2	-25.16	1427.41	0.018
L10	105.25 - 100.25 (10)	TP31.8701x31.0001x0.25	5.00	0.00	0.0	25.090 5	-25.90	1467.80	0.018
L11	100.25 -	TP32.1311x31.8701x0.25	1.50	0.00	0.0	25.297	-26.12	1479.91	0.018

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio P _u / φP _n
L12	98.75 (11) 98.75 - 98.5 (12)	TP32.1746x32.1311x0.45	0.25	0.00	0.0	6 45.312	-26.19	2650.76	0.010
L13	98.5 - 93.5 (13)	TP33.0445x32.1746x0.44	5.00	0.00	0.0	2 45.917	-27.28	2686.14	0.010
L14	93.5 - 88.5 (14)	TP33.9145x33.0445x0.43	5.00	0.00	0.0	0 46.487	-28.40	2719.49	0.010
L15	88.5 - 80.25 (15)	TP35.35x33.9145x0.4375	8.25	0.00	0.0	0 47.393	-29.25	2772.50	0.011
L16	80.25 - 79.75 (16)	TP34.9373x34.067x0.5	5.00	0.00	0.0	1 54.652	-31.34	3197.15	0.010
L17	79.75 - 74.75 (17)	TP35.8077x34.9373x0.48	5.00	0.00	0.0	1 54.651	-32.68	3197.13	0.010
L18	74.75 - 69.75 (18)	TP36.678x35.8077x0.487	5.00	0.00	0.0	8 55.998	-34.00	3275.91	0.010
L19	69.75 - 66.88 (19)	TP37.1776x36.678x0.487	2.87	0.00	0.0	5 56.771	-34.76	3321.13	0.010
L20	66.88 - 66.63 (20)	TP37.2211x37.1776x0.62	0.25	0.00	0.0	5 72.597	-34.85	4246.95	0.008
L21	66.63 - 61.63 (21)	TP38.0914x37.2211x0.61	5.00	0.00	0.0	5 72.861	-36.46	4262.42	0.009
L22	61.63 - 56.63 (22)	TP38.9618x38.0914x0.61	5.00	0.00	0.0	25 74.553	-38.10	4361.40	0.009
L23	56.63 - 51.63 (23)	TP39.8321x38.9618x0.6	5.00	0.00	0.0	8 74.713	-39.75	4370.75	0.009
L24	51.63 - 46.63 (24)	TP40.7024x39.8321x0.6	5.00	0.00	0.0	6 76.371	-41.43	4467.71	0.009
L25	46.63 - 39.75 (25)	TP41.9x40.7024x0.5875	6.88	0.00	0.0	1 75.332	-41.98	4406.94	0.010
L26	39.75 - 38.75 (26)	TP41.4485x40.3612x0.65	6.25	0.00	0.0	4 84.171	-45.86	4924.02	0.009
L27	38.75 - 33.75 (27)	TP42.3184x41.4485x0.65	5.00	0.00	0.0	4 85.966	-47.74	5029.01	0.009
L28	33.75 - 31.75 (28)	TP42.6663x42.3184x0.65	2.00	0.00	0.0	0 86.683	-48.50	5071.01	0.010
L29	31.75 - 31.5 (29)	TP42.7098x42.6663x0.65	0.25	0.00	0.0	9 86.773	-48.60	5076.26	0.010
L30	31.5 - 26.5 (30)	TP43.5797x42.7098x0.63	5.00	0.00	0.0	6 86.890	-50.51	5083.08	0.010
L31	26.5 - 21.5 (31)	TP44.4496x43.5797x0.62	5.00	0.00	0.0	3 86.937	-52.44	5085.81	0.010
L32	21.5 - 17.75 (32)	TP45.102x44.4496x0.625	3.75	0.00	0.0	0 88.231	-53.91	5161.52	0.010
L33	17.75 - 17.5 (33)	TP45.1454x45.102x0.725	0.25	0.00	0.0	2 102.21	-54.03	5979.76	0.009
L34	17.5 - 14.25 (34)	TP45.7109x45.1454x0.72	3.25	0.00	0.0	80 103.51	-55.61	6055.87	0.009
L35	14.25 - 14 (35)	TP45.7544x45.7109x0.63	0.25	0.00	0.0	90 91.290	-55.72	5340.50	0.010
L36	14 - 9 (36)	TP46.6242x45.7544x0.62	5.00	0.00	0.0	6 91.251	-57.82	5338.18	0.011
L37	9 - 4 (37)	TP47.4941x46.6242x0.62	5.00	0.00	0.0	0 92.976	-59.92	5439.13	0.011
L38	4 - 0 (38)	TP48.19x47.4941x0.625	4.00	0.00	0.0	5 94.357	-61.62	5519.89	0.011
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Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio M _{ux} / φM _{nx}	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio M _{uy} / φM _{ny}
L1	148 - 143 (1)	TP24.8698x24x0.2188	29.91	615.47	0.049	0.00	615.47	0.000
L2	143 - 138 (2)	TP25.7397x24.8698x0.21	54.14	652.99	0.083	0.00	652.99	0.000
L3	138 - 133 (3)	TP26.6095x25.7397x0.21	106.47	691.09	0.154	0.00	691.09	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 $\frac{M_{uy}}{\phi M_{ny}}$
L4	133 - 128 (4)	TP27.4794x26.6095x0.21 88	154.98	729.73	0.212	0.00	729.73	0.000
L5	128 - 123 (5)	TP28.3492x27.4794x0.21 88	227.07	768.86	0.295	0.00	768.86	0.000
L6	123 - 116.5 (6)	TP29.48x28.3492x0.2188 88	267.37	790.58	0.338	0.00	790.58	0.000
L7	116.5 - 115.25 (7)	TP29.2601x28.3901x0.25	341.87	965.83	0.354	0.00	965.83	0.000
L8	115.25 - 110.25 (8)	TP30.1301x29.2601x0.25	434.64	1015.44	0.428	0.00	1015.44	0.000
L9	110.25 - 105.25 (9)	TP31.0001x30.1301x0.25	531.77	1065.69	0.499	0.00	1065.69	0.000
L10	105.25 - 100.25 (10)	TP31.8701x31.0001x0.25	630.09	1116.52	0.564	0.00	1116.52	0.000
L11	100.25 - 98.75 (11)	TP32.1311x31.8701x0.25	659.80	1131.88	0.583	0.00	1131.88	0.000
L12	98.75 - 98.5 (12)	TP32.1746x32.1311x0.45	664.77	2182.46	0.305	0.00	2182.46	0.000
L13	98.5 - 93.5 (13)	TP33.0445x32.1746x0.44 38	764.79	2273.96	0.336	0.00	2273.96	0.000
L14	93.5 - 88.5 (14)	TP33.9145x33.0445x0.43 75	866.26	2365.33	0.366	0.00	2365.33	0.000
L15	88.5 - 80.25 (15)	TP35.35x33.9145x0.4375	943.27	2459.04	0.384	0.00	2459.04	0.000
L16	80.25 - 79.75 (16)	TP34.9373x34.067x0.5	1047.42	2856.46	0.367	0.00	2856.46	0.000
L17	79.75 - 74.75 (17)	TP35.8077x34.9373x0.48 75	1154.19	2931.74	0.394	0.00	2931.74	0.000
L18	74.75 - 69.75 (18)	TP36.678x35.8077x0.487 5	1261.85	3079.02	0.410	0.00	3079.02	0.000
L19	69.75 - 66.88 (19)	TP37.1776x36.678x0.487 5	1324.23	3165.18	0.418	0.00	3165.18	0.000
L20	66.88 - 66.63 (20)	TP37.2211x37.1776x0.62 5	1329.69	4022.11	0.331	0.00	4022.11	0.000
L21	66.63 - 61.63 (21)	TP38.0914x37.2211x0.61 25	1439.51	4137.13	0.348	0.00	4137.13	0.000
L22	61.63 - 56.63 (22)	TP38.9618x38.0914x0.61 25	1550.71	4333.09	0.358	0.00	4333.09	0.000
L23	56.63 - 51.63 (23)	TP39.8321x38.9618x0.6	1663.24	4445.31	0.374	0.00	4445.31	0.000
L24	51.63 - 46.63 (24)	TP40.7024x39.8321x0.6	1777.04	4646.24	0.382	0.00	4646.24	0.000
L25	46.63 - 39.75 (25)	TP41.9x40.7024x0.5875	1814.41	4618.82	0.393	0.00	4618.82	0.000
L26	39.75 - 38.75 (26)	TP41.4485x40.3612x0.65	1959.42	5204.70	0.376	0.00	5204.70	0.000
L27	38.75 - 33.75 (27)	TP42.3184x41.4485x0.65	2076.88	5430.79	0.382	0.00	5430.79	0.000
L28	33.75 - 31.75 (28)	TP42.6663x42.3184x0.65	2124.16	5522.57	0.385	0.00	5522.57	0.000
L29	31.75 - 31.5 (29)	TP42.7098x42.6663x0.65	2130.07	5534.09	0.385	0.00	5534.09	0.000
L30	31.5 - 26.5 (30)	TP43.5797x42.7098x0.63 75	2249.01	5661.18	0.397	0.00	5661.18	0.000
L31	26.5 - 21.5 (31)	TP44.4496x43.5797x0.62 5	2368.89	5783.94	0.410	0.00	5783.94	0.000
L32	21.5 - 17.75 (32)	TP45.102x44.4496x0.625	2459.41	5958.67	0.413	0.00	5958.67	0.000
L33	17.75 - 17.5 (33)	TP45.1454x45.102x0.725	2465.46	6879.10	0.358	0.00	6879.10	0.000
L34	17.5 - 14.25 (34)	TP45.7109x45.1454x0.72 5	2544.64	7056.77	0.361	0.00	7056.77	0.000
L35	14.25 - 14 (35)	TP45.7544x45.7109x0.63 75	2550.74	6253.50	0.408	0.00	6253.50	0.000
L36	14 - 9 (36)	TP46.6242x45.7544x0.62 5	2673.25	6376.45	0.419	0.00	6376.45	0.000
L37	9 - 4 (37)	TP47.4941x46.6242x0.62 5	2796.68	6621.54	0.422	0.00	6621.54	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 $\frac{M_{uy}}{\phi M_{ny}}$
L38	4 - 0 (38)	TP48.19x47.4941x0.625	2896.04	6820.95	0.425	0.00	6820.95	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	148 - 143 (1)	TP24.8698x24x0.2188	4.70	300.38	0.016	0.00	648.46	0.000
L2	143 - 138 (2)	TP25.7397x24.8698x0.2188	5.00	310.98	0.016	0.00	695.03	0.000
L3	138 - 133 (3)	TP26.6095x25.7397x0.2188	9.56	321.58	0.030	0.44	743.22	0.001
L4	133 - 128 (4)	TP27.4794x26.6095x0.2188	9.86	332.18	0.030	0.44	793.02	0.001
L5	128 - 123 (5)	TP28.3492x27.4794x0.2188	14.58	342.77	0.043	0.39	844.43	0.000
L6	123 - 116.5 (6)	TP29.48x28.3492x0.2188	14.73	348.60	0.042	0.39	873.40	0.000
L7	116.5 - 115.25 (7)	TP29.2601x28.3901x0.25	15.06	403.99	0.037	0.39	1026.37	0.000
L8	115.25 - 110.25 (8)	TP30.1301x29.2601x0.25	19.32	416.11	0.046	2.84	1088.85	0.003
L9	110.25 - 105.25 (9)	TP31.0001x30.1301x0.25	19.56	428.22	0.046	2.84	1153.17	0.002
L10	105.25 - 100.25 (10)	TP31.8701x31.0001x0.25	19.79	440.34	0.045	2.84	1219.35	0.002
L11	100.25 - 98.75 (11)	TP32.1311x31.8701x0.25	19.87	443.97	0.045	2.84	1239.57	0.002
L12	98.75 - 98.5 (12)	TP32.1746x32.1311x0.45	19.88	795.23	0.025	2.84	2209.37	0.001
L13	98.5 - 93.5 (13)	TP33.0445x32.1746x0.4438	20.16	805.84	0.025	2.84	2300.69	0.001
L14	93.5 - 88.5 (14)	TP33.9145x33.0445x0.4375	20.45	815.85	0.025	2.84	2391.86	0.001
L15	88.5 - 80.25 (15)	TP35.35x33.9145x0.4375	20.66	831.75	0.025	2.84	2486.01	0.001
L16	80.25 - 79.75 (16)	TP34.9373x34.067x0.5	21.02	959.14	0.022	2.84	2892.63	0.001
L17	79.75 - 74.75 (17)	TP35.8077x34.9373x0.4875	21.42	959.14	0.022	3.16	2966.78	0.001
L18	74.75 - 69.75 (18)	TP36.678x35.8077x0.4875	21.68	982.77	0.022	3.16	3114.78	0.001
L19	69.75 - 66.88 (19)	TP37.1776x36.678x0.4875	21.83	996.34	0.022	3.16	3201.37	0.001
L20	66.88 - 66.63 (20)	TP37.2211x37.1776x0.625	21.84	1274.09	0.017	3.16	4083.32	0.001
L21	66.63 - 61.63 (21)	TP38.0914x37.2211x0.6125	22.12	1278.73	0.017	3.16	4197.05	0.001
L22	61.63 - 56.63 (22)	TP38.9618x38.0914x0.6125	22.39	1308.42	0.017	3.16	4394.24	0.001
L23	56.63 - 51.63 (23)	TP39.8321x38.9618x0.6	22.65	1311.22	0.017	3.16	4505.03	0.001
L24	51.63 - 46.63 (24)	TP40.7024x39.8321x0.6	22.90	1340.31	0.017	3.16	4707.13	0.001
L25	46.63 - 39.75 (25)	TP41.9x40.7024x0.5875	22.99	1322.08	0.017	3.16	4677.41	0.001
L26	39.75 - 38.75 (26)	TP41.4485x40.3612x0.65	23.40	1477.21	0.016	3.06	5277.96	0.001
L27	38.75 - 33.75 (27)	TP42.3184x41.4485x0.65	23.62	1508.70	0.016	3.06	5505.42	0.001
L28	33.75 - 31.75 (28)	TP42.6663x42.3184x0.65	23.70	1521.30	0.016	3.06	5597.75	0.001
L29	31.75 - 31.5 (29)	TP42.7098x42.6663x0.65	23.70	1522.88	0.016	3.06	5609.34	0.001
L30	31.5 - 26.5	TP43.5797x42.7098x0.63	23.90	1524.92	0.016	3.06	5734.73	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 $\frac{T_u}{\phi T_n}$
L31	(30) 26.5 - 21.5	75 TP44.4496x43.5797x0.62	24.09	1525.74	0.016	3.06	5855.70	0.001
L32	(31) 21.5 - 17.75	5 TP45.102x44.4496x0.625	24.23	1548.46	0.016	3.06	6031.34	0.001
L33	(32) 17.75 - 17.5	TP45.1454x45.102x0.725	24.23	1793.93	0.014	3.06	6978.59	0.000
L34	(33) 17.5 - 14.25	TP45.7109x45.1454x0.72	24.42	1816.76	0.013	3.25	7157.38	0.000
L35	(34) 14.25 - 14	5 TP45.7544x45.7109x0.63	24.42	1602.15	0.015	3.25	6330.27	0.001
L36	(35) 14 - 9 (36)	75 TP46.6242x45.7544x0.62	24.61	1601.45	0.015	3.25	6451.27	0.001
L37	(36) 9 - 4 (37)	5 TP47.4941x46.6242x0.62	24.79	1631.74	0.015	3.25	6697.57	0.000
L38	(37) 4 - 0 (38)	5 TP48.19x47.4941x0.625	24.93	1655.97	0.015	3.25	6897.93	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	148 - 143 (1)	0.006	0.049	0.000	0.016	0.000	0.055	1.050	
L2	143 - 138 (2)	0.006	0.083	0.000	0.016	0.000	0.089	1.050	
L3	138 - 133 (3)	0.011	0.154	0.000	0.030	0.001	0.166	1.050	
L4	133 - 128 (4)	0.011	0.212	0.000	0.030	0.001	0.224	1.050	
L5	128 - 123 (5)	0.014	0.295	0.000	0.043	0.000	0.311	1.050	
L6	123 - 116.5 (6)	0.014	0.338	0.000	0.042	0.000	0.354	1.050	
L7	116.5 - 115.25 (7)	0.013	0.354	0.000	0.037	0.000	0.368	1.050	
L8	115.25 - 110.25 (8)	0.018	0.428	0.000	0.046	0.003	0.448	1.050	
L9	110.25 - 105.25 (9)	0.018	0.499	0.000	0.046	0.002	0.519	1.050	
L10	105.25 - 100.25 (10)	0.018	0.564	0.000	0.045	0.002	0.584	1.050	
L11	100.25 - 98.75 (11)	0.018	0.583	0.000	0.045	0.002	0.603	1.050	
L12	98.75 - 98.5 (12)	0.010	0.305	0.000	0.025	0.001	0.315	1.050	
L13	98.5 - 93.5 (13)	0.010	0.336	0.000	0.025	0.001	0.347	1.050	
L14	93.5 - 88.5 (14)	0.010	0.366	0.000	0.025	0.001	0.377	1.050	
L15	88.5 - 80.25 (15)	0.011	0.384	0.000	0.025	0.001	0.395	1.050	
L16	80.25 - 79.75 (16)	0.010	0.367	0.000	0.022	0.001	0.377	1.050	
L17	79.75 - 74.75 (17)	0.010	0.394	0.000	0.022	0.001	0.404	1.050	
L18	74.75 - 69.75 (18)	0.010	0.410	0.000	0.022	0.001	0.421	1.050	
L19	69.75 - 66.88 (19)	0.010	0.418	0.000	0.022	0.001	0.429	1.050	
L20	66.88 - 66.63 (20)	0.008	0.331	0.000	0.017	0.001	0.339	1.050	
L21	66.63 - 61.63 (21)	0.009	0.348	0.000	0.017	0.001	0.357	1.050	
L22	61.63 - 56.63 (22)	0.009	0.358	0.000	0.017	0.001	0.367	1.050	
L23	56.63 - 51.63 (23)	0.009	0.374	0.000	0.017	0.001	0.384	1.050	
L24	51.63 - 46.63	0.009	0.382	0.000	0.017	0.001	0.392	1.050	

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P_u	M_{ux}	M_{uy}	V_u	T_u			
	(24)								
L25	46.63 - 39.75	0.010	0.393	0.000	0.017	0.001	0.403	1.050	
	(25)								
L26	39.75 - 38.75	0.009	0.376	0.000	0.016	0.001	0.386	1.050	
	(26)								
L27	38.75 - 33.75	0.009	0.382	0.000	0.016	0.001	0.392	1.050	
	(27)								
L28	33.75 - 31.75	0.010	0.385	0.000	0.016	0.001	0.394	1.050	
	(28)								
L29	31.75 - 31.5	0.010	0.385	0.000	0.016	0.001	0.395	1.050	
	(29)								
L30	31.5 - 26.5	0.010	0.397	0.000	0.016	0.001	0.407	1.050	
	(30)								
L31	26.5 - 21.5	0.010	0.410	0.000	0.016	0.001	0.420	1.050	
	(31)								
L32	21.5 - 17.75	0.010	0.413	0.000	0.016	0.001	0.423	1.050	
	(32)								
L33	17.75 - 17.5	0.009	0.358	0.000	0.014	0.000	0.368	1.050	
	(33)								
L34	17.5 - 14.25	0.009	0.361	0.000	0.013	0.000	0.370	1.050	
	(34)								
L35	14.25 - 14	0.010	0.408	0.000	0.015	0.001	0.419	1.050	
	(35)								
L36	14 - 9 (36)	0.011	0.419	0.000	0.015	0.001	0.430	1.050	
L37	9 - 4 (37)	0.011	0.422	0.000	0.015	0.000	0.434	1.050	
L38	4 - 0 (38)	0.011	0.425	0.000	0.015	0.000	0.436	1.050	

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	148 - 143	Pole	TP24.8698x24x0.2188	1	-5.99	1051.32	5.2	Pass
L2	143 - 138	Pole	TP25.7397x24.8698x0.2188	2	-6.37	1088.42	8.5	Pass
L3	138 - 133	Pole	TP26.6095x25.7397x0.2188	3	-11.74	1125.52	15.8	Pass
L4	133 - 128	Pole	TP27.4794x26.6095x0.2188	4	-12.20	1162.61	21.4	Pass
L5	128 - 123	Pole	TP28.3492x27.4794x0.2188	5	-16.26	1199.71	29.7	Pass
L6	123 - 116.5	Pole	TP29.48x28.3492x0.2188	6	-16.55	1220.11	33.7	Pass
L7	116.5 - 115.25	Pole	TP29.2601x28.3901x0.25	7	-17.44	1413.97	35.1	Pass
L8	115.25 - 110.25	Pole	TP30.1301x29.2601x0.25	8	-24.44	1456.38	42.7	Pass
L9	110.25 - 105.25	Pole	TP31.0001x30.1301x0.25	9	-25.16	1498.78	49.1	Pass
L10	105.25 - 100.25	Pole	TP31.8701x31.0001x0.25	10	-25.90	1541.19	55.6	Pass
L11	100.25 - 98.75	Pole	TP32.1311x31.8701x0.25	11	-26.12	1553.91	57.4	Pass
L12	98.75 - 98.5	Pole	TP32.1746x32.1311x0.45	12	-26.19	2783.30	30.0	Pass
L13	98.5 - 93.5	Pole	TP33.0445x32.1746x0.4438	13	-27.28	2820.45	33.1	Pass
L14	93.5 - 88.5	Pole	TP33.9145x33.0445x0.4375	14	-28.40	2855.46	35.9	Pass
L15	88.5 - 80.25	Pole	TP35.35x33.9145x0.4375	15	-29.25	2911.12	37.6	Pass
L16	80.25 - 79.75	Pole	TP34.9373x34.067x0.5	16	-31.34	3357.01	35.9	Pass
L17	79.75 - 74.75	Pole	TP35.8077x34.9373x0.4875	17	-32.68	3356.99	38.5	Pass
L18	74.75 - 69.75	Pole	TP36.678x35.8077x0.4875	18	-34.00	3439.71	40.1	Pass
L19	69.75 - 66.88	Pole	TP37.1776x36.678x0.4875	19	-34.76	3487.19	40.9	Pass
L20	66.88 - 66.63	Pole	TP37.2211x37.1776x0.625	20	-34.85	4459.30	32.3	Pass
L21	66.63 - 61.63	Pole	TP38.0914x37.2211x0.6125	21	-36.46	4475.54	34.0	Pass
L22	61.63 - 56.63	Pole	TP38.9618x38.0914x0.6125	22	-38.10	4579.47	34.9	Pass
L23	56.63 - 51.63	Pole	TP39.8321x38.9618x0.6	23	-39.75	4589.29	36.5	Pass
L24	51.63 - 46.63	Pole	TP40.7024x39.8321x0.6	24	-41.43	4691.10	37.3	Pass
L25	46.63 - 39.75	Pole	TP41.9x40.7024x0.5875	25	-41.98	4627.29	38.4	Pass
L26	39.75 - 38.75	Pole	TP41.4485x40.3612x0.65	26	-45.86	5170.22	36.8	Pass
L27	38.75 - 33.75	Pole	TP42.3184x41.4485x0.65	27	-47.74	5280.46	37.4	Pass
L28	33.75 - 31.75	Pole	TP42.6663x42.3184x0.65	28	-48.50	5324.56	37.6	Pass
L29	31.75 - 31.5	Pole	TP42.7098x42.6663x0.65	29	-48.60	5330.07	37.6	Pass
L30	31.5 - 26.5	Pole	TP43.5797x42.7098x0.6375	30	-50.51	5337.23	38.8	Pass
L31	26.5 - 21.5	Pole	TP44.4496x43.5797x0.625	31	-52.44	5340.10	40.0	Pass
L32	21.5 - 17.75	Pole	TP45.102x44.4496x0.625	32	-53.91	5419.60	40.3	Pass
L33	17.75 - 17.5	Pole	TP45.1454x45.102x0.725	33	-54.03	6278.75	35.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L34	17.5 - 14.25	Pole	TP45.7109x45.1454x0.725	34	-55.61	6358.66	35.2	Pass	
L35	14.25 - 14	Pole	TP45.7544x45.7109x0.6375	35	-55.72	5607.52	39.9	Pass	
L36	14 - 9	Pole	TP46.6242x45.7544x0.625	36	-57.82	5605.09	41.0	Pass	
L37	9 - 4	Pole	TP47.4941x46.6242x0.625	37	-59.92	5711.09	41.3	Pass	
L38	4 - 0	Pole	TP48.19x47.4941x0.625	38	-61.62	5795.88	41.5	Pass	
							Summary		
							Pole (L11)	57.4	Pass
							RATING =	57.4	Pass

***NOTE: Above stress ratios for reinforced sections are approximate. More exact calculations are presented in Appendix C**

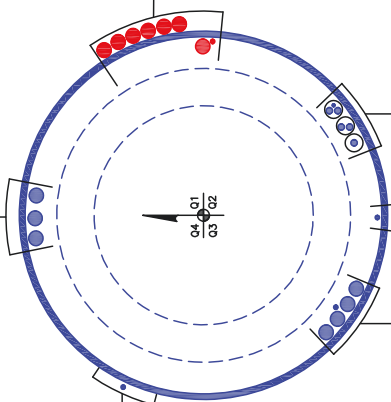
APPENDIX B
BASE LEVEL DRAWING



(PROPOSED EQUIPMENT CONFIGURATION)
(7) 1-5/8" TO 138 FT LEVEL
(1) 1/2" TO 16 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(3) 1-5/8" TO 150 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 45 FT LEVEL



(OTHER CONSIDERED EQUIPMENT - IN CONDUIT)
(1) 3/8" TO 128 FT LEVEL
(5) 3/4" TO 128 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 79 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 114 FT LEVEL
(4) 1-5/8" TO 114 FT LEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

Site BU: 876373
Work Order: 2296741

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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	148	31.5	3.75	18	24	29.48	0.21875	Auto	A607-65
2	120.25	40	4.5	18	28.39	35.35	0.25	Auto	A607-65
3	84.75	45	5.25	18	34.07	41.9	0.3125	Auto	A607-65
4	45	45	0	18	40.36	48.19	0.375	Auto	A607-65

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	17.75	plate	CCI-SFP-065125	2				E1			E1											
2	14.25	31.75	plate	CCI-SFP-085125	1						E1												
3	0	31.75	plate	CCI-SFP-085125	2												E1						E1
4	31.75	66.88	plate	CCI-SFP-085125	3						E1						E1						E1
5	66.88	98.75	plate	CCI-SFP-060100	3						E1						E1						E1
6																							
7																							
8																							
9																							
10																							

Reinforcement Details

	B (in)	H (in)	Gross Area (in ²)	Pole Face to Centroid (in)	Bottom Termination Type	Bottom Termination Length (in)	Top Termination Type	Top Termination Length (in)	Lu (in)	Net Area (in ²)	Bolt Hole Size (in)	Reinforcement Material
1	6.5	1.25	8.125	0.625	PC 8.8 - M20 (100)	33	PC 8.8 - M20 (100)	33.000	19.000	6.563	1.1875	A572-65
2	8.5	1.25	10.625	0.625	PC 8.8 - M20 (100)	45	PC 8.8 - M20 (100)	45.000	17.000	9.063	1.1875	A572-65
3	8.5	1.25	10.625	0.625	PC 8.8 - M20 (100)	45	PC 8.8 - M20 (100)	45.000	17.000	9.063	1.1875	A572-65
4	8.5	1.25	10.625	0.625	PC 8.8 - M20 (100)	45	PC 8.8 - M20 (100)	45.000	17.000	9.063	1.1875	A572-65
5	6	1	6	0.5	PC 8.8 - M20 (100)	24	PC 8.8 - M20 (100)	24.000	16.000	4.750	1.1875	A572-65

Connection Details for Custom Reinforcements

Reinforcement	End	# Bolts	N or X	Bolt Spacing (in)	Edge Dist (in)	Weld Grade (ksi)	Transverse (Horiz.) Weld Type	Horiz. Weld Length (in)	Horiz. Groove Depth (in)	Horiz. Groove Angle (deg)	Horiz. Fillet Size (in)	Vertical Weld Length (in)	Vertical Fillet Size (in)	Rev H Connection Capacity (kip)
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TNX Geometry Input

Increment (ft): [Export to TNX](#)

	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	148 - 143	5		18	24.000	24.870	0.21875	A607-65	1.000
2	143 - 138	5		18	24.870	25.740	0.21875	A607-65	1.000
3	138 - 133	5		18	25.740	26.610	0.21875	A607-65	1.000
4	133 - 128	5		18	26.610	27.479	0.21875	A607-65	1.000
5	128 - 123	5		18	27.479	28.349	0.21875	A607-65	1.000
6	123 - 120.25	6.5	3.75	18	28.349	29.480	0.21875	A607-65	1.000
7	120.25 - 115.25	5		18	28.390	29.260	0.25	A607-65	1.000
8	115.25 - 110.25	5		18	29.260	30.130	0.25	A607-65	1.000
9	110.25 - 105.25	5		18	30.130	31.000	0.25	A607-65	1.000
10	105.25 - 100.25	5		18	31.000	31.870	0.25	A607-65	1.000
11	100.25 - 98.75	1.5		18	31.870	32.131	0.25	A607-65	1.000
12	98.75 - 98.5	0.25		18	32.131	32.175	0.45	A607-65	0.956
13	98.5 - 93.5	5		18	32.175	33.045	0.44375	A607-65	0.959
14	93.5 - 88.5	5		18	33.045	33.915	0.4375	A607-65	0.962
15	88.5 - 84.75	8.25	4.5	18	33.915	35.350	0.4375	A607-65	0.954
16	84.75 - 79.75	5		18	34.067	34.937	0.5	A607-65	0.958
17	79.75 - 74.75	5		18	34.937	35.808	0.4875	A607-65	0.974
18	74.75 - 69.75	5		18	35.808	36.678	0.4875	A607-65	0.966
19	69.75 - 66.88	2.87		18	36.678	37.178	0.4875	A607-65	0.961
20	66.88 - 66.63	0.25		18	37.178	37.221	0.625	A607-65	0.943
21	66.63 - 61.63	5		18	37.221	38.091	0.6125	A607-65	0.952
22	61.63 - 56.63	5		18	38.091	38.962	0.6125	A607-65	0.942
23	56.63 - 51.63	5		18	38.962	39.832	0.6	A607-65	0.951
24	51.63 - 46.63	5		18	39.832	40.702	0.6	A607-65	0.942
25	46.63 - 45	6.88	5.25	18	40.702	41.900	0.5875	A607-65	0.959
26	45 - 38.75	6.25		18	40.361	41.448	0.65	A607-65	0.960
27	38.75 - 33.75	5		18	41.448	42.318	0.65	A607-65	0.952
28	33.75 - 31.75	2		18	42.318	42.666	0.65	A607-65	0.948
29	31.75 - 31.5	0.25		18	42.666	42.710	0.65	A607-65	0.948
30	31.5 - 26.5	5		18	42.710	43.580	0.6375	A607-65	0.959
31	26.5 - 21.5	5		18	43.580	44.450	0.625	A607-65	0.970
32	21.5 - 17.75	3.75		18	44.450	45.102	0.625	A607-65	0.965
33	17.75 - 17.5	0.25		18	45.102	45.145	0.725	A607-65	0.992
34	17.5 - 14.25	3.25		18	45.145	45.711	0.725	A607-65	0.986
35	14.25 - 14	0.25		18	45.711	45.754	0.6375	A607-65	1.002
36	14 - 9	5		18	45.754	46.624	0.625	A607-65	1.014
37	9 - 4	5		18	46.624	47.494	0.625	A607-65	1.007
38	4 - 0	4		18	47.494	48.190	0.625	A607-65	1.001

TNX Section Forces

Increment (ft):		TNX Output		
	5	P _u	M _{ux} (kip-ft)	V _u
	Section Height (ft)	(K)		(K)
1	148 - 143	5.99	29.91	4.70
2	143 - 138	6.37	54.14	5.00
3	138 - 133	11.74	106.47	9.56
4	133 - 128	12.20	154.98	9.86
5	128 - 123	16.26	227.07	14.58
6	123 - 120.25	16.55	267.37	14.73
7	120.25 - 115.25	17.44	341.87	15.06
8	115.25 - 110.25	24.44	434.64	19.32
9	110.25 - 105.25	25.16	531.77	19.56
10	105.25 - 100.25	25.90	630.09	19.79
11	100.25 - 98.75	26.12	659.80	19.87
12	98.75 - 98.5	26.19	664.77	19.88
13	98.5 - 93.5	27.28	764.79	20.16
14	93.5 - 88.5	28.40	866.26	20.45
15	88.5 - 84.75	29.25	943.28	20.66
16	84.75 - 79.75	31.34	1047.43	21.02
17	79.75 - 74.75	32.68	1154.19	21.42
18	74.75 - 69.75	34.00	1261.85	21.68
19	69.75 - 66.88	34.76	1324.23	21.83
20	66.88 - 66.63	34.85	1329.69	21.84
21	66.63 - 61.63	36.46	1439.51	22.12
22	61.63 - 56.63	38.10	1550.71	22.39
23	56.63 - 51.63	39.75	1663.24	22.65
24	51.63 - 46.63	41.43	1777.04	22.90
25	46.63 - 45	41.98	1814.41	22.99
26	45 - 38.75	45.86	1959.42	23.40
27	38.75 - 33.75	47.74	2076.88	23.62
28	33.75 - 31.75	48.50	2124.16	23.70
29	31.75 - 31.5	48.60	2130.08	23.70
30	31.5 - 26.5	50.51	2249.01	23.90
31	26.5 - 21.5	52.44	2368.89	24.09
32	21.5 - 17.75	53.91	2459.41	24.23
33	17.75 - 17.5	54.03	2465.46	24.23
34	17.5 - 14.25	55.61	2544.64	24.42
35	14.25 - 14	55.72	2550.74	24.42
36	14 - 9	57.82	2673.25	24.61
37	9 - 4	59.92	2796.67	24.79
38	4 - 0	61.62	2896.04	24.93

Analysis Results

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
148 - 143	Pole	TP24.87x24x0.2188	Pole	5.2%	Pass
143 - 138	Pole	TP25.74x24.87x0.2188	Pole	8.5%	Pass
138 - 133	Pole	TP26.61x25.74x0.2188	Pole	15.8%	Pass
133 - 128	Pole	TP27.479x26.61x0.2188	Pole	21.4%	Pass
128 - 123	Pole	TP28.349x27.479x0.2188	Pole	29.7%	Pass
123 - 120.25	Pole	TP29.48x28.349x0.2188	Pole	33.7%	Pass
120.25 - 115.25	Pole	TP29.26x28.39x0.25	Pole	35.1%	Pass
115.25 - 110.25	Pole	TP30.13x29.26x0.25	Pole	42.7%	Pass
110.25 - 105.25	Pole	TP31x30.13x0.25	Pole	49.4%	Pass
105.25 - 100.25	Pole	TP31.87x31x0.25	Pole	55.6%	Pass
100.25 - 98.75	Pole	TP32.131x31.87x0.25	Pole	57.4%	Pass
98.75 - 98.5	Pole + Reinf.	TP32.175x32.131x0.45	Reinf. 5 Tension Rupture	47.1%	Pass
98.5 - 93.5	Pole + Reinf.	TP33.045x32.175x0.4438	Reinf. 5 Tension Rupture	51.9%	Pass
93.5 - 88.5	Pole + Reinf.	TP33.915x33.045x0.4375	Reinf. 5 Tension Rupture	56.3%	Pass
88.5 - 84.75	Pole + Reinf.	TP35.35x33.915x0.4375	Reinf. 5 Tension Rupture	59.5%	Pass
84.75 - 79.75	Pole + Reinf.	TP34.937x34.067x0.5	Reinf. 5 Tension Rupture	56.7%	Pass
79.75 - 74.75	Pole + Reinf.	TP35.808x34.937x0.4875	Reinf. 5 Tension Rupture	60.0%	Pass
74.75 - 69.75	Pole + Reinf.	TP36.678x35.808x0.4875	Reinf. 5 Tension Rupture	63.0%	Pass
69.75 - 66.88	Pole + Reinf.	TP37.178x36.678x0.4875	Reinf. 5 Tension Rupture	64.6%	Pass
66.88 - 66.63	Pole + Reinf.	TP37.221x37.178x0.625	Reinf. 4 Bolt Shear	49.3%	Pass
66.63 - 61.63	Pole + Reinf.	TP38.091x37.221x0.6125	Reinf. 4 Compression	49.6%	Pass
61.63 - 56.63	Pole + Reinf.	TP38.962x38.091x0.6125	Reinf. 4 Compression	51.6%	Pass
56.63 - 51.63	Pole + Reinf.	TP39.832x38.962x0.6	Reinf. 4 Compression	53.5%	Pass
51.63 - 46.63	Pole + Reinf.	TP40.702x39.832x0.6	Reinf. 4 Compression	55.3%	Pass
46.63 - 45	Pole + Reinf.	TP41.9x40.702x0.5875	Reinf. 4 Compression	55.8%	Pass
45 - 38.75	Pole + Reinf.	TP41.448x40.361x0.65	Reinf. 4 Compression	53.6%	Pass
38.75 - 33.75	Pole + Reinf.	TP42.318x41.448x0.65	Reinf. 4 Compression	55.0%	Pass
33.75 - 31.75	Pole + Reinf.	TP42.666x42.318x0.65	Reinf. 4 Bolt Shear	57.7%	Pass
31.75 - 31.5	Pole + Reinf.	TP42.71x42.666x0.65	Reinf. 3 Bolt Shear	57.7%	Pass
31.5 - 26.5	Pole + Reinf.	TP43.58x42.71x0.6375	Reinf. 3 Compression	56.8%	Pass
26.5 - 21.5	Pole + Reinf.	TP44.45x43.58x0.625	Reinf. 3 Compression	57.9%	Pass
21.5 - 17.75	Pole + Reinf.	TP45.102x44.45x0.625	Reinf. 3 Compression	58.7%	Pass
17.75 - 17.5	Pole + Reinf.	TP45.145x45.102x0.725	Reinf. 3 Compression	55.0%	Pass
17.5 - 14.25	Pole + Reinf.	TP45.711x45.145x0.725	Reinf. 3 Compression	55.7%	Pass
14.25 - 14	Pole + Reinf.	TP45.754x45.711x0.6375	Reinf. 1 Tension Rupture	60.1%	Pass
14 - 9	Pole + Reinf.	TP46.624x45.754x0.625	Reinf. 1 Tension Rupture	61.1%	Pass
9 - 4	Pole + Reinf.	TP47.494x46.624x0.625	Reinf. 1 Tension Rupture	62.1%	Pass
4 - 0	Pole + Reinf.	TP48.19x47.494x0.625	Reinf. 1 Tension Rupture	62.8%	Pass
				Summary	
			Pole	57.4%	Pass
			Reinforcement	64.6%	Pass
			Overall	64.6%	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
148 - 143	1314	n/a	1314	17.11	n/a	17.11	5.2%					
143 - 138	1458	n/a	1458	17.72	n/a	17.72	8.5%					
138 - 133	1612	n/a	1612	18.32	n/a	18.32	15.8%					
133 - 128	1776	n/a	1776	18.93	n/a	18.93	21.4%					
128 - 123	1952	n/a	1952	19.53	n/a	19.53	29.7%					
123 - 120.25	2053	n/a	2053	19.86	n/a	19.86	33.7%					
120.25 - 115.25	2447	n/a	2447	23.02	n/a	23.02	35.1%					
115.25 - 110.25	2673	n/a	2673	23.71	n/a	23.71	42.7%					
110.25 - 105.25	2914	n/a	2914	24.40	n/a	24.40	49.4%					
105.25 - 100.25	3168	n/a	3168	25.09	n/a	25.09	55.6%					
100.25 - 98.75	3247	n/a	3247	25.30	n/a	25.30	57.4%					
98.75 - 98.5	3261	2504	5765	25.33	18.00	43.33	32.2%					47.1%
98.5 - 93.5	3535	2636	6170	26.02	18.00	44.02	35.8%					51.9%
93.5 - 88.5	3823	2771	6594	26.71	18.00	44.71	39.2%					56.3%
88.5 - 84.75	4050	2874	6924	27.23	18.00	45.23	41.7%					59.5%
84.75 - 79.75	5200	2934	8134	34.34	18.00	52.34	37.1%					56.7%
79.75 - 74.75	5602	3076	8678	35.21	18.00	53.21	39.5%					60.0%
74.75 - 69.75	6024	3222	9246	36.07	18.00	54.07	41.8%					63.0%
69.75 - 66.88	6276	3307	9583	36.56	18.00	54.56	43.1%					64.6%
66.88 - 66.63	6298	5995	12293	36.61	31.88	68.48	33.8%					49.3%
66.63 - 61.63	6754	6265	13019	37.47	31.88	69.35	35.6%					49.6%
61.63 - 56.63	7232	6541	13773	38.33	31.88	70.21	37.3%					51.6%
56.63 - 51.63	7732	6823	14554	39.20	31.88	71.07	39.0%					53.5%
51.63 - 46.63	8254	7111	15364	40.06	31.88	71.94	40.6%					55.3%
46.63 - 45	8429	7206	15635	40.34	31.88	72.22	41.2%					55.8%
45 - 38.75	10416	7362	17778	48.89	31.88	80.76	37.5%					53.6%
38.75 - 33.75	11092	7661	18753	49.92	31.88	81.80	38.7%					55.0%
33.75 - 31.75	11370	7782	19153	50.34	31.88	82.21	39.1%					57.7%
31.75 - 31.5	11405	7798	19203	50.39	31.88	82.26	39.2%		57.7%	57.7%		
31.5 - 26.5	12123	8105	20229	51.42	31.88	83.30	40.3%		56.8%	56.8%		
26.5 - 21.5	12870	8419	21289	52.46	31.88	84.33	41.4%		57.9%	57.9%		
21.5 - 17.75	13450	8658	22109	53.23	31.88	85.11	42.2%		58.7%	58.7%		
17.75 - 17.5	13718	12037	25755	53.29	48.13	101.41	39.6%	45.9%	41.1%	55.0%		
17.5 - 14.25	14241	12332	26573	53.96	48.13	102.08	40.3%	46.6%	43.3%	55.7%		
14.25 - 14	14065	9296	23361	54.01	37.50	91.51	43.2%	60.1%		56.5%		
14 - 9	14889	9640	24528	55.05	37.50	92.55	44.2%	61.1%		57.4%		
9 - 4	15744	9989	25734	56.08	37.50	93.58	45.2%	62.1%		58.4%		
4 - 0	16452	10274	26726	56.91	37.50	94.41	45.9%	62.8%		61.4%		

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

Monopole Base Plate Connection

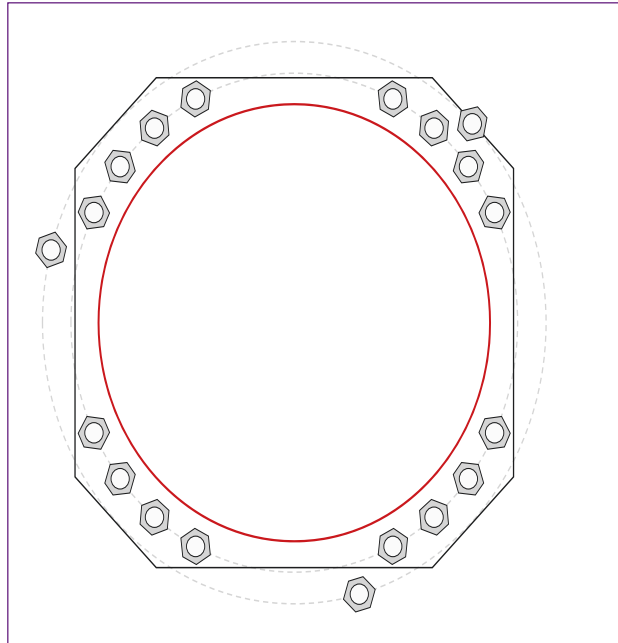


Site Info	
BU #	876373
Site Name	EDDY / WRIGHT PRO
Order #	669336 Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	See Custom Sheet
I_{ar} (in)	See Custom Sheet

Applied Loads	
Moment (kip-ft)	2896.04
Axial Force (kips)	61.62
Shear Force (kips)	24.93

*TIA-222-H Section 15.5 Applied



Connection Properties Analysis Results

Anchor Rod Data

GROUP 1: (16) 2-1/4" ϕ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 55" BC
Anchor Spacing: 6 in
 GROUP 2: (3) 2-1/4" ϕ bolts (A193 Gr. B7 N; $F_y=105$ ksi, $F_u=125$ ksi) on 62" BC

Base Plate Data

54" W x 2.75" Plate (A572-55; $F_y=55$ ksi, $F_u=70$ ksi); Clip: 10 in

Stiffener Data

N/A

Pole Data

48.19" x 0.375" 18-sided pole (A607-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary

(units of kips, kip-in)

GROUP 1:		
$P_u_t = 123.61$	$\phi P_n_t = 243.75$	Stress Rating
$V_u = 1.56$	$\phi V_n = 149.1$	48.3%
$M_u = n/a$	$\phi M_n = n/a$	Pass
GROUP 2:		
$P_u_t = 143.71$	$\phi P_n_t = 304.69$	Stress Rating
$V_u = 0$	$\phi V_n = 186.38$	44.9%
$M_u = n/a$	$\phi M_n = n/a$	Pass

Base Plate Summary

Max Stress (ksi):	24.96	(Flexural)
Allowable Stress (ksi):	49.5	
Stress Rating:	48.0%	Pass

CCIplate

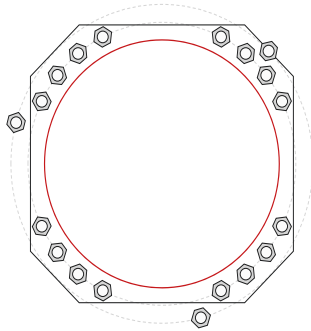
Elevation (ft) 0 (Base)

note: Bending interaction not considered when Grout Considered = "Yes"

Bolt Group	Resist Axial	Resist Shear	Induce Plate Bending	Grout Considered	Apply at BARB Elevation	BARB CL Elevation (ft)
1	Yes	Yes	Yes	No	No	
2	No	No	No	No	No	

Custom Bolt Connection										
Bolt	Bolt Group ID	Location (deg.)	Diameter (in)	Material	Bolt Circle (in)	Eta Factor, η :	I_{br} (in):	Thread Type	Area Override, in ²	Tension Only
1	1	26.211261	2.25	A615-75	55	0.5	1.1875	N-Included		No
2	1	38.737087	2.25	A615-75	55	0.5	1.1875	N-Included		No
3	1	51.262913	2.25	A615-75	55	0.5	1.1875	N-Included		No
4	1	63.788739	2.25	A615-75	55	0.5	1.1875	N-Included		No
5	1	116.21126	2.25	A615-75	55	0.5	1.1875	N-Included		No
6	1	128.73709	2.25	A615-75	55	0.5	1.1875	N-Included		No
7	1	141.26291	2.25	A615-75	55	0.5	1.1875	N-Included		No
8	1	153.78874	2.25	A615-75	55	0.5	1.1875	N-Included		No
9	1	206.21126	2.25	A615-75	55	0.5	1.1875	N-Included		No
10	1	218.73709	2.25	A615-75	55	0.5	1.1875	N-Included		No
11	1	231.26291	2.25	A615-75	55	0.5	1.1875	N-Included		No
12	1	243.78874	2.25	A615-75	55	0.5	1.1875	N-Included		No
13	1	296.21126	2.25	A615-75	55	0.5	1.1875	N-Included		No
14	1	308.73709	2.25	A615-75	55	0.5	1.1875	N-Included		No
15	1	321.26291	2.25	A615-75	55	0.5	1.1875	N-Included		No
16	1	333.78874	2.25	A615-75	55	0.5	1.1875	N-Included		No
17	2	45	2.25	A193 Gr. B7	62	0.5	1.1875	N-Included		No
18	2	165	2.25	A193 Gr. B7	62	0.5	1.1875	N-Included		No
19	2	285	2.25	A193 Gr. B7	62	0.5	1.1875	N-Included		No

Plot Graphic



Anchor Rod Bracket Parameters:

New Anchor Rod Inputs

Number of New Anchors: $N_{new} := 3$

Diameter of New Anchors: $D_{new} := 2.25 \cdot \text{in}$

Net Area of a New Anchor Rod: $A_{net_new} := 3.25 \cdot \text{in}^2$

New Anchor Bolt Circle: $BC_{new} := 62 \cdot \text{in}$

New Anchor Yield Strength: $F_{y_rod} := 105 \text{ksi}$

New Anchor Ultimate Strength: $F_{u_rod} := 125 \text{ksi}$

Anchor Rod Bracket Tube Inputs

Bracket Tube Member:
(Use Square HSS for New)
(AISC 15th Ed., Table 1-12) **Pipe 4XXS**

Bracket Tube Width/Diameter: $OD_{HSS} := 4.5 \cdot \text{in}$

Bracket Tube Area: $A_{HSS} := 7.66 \cdot \text{in}^2$

Bracket Tube Wall Thickness:
(Input Nominal Thickness) $t_{HSS} := 0.674 \cdot \text{in}$

Bracket Tube Moment of Inertia: $I_{HSS} := 14.7 \cdot \text{in}^4$

Bracket Tube Radius of Gyration: $r_{HSS} := 1.39 \cdot \text{in}$

Bracket Tube Length: $L_{HSS} := 14 \cdot \text{in}$

Bracket Tube Yield Strength: $F_{y_HSS} := 35 \cdot \text{ksi}$

Bracket Tube Ultimate Strength: $F_{u_HSS} := 60 \cdot \text{ksi}$

Anchor Rod Bracket Plate Inputs

Bracket Plate Width: $w_{plate} := 4.5625 \cdot \text{in}$

Bracket Plate Thickness: $t_{plate} := 1.25 \cdot \text{in}$

Bracket Plate Length 1: $L_{plate1} := 54 \cdot \text{in}$

Bracket Plate Length 2: $L_{plate2} := 14 \cdot \text{in}$

Bracket Plate Yield Strength: $F_{y_plate} := 65 \text{ksi}$

Bracket Plate Ultimate Strength: $F_{u_plate} := 80 \text{ksi}$

Analysis/Design Options

Select Tower Type: **Monopole**
Self Support

Select Tower Leg Type (SSTs Only): **Pipe**
Solid Rod
Monopole

Select TIA Revision: **REV-G**
REV-H

Performing analysis of existing anchor rod brackets or design of new brackets? **Analysis**
Design

New anchor rod analysis: demand force (from load distribution) $P_{u_max} := 143.71 \text{kip}$

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

Is this a CADSA site?
(Pull out testing requirements) Yes
 No

Check tower leg/pole punching shear? **No**
Yes

Tower/Pole & Reinforcement Inputs

Tower/Pole Thickness: $t_{tow} := 0.375 \cdot \text{in}$

Tower/Pole Grade: $F_{y_tow} := 65 \cdot \text{ksi}$
 $F_{u_tow} := 80 \cdot \text{ksi}$

Reinforcement thickness: $t_{ref} := 0 \cdot \text{in}$

Reinforcement Grade: $F_{y_ref} := 0 \text{ksi}$
 $F_{u_ref} := 0 \text{ksi}$

Gusset Plate to HSS Weld Inputs

Weld Electrode Strength: $F_{EXX_HSS} := 80\text{ksi}$

Gusset Plate Fillet Weld Size:
(in sixteenths of an inch) $D := 6$

Groove Depth (inches): $GD := 0.375\text{in}$

Gusset Plate to Tower Weld Inputs

Weld Electrode Strength: $F_{EXX_TOW} := 80\text{ksi}$

Gusset Plate to Tower Weld Size:
(in sixteenths of an inch) $D_2 := 6$

Gusset Plate to Tower Baseplate Weld Inputs

Base Plate Yield Strength: $F_{y_base} := 55\text{ksi}$

Base Plate Ultimate Strength: $F_{u_base} := 70\text{ksi}$

Gusset Horizontal Notch Length: $\text{Notch}_{\text{horiz}} := 0.75\cdot\text{in}$

Gusset Vertical Notch Length: $\text{Notch}_{\text{vert}} := 0.75\cdot\text{in}$

Gap between Base Plate and HSS: $\text{Gap} := 0\text{in}$

Anchor Rod Embedment/Foundation Inputs

Projected Embedment Depth: $L_{em} := 7\cdot f$

Concrete Strength: $f_c := 3000\text{psi}$

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

Yield Strength of Rebar: $f_y := 60\text{ksi}$

Bracket Weld Options

Welding Interpolation:
per AISC SCM Table 8-4

13th Edition
14th Edition
15th Edition

Groove Weld:

None
45 PJP
60 PJP
CJP

What is the bracket
plate welded to?

Tower Only
Tower & Reinforcement
Reinforcement Only

Is the bracket welded
to the base plate?

Yes
No

Are anchor rods
installed in piers?

Yes
No

Select new anchor
rod epoxy type:

Sikadur32

Anchor Rod Bracket Calculations

Anchor Rod Loading

Total Net Area of New Anchors: $A_{n_new} := N_{new} \cdot A_{net_new} = 9.75 \cdot \text{in}^2$

Anchor Rod Compression Reduction Factor: $\phi_c := 1.00$

Anchor Rod Tension Reduction Factor: $\phi_t := 0.75$

Anchor Rod Compression Capacity: $\phi P_{nc} := \phi_c \cdot F_{y_rod} \cdot A_{net_new} = 341.25 \cdot \text{kip}$

Anchor Rod Tension Capacity: $\phi P_{nt} := \phi_t \cdot F_{u_rod} \cdot A_{net_new} = 304.69 \cdot \text{kip}$

Bracket Design Load:
(Anchor Capacity,
TIA-222-H Section 4.9.9) $\phi P_n := \max(\phi P_{nt}, \phi P_{nc}) = 341.25 \cdot \text{kip}$

Bracket Demand Loading: $P_u := \begin{cases} \phi P_n & \text{if AorD} = \text{"Design"} \\ P_{u_max} & \text{if AorD} = \text{"Analysis"} \end{cases} = 143.71 \cdot \text{kip}$

Bracket Tube Bearing Check

Bracket Tube Bearing Reduction Factor: $\phi_b := .75$

Bracket Tube Bearing Capacity: $\phi P_n = \phi_b \cdot R_n = \phi_b \cdot 1.8 \cdot F_{ypipe} \cdot A_{pb}$

Required Bracket Tube Area: $A_{pb} := \frac{P_u}{\phi_b \cdot 1.8 \cdot F_{y_HSS}} = 3.04 \cdot \text{in}^2$

Bracket Tube Required Area Check: $\text{Check}_{bear} := \begin{cases} \text{"OK"} & \text{if } A_{HSS} \geq A_{pb} \\ \text{"N/G"} & \text{otherwise} \end{cases}$

AISC 15th Ed., Equation J7-1

Check_{bear} = "OK"

Bracket Tube Compression Check

AISC 15th Ed., Eqs. E3-1 to E3-4

Bracket Tube Compression Reduction Factor: $\phi_{\text{crr}} := 0.9$

Modulus of Elasticity of Steel: $E := 29000 \text{ksi}$

Bracket Tube Effective Length Factor: $K := 1$

Bracket Tube Slenderness Ratio: $L_{c_r} := \frac{K \cdot L_{HSS}}{r_{HSS}} = 10.07$

Bracket Tube Elastic Buckling Strength: $F_e := \frac{\pi^2 \cdot E}{(L_{c_r})^2} = 2821.44 \cdot \text{ksi}$

Bracket Tube Effective Yield:
 Strength

$$F_{y_eff} := \begin{cases} F_{y_HSS} & \text{if } \frac{OD_{HSS}}{t_{HSS}} \leq 0.144 \cdot \frac{E}{F_{y_HSS}} \\ \left(\frac{0.0379 \cdot E}{\frac{OD_{HSS}}{t_{HSS}} \cdot F_{y_HSS}} + \frac{2}{3} \right) \cdot F_{y_HSS} & \text{if } 0.144 \cdot \frac{E}{F_{y_HSS}} \leq \frac{OD_{HSS}}{t_{HSS}} \leq 0.448 \cdot \frac{E}{F_{y_HSS}} \\ \frac{0.377 \cdot E}{\frac{OD_{HSS}}{t_{HSS}}} & \text{otherwise} \end{cases}$$

$$F_{y_eff} = 35 \cdot \text{ksi}$$

$$\lambda_c := \frac{L_{c_r}}{\pi} \cdot \left(\frac{F_{y_eff}}{E} \right)^{0.5} = 0.11$$

Bracket Tube Critical Buckling Strength:

$$F_{cr} := \begin{cases} (0.658)^{\lambda_c^2} \cdot F_{y_eff} & \text{if } \lambda_c < 1.5 \wedge TIA = \text{"REV-G"} \\ \left(\frac{0.877}{\lambda_c^2} \right) \cdot F_{y_eff} & \text{if } \lambda_c > 1.5 \wedge TIA = \text{"REV-G"} \\ \left[\left(\frac{F_{y_eff}}{F_e} \right) \cdot F_{y_eff} \right] & \text{if } L_{c_r} \leq 4.71 \cdot \sqrt{\frac{E}{F_{y_eff}}} \wedge TIA = \text{"REV-H"} \\ (0.877 \cdot F_e) & \text{if } L_{c_r} > 4.71 \cdot \sqrt{\frac{E}{F_{y_eff}}} \wedge TIA = \text{"REV-H"} \end{cases}$$

$$F_{cr} = 34.82 \cdot \text{ksi}$$

Bracket Tube Compression Capacity:

$$\phi P_{n_comp} := \begin{cases} \phi_c \cdot F_{y_HSS} \cdot A_{HSS} & \text{if } L_{c_r} \leq 25 = 241.29 \cdot \text{kip} \\ \phi_c \cdot F_{cr} \cdot A_{HSS} & \text{otherwise} \end{cases} \quad \text{AISC 15th Ed., Equation J4-6}$$

$$\text{Rating}_{comp} := \begin{cases} \left(\frac{P_u}{\phi P_{n_comp}} \right) \cdot \left(\frac{1}{1.05} \right) & \text{if } TIA = \text{"REV-H"} \wedge S15\text{Allowable} = \text{"Yes"} = 56.72\% \\ \frac{P_u}{\phi P_{n_comp}} & \text{otherwise} \end{cases}$$

$$\text{Check}_{comp} := \begin{cases} \text{"OK"} & \text{if } \text{Rating}_{comp} \leq 1.0 \wedge TIA = \text{"REV-H"} = \text{"OK"} \\ \text{"OK"} & \text{if } \text{Rating}_{comp} \leq 1.05 \wedge TIA = \text{"REV-G"} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

HSS Punching Shear check

AISC 15th Ed., Section J4.2

Punching Shear Stress
 (max per unit length):

$$f_v := \frac{M_2}{S_{plate2}} \cdot t_{plate} \cdot 1 \text{ in} = 11.88 \cdot \text{kip}$$

Shear Yield Reduction Factor:

$$\phi_{sy} := 1.00$$

Shear Rupture Reduction Factor:

$$\phi_{sr} := 0.75$$

HSS Punching Shear Capacity:
 (Yield)

$$\phi F_{sy} := \phi_{sy} \cdot 0.6 \cdot F_{y_HSS} \cdot 2 \cdot t_{HSS} \cdot 1 \text{ in} = 28.31 \cdot \text{kip}$$

AISC 15th Ed., Equation J4-3

HSS Punching Shear Capacity:
 (Rupture)

$$\phi F_{sr} := \phi_{sr} \cdot 0.6 \cdot F_{u_HSS} \cdot 2 \cdot t_{HSS} \cdot 1 \text{ in} = 36.4 \cdot \text{kip}$$

AISC 15th Ed., Equation J4-4

HSS Punching Shear Capacity:
 (Controlling)

$$\phi F_v := \min(\phi F_{sy}, \phi F_{sr}) = 28.31 \cdot \text{kip}$$

$$\text{Rating}_{PS1} := \begin{cases} \left(\frac{f_v}{\phi F_v} \right) \cdot \left(\frac{1}{1.05} \right) & \text{if TIA} = \text{"REV-H"} \wedge \text{S15Allowable} = \text{"Yes"} = 39.98\% \\ \left(\frac{f_v}{\phi F_v} \right) & \text{otherwise} \end{cases}$$

$$\text{Check}_{PS} := \begin{cases} \text{"OK"} & \text{if Rating}_{PS1} \leq 1.0 \wedge \text{TIA} = \text{"REV-H"} = \text{"OK"} \\ \text{"OK"} & \text{if Rating}_{PS1} \leq 1.05 \wedge \text{TIA} = \text{"REV-G"} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

Tower Punching Shear check

Include_{PS} = "Include Page from Report"

Punching Shear Stress
 (max per unit length):

$$f_{v1} := \frac{M_1}{S_{plate1}} \cdot t_{plate} \cdot 1 \text{ in} = 2.15 \cdot \text{kip}$$

Tower Punching Shear Capacity:
 (Yield)

$$\phi F_{sy} := \phi_{sy} \cdot 0.6 \cdot F_{y_tow} \cdot 2 \cdot t_{tow} \cdot 1 \text{ in}$$

AISC 15th Ed., Equation J4-3

Tower Punching Shear Capacity:
 (Rupture)

$$\phi F_{sr} := \phi_{sr} \cdot 0.6 \cdot F_{u_tow} \cdot 2 \cdot t_{tow} \cdot 1 \text{ in}$$

AISC 15th Ed., Equation J4-4

Reinforcement Punching Shear: Capacity
 (Yield)

$$\phi F_{sy_ref} := \phi_{sy} \cdot 0.6 \cdot F_{y_ref} \cdot 2 \cdot t_{ref} \cdot 1 \text{ in}$$

AISC 15th Ed., Equation J4-3

Reinforcement Punching Shear:
 Capacity (Rupture)

$$\phi F_{sr_ref} := \phi_{sr} \cdot 0.6 \cdot F_{u_ref} \cdot 2 \cdot t_{ref} \cdot 1 \text{ in}$$

AISC 15th Ed., Equation J4-4

Tower/Reinforcement Punching Shear:
 Capacity (Controlling)

$$\phi F_{v1} := \begin{cases} \min(\phi F_{sy}, \phi F_{sr}) & \text{if Ref} = \text{"Tower Only"} \\ \min(\phi F_{sy}, \phi F_{sr}, \phi F_{sy_ref}, \phi F_{sr_ref}) & \text{if Ref} = \text{"Tower \& Reinforcement"} \\ \min(\phi F_{sy_ref}, \phi F_{sr_ref}) & \text{if Ref} = \text{"Reinforcement Only"} \end{cases}$$

$$\phi F_{v1} = 27 \cdot \text{kip}$$

$$\text{Rating}_{PS2} := \begin{cases} \left(\frac{f_{v1}}{\phi F_{v1}} \right) \cdot \left(\frac{1}{1.05} \right) & \text{if TIA} = \text{"REV-H"} \wedge \text{S15Allowable} = \text{"Yes"} = 7.58\% \\ \left(\frac{f_{v1}}{\phi F_{v1}} \right) & \text{otherwise} \end{cases}$$

$$\text{Check}_{PS1} := \begin{cases} \text{"OK"} & \text{if Rating}_{PS2} \leq 1.0 \wedge \text{TIA} = \text{"REV-H"} = \text{"OK"} \\ \text{"OK"} & \text{if Rating}_{PS2} \leq 1.05 \wedge \text{TIA} = \text{"REV-G"} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

Gusset Plate to HSS Weld Check

AISC 15th Ed., Table 8-4

Controlling Part Thickness:
 (Gusset Plate vs HSS)

$$thin_{part1} := \min\left(\frac{t_{plate}}{in}, \frac{t_{HSS}}{in}\right) = 0.67$$

Weld Group Factor:
 (Load not in plane with weld group)

$$k := 0$$

Weld Reduction Factor:

$$\phi_w := 0.75$$

Weld Group Factor:

$$a := \frac{ecc_2}{L_{plate2}} = 0.19$$

Weld Electrode Coefficient:

$$C_1 := \begin{cases} 1.00 & \text{if } F_{EXX_HSS} = 70 \cdot \text{ksi} \\ 1.03 & \text{if } F_{EXX_HSS} = 80 \cdot \text{ksi} \end{cases} = 1.03$$

Weld Group Coefficient:

$$Coeff_1 = 3.53$$

Minimum Weld Size:

$$D_{min1} := \text{ceil}\left(\frac{P_u \cdot in}{\phi_w \cdot Coeff_1 \cdot C_1 \cdot L_{plate2} \cdot kip}\right) = 4$$

$$minweldsize := \frac{D_{min1}}{16} = \frac{1}{4}$$

Minimum Weld Size Check:

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

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

Gusset to HSS Weld Capacity:

$$\phi Rn_{weld1} := \phi_w \cdot Coeff_1 \cdot \text{ksi} \cdot in \cdot C_1 \cdot D_1 \cdot L_{plate2} = 445.35 \cdot kip$$

$$Rating_{weld1} := \begin{cases} \left(\frac{P_u}{\phi Rn_{weld1}}\right) \cdot \left(\frac{1}{1.05}\right) & \text{if } TIA = \text{"REV-H"} \wedge S15Allowable = \text{"Yes"} \\ \left(\frac{P_u}{\phi Rn_{weld1}}\right) & \text{otherwise} \end{cases} = 30.73\%$$

$$Check_{weld1} := \begin{cases} \text{"OK"} & \text{if } Rating_{weld1} \leq 1.0 \wedge TIA = \text{"REV-H"} \\ \text{"OK"} & \text{if } Rating_{weld1} \leq 1.05 \wedge TIA = \text{"REV-G"} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

Gusset Plate to Tower Weld Check

AISC 15th Ed., Table 8-4

Controlling Part Thickness:
 (Gusset Plate vs Tower)

$$thin_{part2} := \min\left(\frac{t_{plate}}{in}, \frac{t_{tow}}{in}\right) = 0.38$$

Weld Group Factor:
 (Load not in plane with weld group)

$$k_w := 0$$

Weld Reduction Factor:

$$\phi_w := 0.75$$

Weld Group Factor:

$$a_w := \frac{ecc_1}{L_{plate1}} = 0.13$$

Weld Electrode Coefficient:

$$C_1 := \begin{cases} 1.00 & \text{if } F_{EXX_TOW} = 70 \cdot \text{ksi} \\ 1.03 & \text{if } F_{EXX_TOW} = 80 \cdot \text{ksi} \end{cases} = 1.03$$

Weld Group Coefficient:

$$Coeff_2 = 3.69$$

Minimum Weld Size:

$$D_{min2} := \text{ceil}\left(\frac{P_u \cdot in}{\phi_w \cdot Coeff_2 \cdot C_1 \cdot L_{plate1} \cdot kip}\right) = 1$$

Minimum Weld Size Check:

$$min_{weldsize} := \frac{D_{min2}}{16} = \frac{1}{16}$$

$$Check_{weld2} := \begin{cases} \text{"OK"} & \text{if } D_2 \geq D_{min2} \wedge D_2 \geq Min_{weldsize1} \wedge D_2 \leq Max_{weldsize1} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

$$Check_{weld2} = \text{"OK"}$$

Gusset to HSS Weld Capacity:

$$\phi Rn_{weld2} := \phi_w \cdot Coeff_2 \cdot \text{ksi} \cdot in \cdot C_1 \cdot D_2 \cdot L_{plate1} = 922.44 \cdot \text{kip}$$

$$Rating_{weld2} := \begin{cases} \left(\frac{P_u}{\phi Rn_{weld2}}\right) \cdot \left(\frac{1}{1.05}\right) & \text{if } TIA = \text{"REV-H"} \wedge S15Allowable = \text{"Yes"} \\ \left(\frac{P_u}{\phi Rn_{weld2}}\right) & \text{otherwise} \end{cases} = 14.84\%$$

$$Check_{weld3} := \begin{cases} \text{"OK"} & \text{if } Rating_{weld2} \leq 1.0 \wedge TIA = \text{"REV-H"} \\ \text{"OK"} & \text{if } Rating_{weld2} \leq 1.05 \wedge TIA = \text{"REV-G"} \\ \text{"N/G"} & \text{otherwise} \end{cases}$$

Gusset Plate to Base Plate Weld Check

Include_{BP} = "Include Page from Report"

Height of vertical weld from base plate: $H_{\text{vw}} := L_{\text{plate1}} = 54 \cdot \text{in}$

Case 1: Vertical Fillet Weld Controls

Gusset to Tower/Pole Fillet Weld Size:
Effective Throat (2 weld groups) $et_{\text{vf}} := 2 \frac{D_2}{16} \cdot \text{in} \cdot \frac{\sqrt{2}}{2} = 0.53 \cdot \text{in}$

Gusset to Base Plate Fillet Weld Size:
Effective Throat $et_{\text{cjp}} := t_{\text{plate}} = 1.25 \cdot \text{in}$

Length of Vertical Weld to Tower/Pole: $L_{\text{v}} := H - \text{Notch}_{\text{vert}} = 53.25 \cdot \text{in}$

Area of Vertical Weld to Tower/Pole: $A_{\text{v}} := et_{\text{vf}} \cdot L_{\text{v}} = 28.24 \cdot \text{in}^2$

Length of Horizontal Weld to Base:
Plate $L_{\text{h}} := w_{\text{plate}} - \text{Notch}_{\text{horiz}} - \text{Gap} = 3.81 \cdot \text{in}$

Area of Horizontal Weld to Base:
Plate $A_{\text{h}} := et_{\text{cjp}} \cdot L_{\text{h}} = 4.77 \cdot \text{in}^2$

Vertical Weld Centroid: $A_{\text{vw}} := A_{\text{v}} = 28.24 \cdot \text{in}^2$
 $x_{\text{v}} := 0$
 $y_{\text{v}} := \frac{L_{\text{v}}}{2} + \text{Notch}_{\text{vert}} = 27.38 \cdot \text{in}$

$xA_{\text{v}} := x_{\text{v}} \cdot A_{\text{v}} = 0 \cdot \text{in}^3$
 $yA_{\text{v}} := y_{\text{v}} \cdot A_{\text{v}} = 773.07 \cdot \text{in}^3$

Horizontal Weld Centroid: $A_{\text{hw}} := A_{\text{h}} = 4.77 \cdot \text{in}^2$
 $x_{\text{h}} := \frac{L_{\text{h}}}{2} + \text{Notch}_{\text{horiz}} = 2.66 \cdot \text{in}$
 $y_{\text{h}} := 0 \cdot \text{in}$
 $xA_{\text{h}} := x_{\text{h}} \cdot A_{\text{h}} = 12.66 \cdot \text{in}^3$
 $yA_{\text{h}} := y_{\text{h}} \cdot A_{\text{h}} = 0$

Weld Group Centroid: $A_{\text{sum}} := A_{\text{v}} + A_{\text{h}} = 33.01 \cdot \text{in}^2$
 $xA_{\text{sum}} := xA_{\text{v}} + xA_{\text{h}} = 12.66 \cdot \text{in}^3$
 $yA_{\text{sum}} := yA_{\text{v}} + yA_{\text{h}} = 773.07 \cdot \text{in}^3$
 $x_{\text{prime}} := \frac{xA_{\text{sum}}}{A_{\text{sum}}} = 0.38 \cdot \text{in}$
 $y_{\text{prime}} := \frac{yA_{\text{sum}}}{A_{\text{sum}}} = 23.42 \cdot \text{in}$

Vertical Weld Group Moment of:
Inertia $I_{\text{v}} := \frac{L_{\text{v}}^3 \cdot et_{\text{vf}}}{12} + (L_{\text{v}} \cdot et_{\text{vf}}) \cdot (y_{\text{v}} - y_{\text{prime}})^2 + A_{\text{h}} \cdot y_{\text{prime}}^2 = 9728.7 \cdot \text{in}^4$

Horizontal Weld Group Moment of:
Inertia $I_{\text{h}} := \frac{L_{\text{h}}^3 \cdot et_{\text{cjp}}}{12} + A_{\text{h}} \cdot (x_{\text{h}} - x_{\text{prime}})^2 + A_{\text{v}} \cdot x_{\text{prime}}^2 = 34.54 \cdot \text{in}^4$

Polar Moment of Inertia: $I_{\text{p}} := I_{\text{v}} + I_{\text{h}} = 9763.24 \cdot \text{in}^4$

Total Weld Area:

$$A_{w_{total}} := A_{sum} = 33.01 \cdot \text{in}^2$$

Include_{BP} = "Include Page from Report"

Weld Group Polar Moment of Inertia:

$$I_{p_{total}} := I_p = 9763.24 \cdot \text{in}^4$$

Weld Group Eccentricity:

$$e := w_{plate} + \frac{OD_{HSS}}{2} - x_{prime} = 6.43 \cdot \text{in}$$

Design Moment

$$M_d := P_u \cdot e = 923.91 \cdot \text{kip} \cdot \text{in}$$

Check extreme fiber 1

$$c_{x1} := -1 \cdot x_{prime} = -0.38 \cdot \text{in}$$

$$c_{y1} := H - y_{prime} = 30.58 \cdot \text{in}$$

$$r_{px1} := 0 \text{ksi}$$

$$r_{py1} := \frac{P_u}{A_{w_{total}}} = 4.354 \cdot \text{ksi}$$

$$r_{mx1} := M_d \cdot \frac{c_{y1}}{I_{p_{total}}} = 2.894 \cdot \text{ksi}$$

$$r_{my1} := M_d \cdot \frac{c_{x1}}{I_{p_{total}}} = -0.036 \cdot \text{ksi}$$

$$r_{a1} := \sqrt{(r_{px1} + r_{mx1})^2 + (r_{py1} + r_{my1})^2} = 5.2 \cdot \text{ksi}$$

$$\phi_{wg} := .75$$

$$R_{nweld} := \phi_{wg} \cdot 0.6 F_{EXX_TOW} = 36 \cdot \text{ksi}$$

$$Cap_1 := \frac{r_{a1}}{R_{nweld}} = 14.44 \cdot \%$$

Check extreme fiber 2

$$c_{x2} := w_{plate} - Gap - x_{prime} = 4.18 \cdot \text{in}$$

$$c_{y2} := -1 \cdot y_{prime} = -23.42 \cdot \text{in}$$

$$r_{px2} := 0 \text{ksi}$$

$$r_{py2} := \frac{P_u}{A_{w_{total}}} = 4.354 \cdot \text{ksi}$$

$$r_{mx2} := M_d \cdot \frac{c_{y2}}{I_{p_{total}}} = -2.216 \cdot \text{ksi}$$

$$r_{my2} := M_d \cdot \frac{c_{x2}}{I_{p_{total}}} = 0.395 \cdot \text{ksi}$$

$$r_{a2} := \sqrt{(r_{px2} + r_{mx2})^2 + (r_{py2} + r_{my2})^2} = 5.24 \cdot \text{ksi}$$

$$F_u := \min(F_{u_plate}, F_{u_base}) = 70 \cdot \text{ksi}$$

$$R_{nplate} := \phi_{wg} \cdot 0.6 \cdot F_u = 31.5 \cdot \text{ksi}$$

$$Cap_2 := \frac{r_{a2}}{R_{nplate}} = 16.64 \cdot \%$$

Include_{BP} = "Include Page from Report"

Case 2: Vertical Fillet Weld Base Material Controls

Gusset to Tower/Pole Fillet Weld Size:
Effective Throat (2 weld groups)

$$et_{vf} := 2 \frac{D_2}{16} \cdot in = 0.75 \cdot in$$

Gusset to Base Plate CJP Weld Size:
Effective Throat

$$et_{cjp} := t_{plate} = 1.25 \cdot in$$

Length of Vertical Weld to pole

$$L_v := H - Notch_{vert} = 53.25 \cdot in$$

Area of Vertical Weld to pole

$$A_{vf} := et_{vf} \cdot L_v = 39.94 \cdot in^2$$

Length of Horizontal Weld to BP

$$L_h := w_{plate} - Notch_{horiz} - Gap = 3.81 \cdot in$$

Area of Horizontal Weld

$$A_{hw} := et_{cjp} \cdot L_h = 4.77 \cdot in^2$$

Vertical Weld Centroid:

$$A_v := A_v = 39.94 \cdot in^2$$

$$x_v := 0$$

$$xA_v := x_v \cdot A_v = 0 \cdot in^3$$

$$y_v := \frac{L_v}{2} + Notch_{vert} = 27.38 \cdot in$$

$$yA_v := y_v \cdot A_v = 1093.29 \cdot in^3$$

Horizontal Weld Centroid:

$$A_h := A_h = 4.77 \cdot in^2$$

$$x_h := \frac{L_h}{2} + Notch_{horiz} = 2.66 \cdot in$$

$$xA_h := x_h \cdot A_h = 12.66 \cdot in^3$$

$$y_h := 0 \cdot in$$

$$yA_h := y_h \cdot A_h = 0$$

Weld Group Centroid:

$$A_{sum} := A_v + A_h = 44.7 \cdot in^2$$

$$xA_{sum} := xA_v + xA_h = 12.66 \cdot in^3$$

$$x_{prime} := \frac{xA_{sum}}{A_{sum}} = 0.28 \cdot in$$

$$yA_{sum} := yA_v + yA_h = 1093.29 \cdot in^3$$

$$y_{prime} := \frac{yA_{sum}}{A_{sum}} = 24.46 \cdot in$$

Vertical Weld Group Moment of:
Inertia

$$I_v := \frac{L_v^3 \cdot et_{vf}}{12} + (L_v \cdot et_{vf}) \cdot (y_v - y_{prime})^2 + A_h \cdot y_{prime}^2 = 12627.7 \cdot in^4$$

Horizontal Weld Group Moment of:
Inertia

$$I_h := \frac{L_h^3 \cdot et_{cjp}}{12} + A_h \cdot (x_h - x_{prime})^2 + A_v \cdot x_{prime}^2 = 35.81 \cdot in^4$$

Polar Moment of Inertia:

$$I_p := I_v + I_h = 12663.51 \cdot in^4$$

Total Weld Area:

$$A_{w_{total}} := A_{sum} = 44.7 \cdot in^2$$

Weld Group Polar Moment of Inertia:

$$I_{p_{total}} := I_p = 12663.51 \cdot in^4$$

Weld Group Eccentricity:

$$e := w_{\text{plate}} + \frac{OD_{\text{HSS}}}{2} - x_{\text{prime}} = 6.53 \cdot \text{in}$$

Include_{BP} = "Include Page from Report"

Design Moment

$$M_d := P_u \cdot e = 938.33 \cdot \text{kip} \cdot \text{in}$$

Check extreme fiber 1

$$c_{x1} := -1 \cdot x_{\text{prime}} = -0.28 \cdot \text{in}$$

$$c_{y1} := H - y_{\text{prime}} = 29.54 \cdot \text{in}$$

$$r_{px1} := 0 \text{ ksi}$$

$$r_{py1} := \frac{P_u}{A_{w_{\text{total}}}} = 3.215 \cdot \text{ksi}$$

$$r_{mx1} := M_d \cdot \frac{c_{y1}}{I_{p_{\text{total}}}} = 2.189 \cdot \text{ksi}$$

$$r_{my1} := M_d \cdot \frac{c_{x1}}{I_{p_{\text{total}}}} = -0.021 \cdot \text{ksi}$$

$$r_{a1} := \sqrt{(r_{px1} + r_{mx1})^2 + (r_{py1} + r_{my1})^2} = 3.87 \cdot \text{ksi}$$

$$R_{\text{nweld}} := \phi_{\text{wg}} \cdot 0.6 F_{u_{\text{tow}}} = 36 \cdot \text{ksi}$$

$$\text{Cap}_3 := \frac{r_{a1}}{R_{\text{nweld}}} = 10.76 \cdot \%$$

Check extreme fiber 2

$$c_{x2} := w_{\text{plate}} - \text{Gap} - x_{\text{prime}} = 4.28 \cdot \text{in}$$

$$c_{y2} := -1 \cdot y_{\text{prime}} = -24.46 \cdot \text{in}$$

$$r_{px2} := 0 \text{ ksi}$$

$$r_{py2} := \frac{P_u}{A_{w_{\text{total}}}} = 3.215 \cdot \text{ksi}$$

$$r_{mx2} := M_d \cdot \frac{c_{y2}}{I_{p_{\text{total}}}} = -1.812 \cdot \text{ksi}$$

$$r_{my2} := M_d \cdot \frac{c_{x2}}{I_{p_{\text{total}}}} = 0.317 \cdot \text{ksi}$$

$$r_{a2} := \sqrt{(r_{px2} + r_{mx2})^2 + (r_{py2} + r_{my2})^2} = 3.97 \cdot \text{ksi}$$

$$F_u := \min(F_{u_{\text{plate}}}, F_{u_{\text{base}}}) = 70 \cdot \text{ksi}$$

$$\phi_{\text{wg}} := .75$$

$$R_{\text{nplate}} := \phi_{\text{wg}} \cdot 0.6 \cdot F_u = 31.5 \cdot \text{ksi}$$

$$\text{Cap}_4 := \frac{r_{a2}}{R_{\text{nplate}}} = 12.6 \cdot \%$$

Rating _{weld3} :=	$\max(\text{Cap}_1, \text{Cap}_2, \text{Cap}_3, \text{Cap}_4) \cdot \frac{1}{1.05} \text{ if TIA} = \text{"REV-H"} \wedge \text{S15Allowable} = \text{"Yes"} = 15.8 \cdot \%$ $\max(\text{Cap}_1, \text{Cap}_2, \text{Cap}_3, \text{Cap}_4) \text{ otherwise}$
----------------------------	--

Check :=	$\text{"OK"} \text{ if Rating}_{\text{weld3}} < 1.0 \wedge \text{TIA} = \text{"REV-H"} = \text{"OK"}$ $\text{"OK"} \text{ if Rating}_{\text{weld3}} < 1.05 \wedge \text{TIA} = \text{"REV-G"}$ $\text{"N/G"} \text{ otherwise}$
----------	---

Anchor Rod Embedment Depth Check:

Development Length Check

ACI 318-14 Chapter 25

Rebar Diameter: $d_b := \text{vlookup}(d_s, d_{b\text{table}}, 2) \cdot \text{in} = 1 \cdot \text{in}$

Bracket Design Load: $P_u = 143.71 \cdot \text{kip}$

$$BC_{\text{rebar}} := D_{\text{pier}} - 2 \cdot c_c - \frac{\text{Tie} \cdot \text{in}}{4} - d_b = 285 \cdot \text{in}$$

$$S_{\text{rebar}} := \frac{\pi \cdot BC_{\text{rebar}}}{n} = 33.161 \cdot \text{in}$$

$$c_b := \min\left(c_c + \frac{\text{Tie} \cdot \text{in}}{8} + \frac{d_b}{2}, S_{\text{rebar}} \cdot 0.5\right) = 4.5 \cdot \text{in}$$

Development Length of Rebar:

$$l_d := \left[\frac{3}{40} \cdot \frac{f_y}{\lambda \cdot \sqrt{f'_c}} \cdot \frac{\psi_t \cdot \psi_e \cdot \psi_s}{\min\left(\frac{c_b + k_{rt}}{d_b}, 2.5\right)} \right] \cdot d_b = 32.86 \cdot \text{in} \quad \text{ACI 318-14, Equation 25.4.2.3a}$$

Calculate Max Distance
 Between Rebar and New
 Anchor Rods:

$$A := \frac{1}{2} \cdot S_{\text{rebar}} = 16.581 \cdot \text{in}$$

$$B := \frac{BC_{\text{rebar}}}{2} - \frac{BC_{\text{new}}}{2} = 111.5 \cdot \text{in}$$

$$G := \sqrt{A^2 + B^2} = 112.726 \cdot \text{in}$$

$$l'_d := l_d + \frac{G}{1.5} + 3 \text{in} = 9.25 \text{ft}$$

Epoxy Bond Strength:

$$S_b := 1800 \text{psi}$$

Epoxy to Steel Reduction:
 Factor

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

Required Epoxy Development:
 Length

$$L_{\text{be}} := \frac{P_u}{\pi \cdot D_{\text{new}} \cdot S_b \cdot \phi_{\text{bond}}} = 17.38 \cdot \text{in}$$

Required Embedment Length:

$$L_{\text{min}} := \begin{cases} \max(L_{\text{be}} + L_{\text{bt}}, l'_d + 0.25 \cdot L_{\text{be}}) & \text{if Piers} = \text{"Yes"} \\ (L_{\text{be}} + L_{\text{bt}}) & \text{if Piers} = \text{"No"} \end{cases} = 1.45 \cdot \text{ft}$$

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

Results Summary:

HSS Compression Rating:	$HSS_{compression} = 56.72\%$
Gusset Plate to HSS Flexure Rating:	$Gusset_{flexure1} = "N/A"\%$
Gusset Plate to Tower Flexure Rating:	$Gusset_{flexure2} = "N/A"\%$
Gusset Plate Shear Yield Rating:	$Gusset_{shear1} = 20.05\%$
Gusset Plate Shear Rupture Rating:	$Gusset_{shear2} = 21.72\%$
Gusset Plate to HSS Weld Rating:	$Gusset_{weld1} = 30.73\%$
Gusset Plate to Tower Weld Rating:	$Gusset_{weld2} = 15.85\%$
HSS Punching Shear Rating:	$HSS_{punchingshear} = 39.98\%$
Tower Punching Shear Rating:	$Tower_{punchingshear} = 7.58\%$

Pier and Pad Foundation



BU #: 876373
 Site Name: LONG EDDY / WR
 App. Number: 669336 Rev. 0

TIA-222 Revision: H
 Tower Type: Monopole

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

Superstructure Analysis Reactions		
Compression, P_{comp} :	61.63	kips
Base Shear, V_u_{comp} :	24.91	kips
Moment, M_u :	2896.04	ft-kips
Tower Height, H :	148	ft
BP Dist. Above Fdn, bp_{dist} :	6.125	in
Bolt Circle / Bearing Plate Width, BC :	55	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	112.65	24.91	21.1%	Pass
<i>Bearing Pressure (ksf)</i>	9.32	3.28	35.2%	Pass
<i>Overtuning (kip*ft)</i>	4136.55	3008.39	72.7%	Pass
<i>Pad Flexure (kip*ft)</i>	4093.42	1515.11	35.3%	Pass
<i>Pad Shear - 1-way (kips)</i>	1050.72	198.20	18.0%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.164	0.004	2.2%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	3956.62	0.00	0.0%	Pass

*Rating per TIA-222-H Section 15.5

Structural Rating*:	35.3%
Soil Rating*:	72.7%

Pad Properties		
Depth, D :	3.5	ft
Pad Width, W_1 :	24.5	ft
Pad Thickness, T :	4	ft
Pad Rebar Size (Bottom dir. 2), Sp_2 :	8	
Pad Rebar Quantity (Bottom dir. 2), mp_2 :	27	
Pad Clear Cover, cc_{pad} :	3	in

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

Soil Properties		
Total Soil Unit Weight, γ :	120	pcf
Ultimate Net Bearing, Q_{net} :	12.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	32	degrees
SPT Blow Count, N_{blows} :	10	
Base Friction, μ :		
Neglected Depth, N :	3.33	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, gw :	N/A	ft

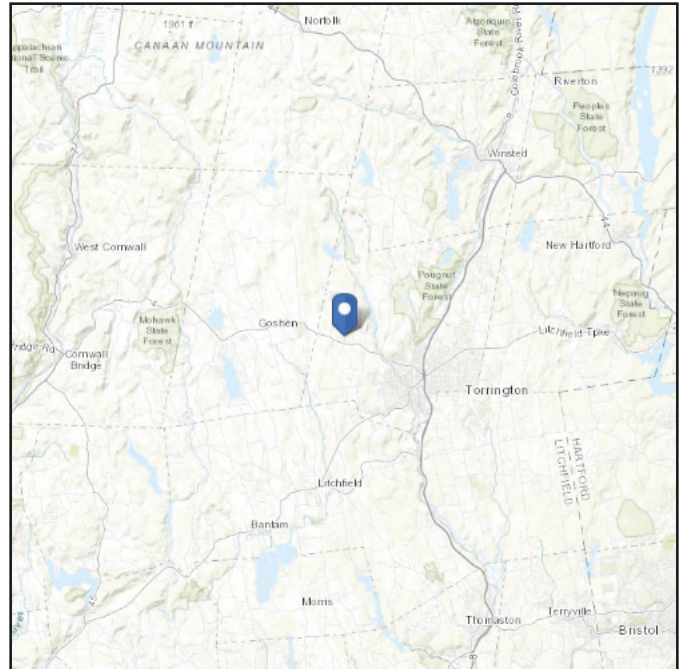
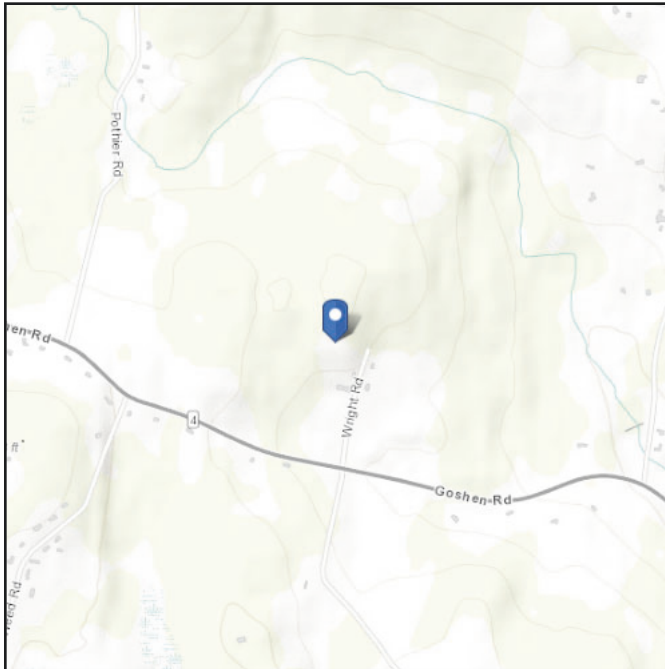
<--Toggle between Gross and Net

ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 41.827317
Longitude: -73.170547
Elevation: 1095.4006675757862 ft (NAVD 88)



Wind

Results:

Wind Speed	115 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	89 Vmph
100-year MRI	95 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Fri Apr 26 2024

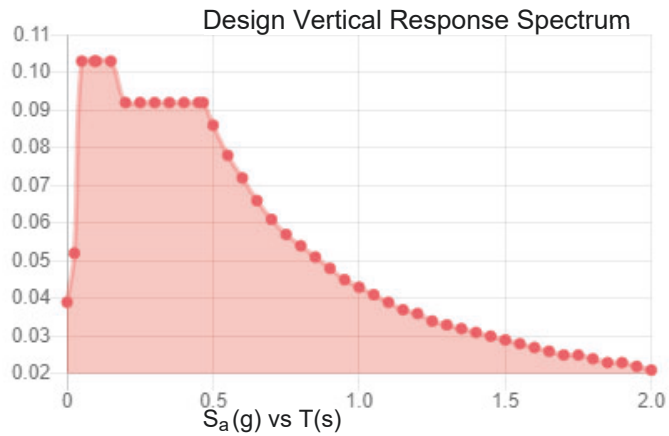
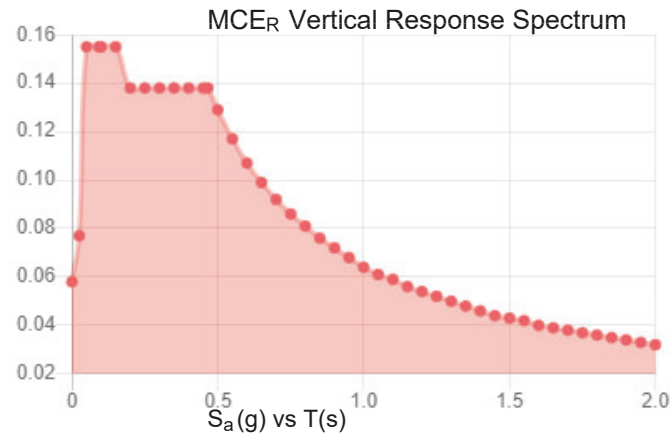
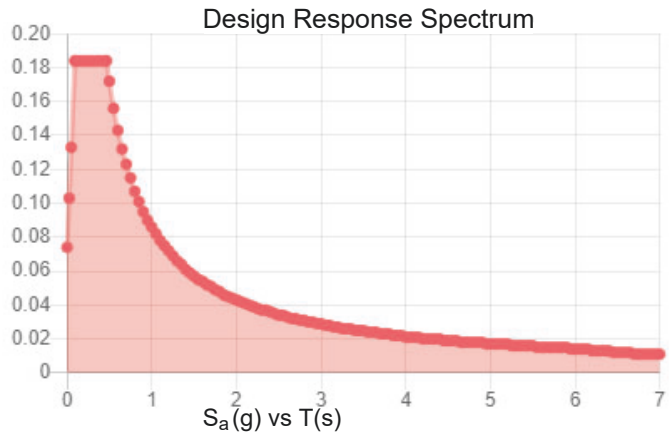
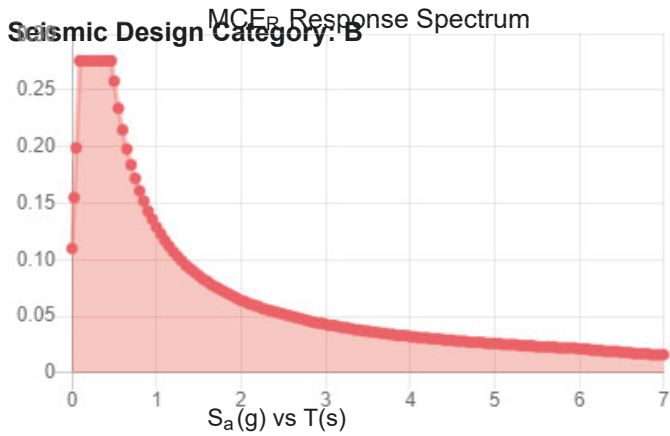
Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Site Soil Class: D - Stiff Soil

Results:

S_s :	0.173	S_{D1} :	0.086
S_1 :	0.054	T_L :	6
F_a :	1.6	PGA :	0.091
F_v :	2.4	PGA _M :	0.146
S_{MS} :	0.276	F_{PGA} :	1.6
S_{M1} :	0.129	I_e :	1
S_{DS} :	0.184	C_v :	0.7



Data Accessed: Fri Apr 26 2024

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness: 1.00 in.

Concurrent Temperature: 5 F

Gust Speed 50 mph

Data Source: Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

Date Accessed: Fri Apr 26 2024

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 500-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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