Robinson+Cole

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Also admitted in Massachusetts

October 7, 2016

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

Re: **EM-VER-161-160902 – Cellco Partnership d/b/a Verizon Wireless**
128 Mather Street, Wilton, Connecticut

Dear Ms. Bachman:

On September 26, 2016, the Siting Council acknowledged receipt of Cellco's notice of intent to modify its existing telecommunications facility at 128 Mather Street in Wilton, Connecticut. The modifications involved the replacement of antennas and the installation of remote radio heads at the above-referenced facility.

As a condition of the acknowledgement, Cellco was required to provide the Council with a copy of the Structural Analysis Report referencing the Rev. G of the Structural Standards. The updated Structural Analysis Report referencing Rev. G is attached.

If you have any questions please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Tim Parks

15353689-v1

Date: **September 29, 2016**

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

Destek Engineering, LLC
1281 Kennestone Circle, Suite 100
Marietta, GA 30066
(770) 693-0835

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate** **Carrier Site Name:**	 Wilton, CT
Crown Castle Designation:	**Crown Castle BU Number:** **Crown Castle Site Name:** **Crown Castle JDE Job Number:** **Crown Castle Work Order Number:** **Crown Castle Application Number:**	806353 BRG 124 943066 355200 1306102 320434 Rev. 9
Engineering Firm Designation:	**Destek Engineering, LLC Project Number:**	1602243
Site Data:	**128 MATHER STREET, WILTON, Fairfield County, CT** **Latitude *41° 14' 18.34"*, Longitude *-73° 25' 26.44"*** **180 Foot - Self Support Tower**	

Dear Sean Dempsey,

Destek Engineering, LLC is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 952630, in accordance with application 320434, revision 9.

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:

LC4.5: Modified Structure w/ Existing + Proposed **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

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

Structural analysis prepared by: Dave Chen, EIT

Respectfully submitted by:

9/29/2016

Ahmet Colakoglu, PE
President

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 180 ft Self Support tower designed by FWT Inc. in May of 1988. The tower was originally designed for a wind speed of 85 mph per ANSI/EIA RS-222-D 1986. The tower has been modified multiple times in the past to accommodate additional loading.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 93 mph with no ice, 50 mph with 0.75 inch ice thickness and 60 mph under service loads, exposure category B with topographic category 1 and crest height of 0 feet.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
164.0	163.0	3	alcatel lucent	RRH4X45 -AWS4 B66	7	1-5/8	-
		3	commscope	LNX-6512DS-VTM w/ Mount Pipe			
		3	kathrein	742 213 w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
178.0	184.0	1	rfs celwave	PD10017	2	7/8	1
170.0	171.0	3	kathrein	800 10504 w/ Mount Pipe	6 1	1-5/8 1/4	1
		3	kathrein	860 10025			
	170.0	1	tower mounts	Side Arm Mount [SO 103-3]			
164.0	164.0	1	tower mounts	Sector Mount [SM 702-3]	6	1-5/8	1
	163.0	6	rfs celwave	APL868013-42T0 w/ Mount Pipe			
		3	rfs celwave	APX75-866512-CT2 w/ Mount Pipe	6	1-1/4	2
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe	-	-	1
	162.0	6	rfs celwave	FD9R6004/2C-3L			
154.0	158.0	6	ericsson	RRUS-11	12 1 2	1-5/8 3/8 5/8	1
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		6	powerwave technologies	LGP21901			
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
	154.0	1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Sector Mount [SM 602-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
146.0	146.0	3	alcatel lucent	800 EXTERNAL NOTCH FILTER	-	-	1
		3	alcatel lucent	PCS 1900 MHz 4x45W-65MHz			
		3	alcatel lucent	TME-800MHZ 2X50W RRH			
143.0	143.0	9	rfs celwave	ACU-A20-N	3	1-1/4	1
		3	rfs celwave	APXVSPP18-C-A20			
		1	tower mounts	Sector Mount [SM 701-3]			
124.0	131.0	2	rfs celwave	1142-2C	2	1/2	1
	124.0	2	tower mounts	Side Arm Mount [SO 302-1]			
104.0	111.0	1	rfs celwave	1142-2C	1	7/8	1
	108.0	1	rfs celwave	220-3BN	1	1/2	
	104.0	2	tower mounts	Side Arm Mount [SO 302-1]			
93.0	93.0	3	commscope	LNX-6515DS-VTM w/ Mount Pipe	13	1-1/4	1
		3	ericsson	ERICSSON AIR 21 B2A B4P			
		3	ericsson	ERICSSON AIR 21 B4A B2P			
		3	ericsson	KRY 112 144/1			
		3	ericsson	RRUS 11 B12			
		1	tower mounts	Sector Mount [SM 402-3]			
62.0	65.0	1	gps	GPS_A	1	1/2	1
	62.0	1	tower mounts	Side Arm Mount [SO 301-1]			
42.0	44.0	1	gps	GPS_A	1	1/2	1
	42.0	1	tower mounts	Side Arm Mount [SO 301-1]			
31.0	32.0	1	gps	GPS_A	1	1/2	1
	31.0	1	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Equipment To Be Removed

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
179	179	2	Generic	PD10017	2	7/8
165	165	3	Generic	PD1132D	3	7/8
160	160	2	Generic	8' Dishes W/O RAD	2	7/8
140	140	2	Generic	PD10017	2	7/8
125	125	3	Generic	PD1132D	3	7/8

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Reports	FDH, Job#: 09-04219E G1, dated 04/29/2009	262283	CCISITES
Tower Foundation Drawings	FWT, Job#: 18888-81, dated 05/31/1988	262285	CCISITES
Foundation Mapping	FDH, Job#: 09-11077E N1, dated 08/07/2012	3290324	CCISITES
Tower Manufacturer Drawings	FWT, Job#: 18888-81, dated 05/06/1988	217757	CCISITES
Tower Reinforcement Drawings	HEB, Job#: 98124A, dated 01/07/2000	3290324	CCISITES
Tower Reinforcement Drawings	APT, Job#: CT105271, dated 12/20/2002	801524	CCISITES
Tower Reinforcement Drawings	Paul J. Ford, Job#: 37509-0801, dated 12/08/2009	2434484	CCISITES
Tower Reinforcement Drawings	Destek, Pro. # 1654003,date 1/13/2016	6061656	CCISITES
Post-Modification Inspection	Paul J. Ford, Job#: 37509-0801, dated 01/11/2010	2575710	CCISITES
Structural Analysis Report	B+T Group, Job#: 102920.001.01, dated 11/17/2015	5978416	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Tower Modifications as designed by Destek Engineering LLC in January of 2016 (CCIDOCS#: 6061656) will be implemented prior to the installation of any additional appurtenances.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T1	180 - 168	Leg	P2x.154	2	-2.168	27.981	7.7	Pass
T2	168 - 160	Leg	P2x.154 (GR)	25	-8.524	38.430	22.2	Pass
T3	160 - 140	Leg	P3x.216 (GR)	40	35.868	70.197	51.1	Pass
T4	140 - 120	Leg	P3.5x.318 (GR)	67	-76.919	122.133	63.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T5	120 - 100	Leg	P4x.337 (GR)	88	-106.958	157.190	68.0 77.2 (b)	Pass
T6	100 - 80	Leg	P5x.375 (GR)	111	118.251	192.527	61.4 72.8 (b)	Pass
T7	80 - 60	Leg	P6x.432 (GR)	132	142.440	264.756	53.8 49.8 (b)[1]	Pass
T8	60 - 40	Leg	P6x.432 (GR)	147	167.611	264.756	63.3 79.0 (b)	Pass
T9	40 - 20	Leg	P6x.432 (GR)	162	191.253	264.756	72.2 60.2 (b)[1]	Pass
T10	20 - 0	Leg	P8x.5 (GR)	183	214.352	402.026	53.3 62.0 (b)	Pass
T1	180 - 168	Diagonal	L2x1 1/2x3/16	10	-0.579	11.752	4.9 7.0 (b)	Pass
T2	168 - 160	Diagonal	L2x1 1/2x3/16	33	-2.549	11.752	21.7 31.4 (b)	Pass
T3	160 - 140	Diagonal	L2x1 1/2x3/16	44	-3.928	7.635	51.5	Pass
T4	140 - 120	Diagonal	L2x2x3/16	71	-4.574	7.150	64.0	Pass
T5	120 - 100	Diagonal	L2 1/2x2x3/16	92	-4.915	7.120	69.0	Pass
T6	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	113	-6.059	8.211	73.8	Pass
T7	80 - 60	Diagonal	L3x3x3/16	133	-7.279	8.983	81.0	Pass
T8	60 - 40	Diagonal	L3 1/2x3x1/4	148	-7.818	11.905	65.7	Pass
T9	40 - 20	Diagonal	L3 1/2x3x1/4	163	-8.626	9.650	89.4	Pass
T10	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	184	-9.014	11.176	80.7	Pass
T9	40 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	169	-3.930	34.656	11.3 49.4 (b)	Pass
T1	180 - 168	Top Girt	L1 1/2x2x3/16	5	-0.118	8.172	1.4 2.3 (b)	Pass
							Summary	
						Leg (T9)	79.0	Pass
						Diagonal (T9)	89.4	Pass
						Secondary Horizontal (T9)	49.4	Pass
						Top Girt (T1)	2.3	Pass
						Bolt Checks	79.0	Pass
						Rating =	89.4	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC4.5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	67.2	Pass
1	Base Foundation	0	49.7	Pass
1	Base Foundation Soil Interaction	0	50.0	Pass

Structure Rating (max from all components) =	89.4%

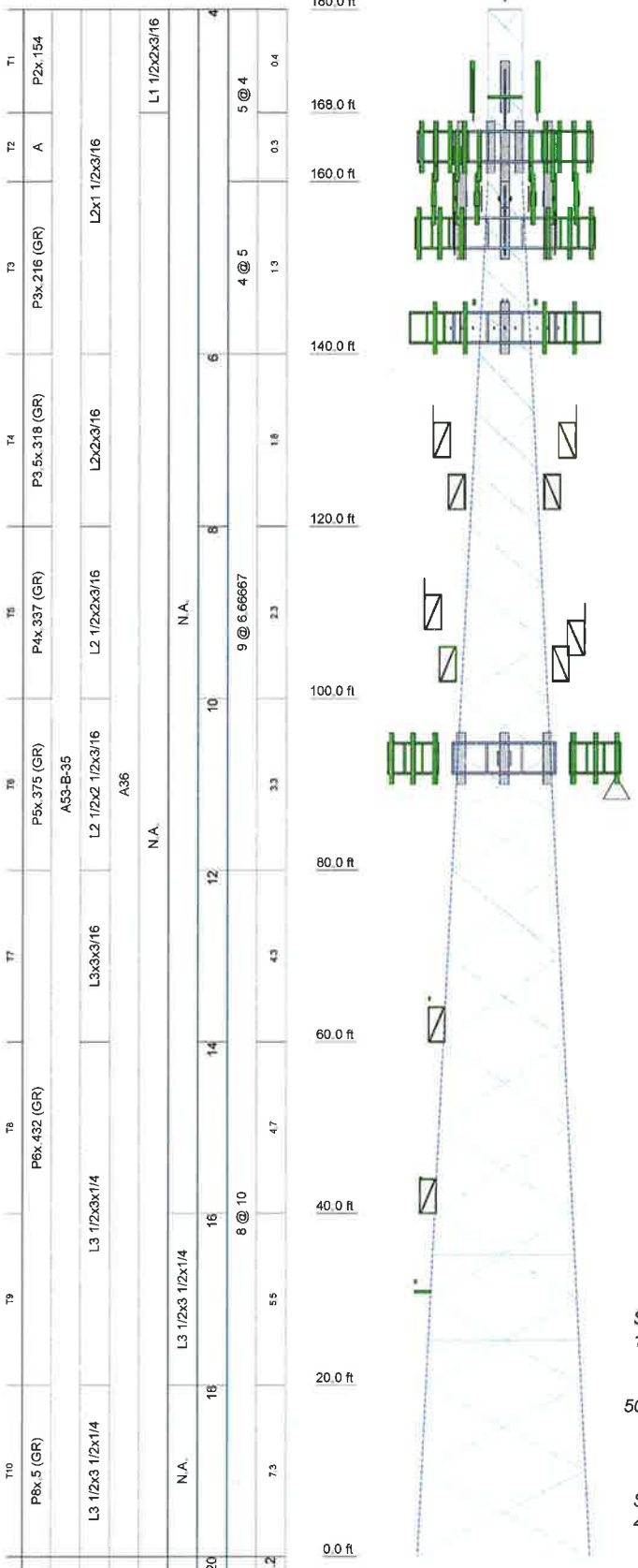
Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The modified tower and its foundation will have sufficient capacity to carry the existing and proposed loads. No additional medications are required at this time.

APPENDIX A

TNXTOWER OUTPUT



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PD10017	178	Pipe Mount [PM 601-3]	154
800 10504 w/ Mount Pipe	170	Sector Mount [SM 602-3]	154
800 10504 w/ Mount Pipe	170	TME-800MHZ 2X50W RRH	146
800 10504 w/ Mount Pipe	170	TME-800MHZ 2X50W RRH	146
860 10025	170	TME-800MHZ 2X50W RRH	146
860 10025	170	PCS 1900 MHz 4x45W-65MHz	146
860 10025	170	PCS 1900 MHz 4x45W-65MHz	146
6' x 2" Mount Pipe	170	PCS 1900 MHz 4x45W-65MHz	146
6' x 2" Mount Pipe	170	800 EXTERNAL NOTCH FILTER	146
6' x 2" Mount Pipe	170	800 EXTERNAL NOTCH FILTER	146
Side Arm Mount [SO 103-3]	170	800 EXTERNAL NOTCH FILTER	146
(2) APL868013-42T0 w/ Mount Pipe	164	APXVSPP18-C-A20	143
(2) APL868013-42T0 w/ Mount Pipe	164	APXVSPP18-C-A20	143
(2) APL868013-42T0 w/ Mount Pipe	164	APXVSPP18-C-A20	143
MG D3-800Tx w/ Mount Pipe	164	(3) ACU-A20-N	143
MG D3-800Tx w/ Mount Pipe	164	(3) ACU-A20-N	143
MG D3-800Tx w/ Mount Pipe	164	(3) ACU-A20-N	143
(2) FD9R6004/2C-3L	164	Pipe Mount [PM 601-3]	143
(2) FD9R6004/2C-3L	164	Sector Mount [SM 701-3]	143
(2) FD9R6004/2C-3L	164	1142-2C	124
LNX-6512DS-VTM w/ Mount Pipe	164	1142-2C	124
LNX-6512DS-VTM w/ Mount Pipe	164	Side Arm Mount [SO 302-1]	124
LNX-6512DS-VTM w/ Mount Pipe	164	Side Arm Mount [SO 302-1]	124
742 213 w/ Mount Pipe	164	220-3BN	104
742 213 w/ Mount Pipe	164	1142-2C	104
742 213 w/ Mount Pipe	164	Side Arm Mount [SO 302-1]	104
RRH4X45-AWS4 B66	164	Side Arm Mount [SO 302-1]	104
RRH4X45-AWS4 B66	164	ERICSSON AIR 21 B2A B4P	93
RRH4X45-AWS4 B66	164	ERICSSON AIR 21 B2A B4P	93
DB-T1-6Z-8AB-0Z	164	ERICSSON AIR 21 B2A B4P	93
(2) 6' x 2" Mount Pipe	164	ERICSSON AIR 21 B4A B2P	93
(2) 6' x 2" Mount Pipe	164	ERICSSON AIR 21 B4A B2P	93
(2) 6' x 2" Mount Pipe	164	ERICSSON AIR 21 B4A B2P	93
Sector Mount [SM 702-3]	164	LNX-6515DS-VTM w/ Mount Pipe	93
(2) 7770.00 w/ Mount Pipe	154	LNX-6515DS-VTM w/ Mount Pipe	93
(2) 7770.00 w/ Mount Pipe	154	LNX-6515DS-VTM w/ Mount Pipe	93
(2) 7770.00 w/ Mount Pipe	154	KRY 112 144/1	93
P65-16-XLH-RR w/ Mount Pipe	154	KRY 112 144/1	93
P65-16-XLH-RR w/ Mount Pipe	154	KRY 112 144/1	93
P65-16-XLH-RR w/ Mount Pipe	154	RRUS 11 B12	93
(2) LGP21401	154	RRUS 11 B12	93
(2) LGP21401	154	RRUS 11 B12	93
(2) LGP21401	154	Sector Mount [SM 402-3]	93
(2) LGP21901	154	GPS_A	62
(2) LGP21901	154	Side Arm Mount [SO 301-1]	62
(2) LGP21901	154	(2) 3'x8" Knife Plate	60
(2) RRUS-11	154	(2) 3'x8" Knife Plate	60
(2) RRUS-11	154	(2) 3'x8" Knife Plate	60
(2) RRUS-11	154	GPS_A	42
DC6-48-60-18-8F	154	Side Arm Mount [SO 301-1]	42
(2) 5' x 2" Pipe Mount	154	Side Arm Mount [SO 701-1]	31
(2) 5' x 2" Pipe Mount	154	GPS_A	31
(2) 5' x 2" Pipe Mount	154	(2) 3'x8" Knife Plate	20
3' x 2" Pipe Mount	154	(2) 3'x8" Knife Plate	20
3' x 2" Pipe Mount	154	(2) 3'x8" Knife Plate	20
3' x 2" Pipe Mount	154		

ALL P
ARE

MAX.
DC
SH

UP
SH

SHEAR
14 K

TORQ
50 mph WI

63 K

SHEAR
44 K

TORQU
REACTIONS -

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P2x.154 (GR)		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. Grouted pipe f'c is 7.000 ksi
9. TOWER RATING: 89.4%

DESTEK ENGINEERING
Destek Engineering, LLC
1281 Kennestone Circle, Suite 100
Marietta, GA 30066
Phone: (770) 693-0835
FAX:

Job: *806353 - BRG 124 943066*			
Project: *1602243*			
Client: Crown Castle	Drawn by: Ahmet Coakoglu		App'd:
Code: TIA-222-G	Date: 09/29/16		Scale: N
Path:			Dwg No.

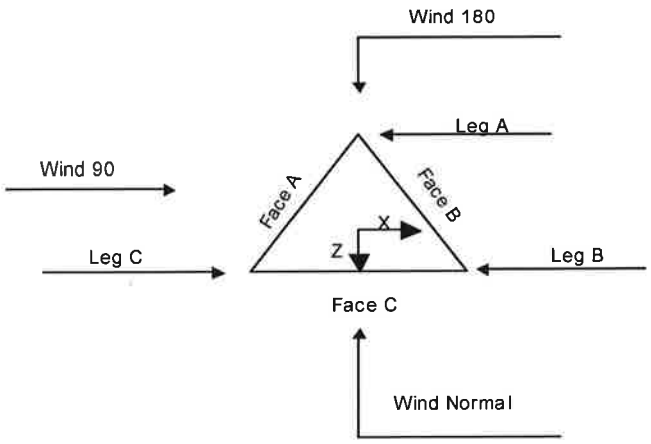
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.000 ft above the ground line.
The base of the tower is set at an elevation of 0.000 ft above the ground line.
The face width of the tower is 4.000 ft at the top and 20.000 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

1) Tower is located in Fairfield County, Connecticut.
2) Basic wind speed of 93 mph.
3) Structure Class II.
4) Exposure Category B.
5) Topographic Category 1.
6) Crest Height 0.000 ft.
7) Nominal ice thickness of 0.750 in.
8) Ice thickness is considered to increase with height.
9) Ice density of 56.000 pcf.
10) A wind speed of 50 mph is used in combination with ice.
11) Temperature drop of 50.000 °F.
12) Deflections calculated using a wind speed of 60 mph.
13) Grouted pipe f'_c is 7.000 ksi.
14) Pressures are calculated at each section.
15) Stress ratio used in tower member design is 1.
16) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	180.000-168.000			4.000	1	12.000
T2	168.000-160.000			4.000	1	8.000
T3	160.000-140.000			4.000	1	20.000
T4	140.000-120.000			6.000	1	20.000
T5	120.000-100.000			8.000	1	20.000
T6	100.000-80.000			10.000	1	20.000
T7	80.000-60.000			12.000	1	20.000
T8	60.000-40.000			14.000	1	20.000
T9	40.000-20.000			16.000	1	20.000
T10	20.000-0.000			18.000	1	20.000

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.000-168.000	4.000	X Brace	No	No	0.000	0.000
T2	168.000-160.000	4.000	X Brace	No	No	0.000	0.000
T3	160.000-140.000	5.000	X Brace	No	No	0.000	0.000
T4	140.000-120.000	6.667	X Brace	No	No	0.000	0.000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T5	120.000-100.000	6.667	X Brace	No	No	0.000	0.000
T6	100.000-80.000	6.667	X Brace	No	No	0.000	0.000
T7	80.000-60.000	10.000	X Brace	No	No	0.000	0.000
T8	60.000-40.000	10.000	X Brace	No	No	0.000	0.000
T9	40.000-20.000	10.000	X Brace	No	Yes	0.000	0.000
T10	20.000-0.000	10.000	X Brace	No	No	0.000	0.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.000-168.000	Pipe	P2x.154	A53-B-35 (35 ksi)	Single Angle	L2x1 1/2x3/16	A36 (36 ksi)
T2 168.000-160.000	Grouted Pipe	P2x.154	A53-B-35 (35 ksi)	Single Angle	L2x1 1/2x3/16	A36 (36 ksi)
T3 160.000-140.000	Grouted Pipe	P3x.216	A53-B-35 (35 ksi)	Single Angle	L2x1 1/2x3/16	A36 (36 ksi)
T4 140.000-120.000	Grouted Pipe	P3.5x.318	A53-B-35 (35 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T5 120.000-100.000	Grouted Pipe	P4x.337	A53-B-35 (35 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 100.000-80.000	Grouted Pipe	P5x.375	A53-B-35 (35 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 80.000-60.000	Grouted Pipe	P6x.432	A53-B-35 (35 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T8 60.000-40.000	Grouted Pipe	P6x.432	A53-B-35 (35 ksi)	Single Angle	L3 1/2x3x1/4	A36 (36 ksi)
T9 40.000-20.000	Grouted Pipe	P6x.432	A53-B-35 (35 ksi)	Single Angle	L3 1/2x3x1/4	A36 (36 ksi)
T10 20.000-0.000	Grouted Pipe	P8x.5	A53-B-35 (35 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.000-168.000	Single Angle	L1 1/2x2x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T9 40.000-20.000	Single Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.000-168.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T2 168.000-160.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T3 160.000-140.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T4 140.000-120.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T5 120.000-100.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T6 100.000-80.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T7 80.000-60.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T8 60.000-40.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T9 40.000-20.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000
T10 20.000-0.000	0.000	0.375	A36 (36 ksi)	1.03	1	1.05	0.000	0.000	36.000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 180.000-168.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 168.000-160.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 160.000-140.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 140.000-120.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 120.000-100.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 100.000-80.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T7 80.000-60.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 60.000-40.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 40.000-20.000	No	No	1	1 1	1 1	1 1	1 1	1 1	0.5 0.5	1 1
T10 20.000-0.000	Yes	No	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.000-168.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T2 168.000-160.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T3 160.000-140.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T4 140.000-120.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 120.000-100.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 100.000-80.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T7 80.000-60.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T8 60.000-40.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T9 40.000-20.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T10 20.000-0.000	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.000-168.000	Flange	0.000 A325N	0	0.625 A325N	1	0.625 A325N	1	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T2 168.000-160.000	Flange	0.625 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T3 160.000-140.000	Flange	0.625 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T4 140.000-120.000	Flange	0.750 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T5 120.000-100.000	Flange	0.750 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T6 100.000-80.000	Flange	0.875 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T7 80.000-60.000	Flange	0.875 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T8 60.000-40.000	Flange	1.000 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0
T9 40.000-20.000	Flange	1.000 A325N	4	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.500 A325N	1
T10 20.000-0.000	Flange	1.500 A36	6	0.625 A325N	1	0.000 A325N	0	0.000 A325N	0	0.625 A325N	0	0.000 A325N	0	0.000 A325N	0

Grouted Pipe Properties

Size	F_y ksi	A_s in^2	A_c in^2	Wt plf	E_c ksi	E_m ksi	F_{ym} ksi
P2x.154 (GR)	35.000	1.075	3.356	10.647	4768.962	40914.218	53.581
P3x.216 (GR)	35.000	2.228	7.393	22.984	4768.962	41656.327	54.738
P3.5x.318 (GR)	35.000	3.678	8.888	31.033	4768.962	38218.387	49.377
P4x.337 (GR)	35.000	4.407	11.497	38.949	4768.962	38951.934	50.521

Size	F_y ksi	A_s in^2	A_c in^2	Wt plf	E_c ksi	E_m ksi	F_{ym} ksi
P5x.375 (GR)	35.000	6.112	18.194	58.701	4768.962	40356.758	52.712
P6x.432 (GR)	35.000	8.405	26.067	82.906	4768.962	40832.181	53.453
P8x.5 (GR)	35.000	12.763	45.664	138.561	4768.962	42650.237	56.288

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
***												
CR 50 1873PE(1-5/8)	C	No	Ar (CaAa)	170.000 - 0.000	0.000	-0.35	6	4	1.980	1.980		0.001
LDF1-50A(1/4")	C	No	Ar (CaAa)	170.000 - 0.000	0.000	-0.325	1	1	0.345	0.345		0.000
LDF4-50A(1/2")	C	No	Ar (CaAa)	31.000 - 0.000	0.000	-0.32	1	1	0.630	0.630		0.000
Feedline Ladder (Af)	C	No	Af (CaAa)	170.000 - 0.000	0.000	-0.36	1	1	3.000	3.000		0.008
***												
Safety Line 3/8	C	No	Ar (CaAa)	180.000 - 0.000	0.000	0	1	1	0.375	0.375		0.000
Climbing Ladder (Flat)	C	No	Af (CaAa)	180.000 - 0.000	0.000	0	1	1	3.840	3.840		0.005
***												
LDF6-50A(1-1/4)	B	No	Ar (CaAa)	93.000 - 0.000	0.000	0.1	13	13	1.550	1.550		0.001
Feedline Ladder (Af)	B	No	Af (CaAa)	93.000 - 0.000	0.000	0.1	1	1	3.000	3.000		0.008
***												
LDF4-50A(1/2")	B	No	Ar (CaAa)	104.000 - 0.000	1.000	0.3	1	1	0.630	0.630		0.000
LDF5-50A(7/8)	B	No	Ar (CaAa)	104.000 - 0.000	0.000	0.3	1	1	1.030	1.030		0.000
LCF158-50JA-A0(1 5/8")	B	No	Ar (CaAa)	154.000 - 0.000	0.000	0.25	12	6	1.980	1.980		0.000
FB-L98B-002-75000(3/8)	B	No	Ar (CaAa)	154.000 - 0.000	0.000	0.35	1	1	0.394	0.000		0.000
WR-VG82ST-BRDA(5/8")	B	No	Ar (CaAa)	154.000 - 0.000	0.000	0.35	2	2	0.500	0.000		0.000
2" Rigid Conduit	B	No	Ar (CaAa)	154.000 - 0.000	0.000	0.35	1	1	2.000	2.000		0.003
***												
HB114-1-0813U4-M5J(1 1/4")	A	No	Ar (CaAa)	143.000 - 0.000	0.000	0.1	3	3	1.540	1.540		0.001
FSJ4-50B(1/2)	A	No	Ar (CaAa)	42.000 - 0.000	0.000	-0.12	4	2	0.530	0.530		0.000
FSJ4-50B(1/2)	A	No	Ar (CaAa)	62.000 - 42.000	0.000	-0.12	3	3	0.530	0.530		0.000
FSJ4-50B(1/2)	A	No	Ar (CaAa)	124.000 - 62.000	0.000	-0.12	2	2	0.530	0.530		0.000
***												
561(1-5/8")	A	No	Ar (CaAa)	164.000 - 0.000	0.000	0	15	8	1.625	1.625		0.001
Feedline Ladder (Af)	A	No	Af (CaAa)	164.000 - 0.000	0.000	0.05	1	1	3.000	3.000		0.008
LDF5-50A(7/8)	A	No	Ar (CaAa)	178.000 - 164.000	4.000	0	2	2	1.030	1.030		0.000
***												

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight klf
***							

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.000-168.000	A	0.000	0.000	2.060	0.000	0.007
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	11.575	0.000	0.087
T2	168.000-160.000	A	0.000	0.000	12.574	0.000	0.117
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	19.200	0.000	0.148
T3	160.000-140.000	A	0.000	0.000	60.136	0.000	0.584
		B	0.000	0.000	36.064	0.000	0.062
		C	0.000	0.000	48.000	0.000	0.369
T4	140.000-120.000	A	0.000	0.000	68.414	0.000	0.646
		B	0.000	0.000	51.520	0.000	0.089
		C	0.000	0.000	48.000	0.000	0.369
T5	120.000-100.000	A	0.000	0.000	70.110	0.000	0.651
		B	0.000	0.000	52.184	0.000	0.091
		C	0.000	0.000	48.000	0.000	0.369
T6	100.000-80.000	A	0.000	0.000	70.110	0.000	0.651
		B	0.000	0.000	87.535	0.000	0.309
		C	0.000	0.000	48.000	0.000	0.369
T7	80.000-60.000	A	0.000	0.000	70.216	0.000	0.651
		B	0.000	0.000	105.140	0.000	0.422
		C	0.000	0.000	48.000	0.000	0.369
T8	60.000-40.000	A	0.000	0.000	71.276	0.000	0.654
		B	0.000	0.000	105.140	0.000	0.422
		C	0.000	0.000	48.000	0.000	0.369
T9	40.000-20.000	A	0.000	0.000	72.230	0.000	0.656
		B	0.000	0.000	105.140	0.000	0.422
		C	0.000	0.000	48.693	0.000	0.371
T10	20.000-0.000	A	0.000	0.000	72.230	0.000	0.656
		B	0.000	0.000	105.140	0.000	0.422
		C	0.000	0.000	49.260	0.000	0.372

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.000-168.000	A	1.771	0.000	0.000	10.070	0.000	0.101
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	24.073	0.000	0.444
T2	168.000-160.000	A	1.761	0.000	0.000	21.989	0.000	0.494
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	40.756	0.000	0.775
T3	160.000-140.000	A	1.745	0.000	0.000	94.317	0.000	2.324
		B		0.000	0.000	69.053	0.000	1.349
		C		0.000	0.000	101.533	0.000	1.922
T4	140.000-120.000	A	1.720	0.000	0.000	123.176	0.000	2.687
		B		0.000	0.000	98.115	0.000	1.907
		C		0.000	0.000	100.968	0.000	1.898
T5	120.000-100.000	A	1.692	0.000	0.000	135.315	0.000	2.762
		B		0.000	0.000	100.873	0.000	1.927
		C		0.000	0.000	100.319	0.000	1.871
T6	100.000-80.000	A	1.658	0.000	0.000	134.513	0.000	2.728

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B		0.000	0.000	192.993	0.000	3.317
		C		0.000	0.000	99.553	0.000	1.838
T7	80.000-60.000	A	1.617	0.000	0.000	133.750	0.000	2.688
		B		0.000	0.000	234.263	0.000	3.912
		C		0.000	0.000	98.616	0.000	1.799
T8	60.000-40.000	A	1.564	0.000	0.000	134.390	0.000	2.663
		B		0.000	0.000	232.176	0.000	3.813
		C		0.000	0.000	97.398	0.000	1.749
T9	40.000-20.000	A	1.486	0.000	0.000	132.161	0.000	2.592
		B		0.000	0.000	229.141	0.000	3.670
		C		0.000	0.000	99.587	0.000	1.721
T10	20.000-0.000	A	1.331	0.000	0.000	128.485	0.000	2.438
		B		0.000	0.000	223.124	0.000	3.393
		C		0.000	0.000	98.693	0.000	1.607

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.000-168.000	0.235	1.520	0.279	1.815
T2	168.000-160.000	0.361	1.262	0.672	1.695
T3	160.000-140.000	1.003	0.657	1.025	1.116
T4	140.000-120.000	1.632	0.691	1.497	1.186
T5	120.000-100.000	1.968	0.859	1.869	1.445
T6	100.000-80.000	3.503	0.644	3.829	1.153
T7	80.000-60.000	4.513	0.560	5.035	1.062
T8	60.000-40.000	5.019	0.631	5.642	1.179
T9	40.000-20.000	5.350	0.710	6.216	1.351
T10	20.000-0.000	6.029	0.832	7.145	1.542

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	CR 50 1873PE(1-5/8)	168.00 - 170.00	0.6000	0.4712
T1	3	LDF1-50A(1/4")	168.00 - 170.00	0.6000	0.4712
T1	5	Feedline Ladder (Af)	168.00 - 170.00	0.6000	0.4712
T1	7	Safety Line 3/8	168.00 - 180.00	0.6000	0.4712
T1	8	Climbing Ladder (Flat)	168.00 - 180.00	0.6000	0.4712
T1	28	LDF5-50A(7/8)	168.00 - 178.00	0.6000	0.4712
T2	2	CR 50 1873PE(1-5/8)	160.00 - 168.00	0.6000	0.5028
T2	3	LDF1-50A(1/4")	160.00 - 168.00	0.6000	0.5028
T2	5	Feedline Ladder (Af)	160.00 - 168.00	0.6000	0.5028
T2	7	Safety Line 3/8	160.00 - 168.00	0.6000	0.5028
T2	8	Climbing Ladder (Flat)	160.00 - 168.00	0.6000	0.5028
T2	25	561(1-5/8")	160.00 -	0.6000	0.5028

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	27	Feedline Ladder (Af)	164.00 160.00 - 164.00	0.6000	0.5028
T2	28	LDF5-50A(7/8)	164.00 - 168.00	0.6000	0.5028
T3	2	CR 50 1873PE(1-5/8)	140.00 - 160.00	0.6000	0.5694
T3	3	LDF1-50A(1/4")	140.00 - 160.00	0.6000	0.5694
T3	5	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.5694
T3	7	Safety Line 3/8	140.00 - 160.00	0.6000	0.5694
T3	8	Climbing Ladder (Flat)	140.00 - 160.00	0.6000	0.5694
T3	15	LCF158-50JA-A0(1 5/8")	140.00 - 154.00	0.6000	0.5694
T3	16	FB-L98B-002-75000(3/8)	140.00 - 154.00	0.6000	0.5694
T3	17	WR-VG82ST-BRDA(5/8")	140.00 - 154.00	0.6000	0.5694
T3	18	2" Rigid Conduit	140.00 - 154.00	0.6000	0.5694
T3	20	HB114-1-0813U4-M5J(1 1/4")	140.00 - 143.00	0.6000	0.5694
T3	25	561(1-5/8")	140.00 - 160.00	0.6000	0.5694
T3	27	Feedline Ladder (Af)	140.00 - 160.00	0.6000	0.5694
T4	2	CR 50 1873PE(1-5/8)	120.00 - 140.00	0.6000	0.6000
T4	3	LDF1-50A(1/4")	120.00 - 140.00	0.6000	0.6000
T4	5	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T4	7	Safety Line 3/8	120.00 - 140.00	0.6000	0.6000
T4	8	Climbing Ladder (Flat)	120.00 - 140.00	0.6000	0.6000
T4	15	LCF158-50JA-A0(1 5/8")	120.00 - 140.00	0.6000	0.6000
T4	16	FB-L98B-002-75000(3/8)	120.00 - 140.00	0.6000	0.6000
T4	17	WR-VG82ST-BRDA(5/8")	120.00 - 140.00	0.6000	0.6000
T4	18	2" Rigid Conduit	120.00 - 140.00	0.6000	0.6000
T4	20	HB114-1-0813U4-M5J(1 1/4")	120.00 - 140.00	0.6000	0.6000
T4	23	FSJ4-50B(1/2)	120.00 - 124.00	0.6000	0.6000
T4	25	561(1-5/8")	120.00 - 140.00	0.6000	0.6000
T4	27	Feedline Ladder (Af)	120.00 - 140.00	0.6000	0.6000
T5	2	CR 50 1873PE(1-5/8)	100.00 - 120.00	0.6000	0.6000
T5	3	LDF1-50A(1/4")	100.00 - 120.00	0.6000	0.6000
T5	5	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T5	7	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T5	8	Climbing Ladder (Flat)	100.00 - 120.00	0.6000	0.6000
T5	13	LDF4-50A(1/2")	100.00 - 104.00	0.6000	0.6000
T5	14	LDF5-50A(7/8)	100.00 - 104.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T5	15	LCF158-50JA-A0(1 5/8")	100.00 - 120.00	0.6000	0.6000
T5	16	FB-L98B-002-75000(3/8)	100.00 - 120.00	0.6000	0.6000
T5	17	WR-VG82ST-BRDA(5/8")	100.00 - 120.00	0.6000	0.6000
T5	18	2" Rigid Conduit	100.00 - 120.00	0.6000	0.6000
T5	20	HB114-1-0813U4-M5J(1 1/4")	100.00 - 120.00	0.6000	0.6000
T5	23	FSJ4-50B(1/2)	100.00 - 120.00	0.6000	0.6000
T5	25	561(1-5/8")	100.00 - 120.00	0.6000	0.6000
T5	27	Feedline Ladder (Af)	100.00 - 120.00	0.6000	0.6000
T6	2	CR 50 1873PE(1-5/8)	80.00 - 100.00	0.6000	0.6000
T6	3	LDF1-50A(1/4")	80.00 - 100.00	0.6000	0.6000
T6	5	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T6	7	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T6	8	Climbing Ladder (Flat)	80.00 - 100.00	0.6000	0.6000
T6	10	LDF6-50A(1-1/4)	80.00 - 93.00	0.6000	0.6000
T6	11	Feedline Ladder (Af)	80.00 - 93.00	0.6000	0.6000
T6	13	LDF4-50A(1/2")	80.00 - 100.00	0.6000	0.6000
T6	14	LDF5-50A(7/8)	80.00 - 100.00	0.6000	0.6000
T6	15	LCF158-50JA-A0(1 5/8")	80.00 - 100.00	0.6000	0.6000
T6	16	FB-L98B-002-75000(3/8)	80.00 - 100.00	0.6000	0.6000
T6	17	WR-VG82ST-BRDA(5/8")	80.00 - 100.00	0.6000	0.6000
T6	18	2" Rigid Conduit	80.00 - 100.00	0.6000	0.6000
T6	20	HB114-1-0813U4-M5J(1 1/4")	80.00 - 100.00	0.6000	0.6000
T6	23	FSJ4-50B(1/2)	80.00 - 100.00	0.6000	0.6000
T6	25	561(1-5/8")	80.00 - 100.00	0.6000	0.6000
T6	27	Feedline Ladder (Af)	80.00 - 100.00	0.6000	0.6000
T7	2	CR 50 1873PE(1-5/8)	60.00 - 80.00	0.6000	0.6000
T7	3	LDF1-50A(1/4")	60.00 - 80.00	0.6000	0.6000
T7	5	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	7	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T7	8	Climbing Ladder (Flat)	60.00 - 80.00	0.6000	0.6000
T7	10	LDF6-50A(1-1/4)	60.00 - 80.00	0.6000	0.6000
T7	11	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T7	13	LDF4-50A(1/2")	60.00 - 80.00	0.6000	0.6000
T7	14	LDF5-50A(7/8)	60.00 - 80.00	0.6000	0.6000
T7	15	LCF158-50JA-A0(1 5/8")	60.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	16	FB-L98B-002-75000(3/8)	80.00 60.00 - 80.00	0.6000	0.6000
T7	17	WR-VG82ST-BRDA(5/8")	60.00 - 80.00	0.6000	0.6000
T7	18	2" Rigid Conduit	60.00 - 80.00	0.6000	0.6000
T7	20	HB114-1-0813U4-M5J(1 1/4")	60.00 - 80.00	0.6000	0.6000
T7	22	FSJ4-50B(1/2)	60.00 - 62.00	0.6000	0.6000
T7	23	FSJ4-50B(1/2)	62.00 - 80.00	0.6000	0.6000
T7	25	561(1-5/8")	60.00 - 80.00	0.6000	0.6000
T7	27	Feedline Ladder (Af)	60.00 - 80.00	0.6000	0.6000
T8	2	CR 50 1873PE(1-5/8)	40.00 - 60.00	0.6000	0.6000
T8	3	LDF1-50A(1/4")	40.00 - 60.00	0.6000	0.6000
T8	5	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	7	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T8	8	Climbing Ladder (Flat)	40.00 - 60.00	0.6000	0.6000
T8	10	LDF6-50A(1-1/4)	40.00 - 60.00	0.6000	0.6000
T8	11	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T8	13	LDF4-50A(1/2")	40.00 - 60.00	0.6000	0.6000
T8	14	LDF5-50A(7/8)	40.00 - 60.00	0.6000	0.6000
T8	15	LCF158-50JA-A0(1 5/8")	40.00 - 60.00	0.6000	0.6000
T8	16	FB-L98B-002-75000(3/8)	40.00 - 60.00	0.6000	0.6000
T8	17	WR-VG82ST-BRDA(5/8")	40.00 - 60.00	0.6000	0.6000
T8	18	2" Rigid Conduit	40.00 - 60.00	0.6000	0.6000
T8	20	HB114-1-0813U4-M5J(1 1/4")	40.00 - 60.00	0.6000	0.6000
T8	21	FSJ4-50B(1/2)	40.00 - 42.00	0.6000	0.6000
T8	22	FSJ4-50B(1/2)	42.00 - 60.00	0.6000	0.6000
T8	25	561(1-5/8")	40.00 - 60.00	0.6000	0.6000
T8	27	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T9	2	CR 50 1873PE(1-5/8)	20.00 - 40.00	0.6000	0.6000
T9	3	LDF1-50A(1/4")	20.00 - 40.00	0.6000	0.6000
T9	4	LDF4-50A(1/2")	20.00 - 31.00	0.6000	0.6000
T9	5	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T9	7	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T9	8	Climbing Ladder (Flat)	20.00 - 40.00	0.6000	0.6000
T9	10	LDF6-50A(1-1/4)	20.00 - 40.00	0.6000	0.6000
T9	11	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T9	13	LDF4-50A(1/2")	20.00 - 40.00	0.6000	0.6000
T9	14	LDF5-50A(7/8)	20.00 - 40.00	0.6000	0.6000
T9	15	LCF158-50JA-A0(1 5/8")	20.00 - 40.00	0.6000	0.6000
T9	16	FB-L98B-002-75000(3/8)	20.00 - 40.00	0.6000	0.6000
T9	17	WR-VG82ST-BRDA(5/8")	20.00 - 40.00	0.6000	0.6000
T9	18	2" Rigid Conduit	20.00 - 40.00	0.6000	0.6000
T9	20	HB114-1-0813U4-M5J(1 1/4")	20.00 - 40.00	0.6000	0.6000
T9	21	FSJ4-50B(1/2)	20.00 - 40.00	0.6000	0.6000
T9	25	561(1-5/8")	20.00 - 40.00	0.6000	0.6000
T9	27	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T10	2	CR 50 1873PE(1-5/8)	0.00 - 20.00	0.6000	0.6000
T10	3	LDF1-50A(1/4")	0.00 - 20.00	0.6000	0.6000
T10	4	LDF4-50A(1/2")	0.00 - 20.00	0.6000	0.6000
T10	5	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	7	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000
T10	8	Climbing Ladder (Flat)	0.00 - 20.00	0.6000	0.6000
T10	10	LDF6-50A(1-1/4)	0.00 - 20.00	0.6000	0.6000
T10	11	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000
T10	13	LDF4-50A(1/2")	0.00 - 20.00	0.6000	0.6000
T10	14	LDF5-50A(7/8)	0.00 - 20.00	0.6000	0.6000
T10	15	LCF158-50JA-A0(1 5/8")	0.00 - 20.00	0.6000	0.6000
T10	16	FB-L98B-002-75000(3/8)	0.00 - 20.00	0.6000	0.6000
T10	17	WR-VG82ST-BRDA(5/8")	0.00 - 20.00	0.6000	0.6000
T10	18	2" Rigid Conduit	0.00 - 20.00	0.6000	0.6000
T10	20	HB114-1-0813U4-M5J(1 1/4")	0.00 - 20.00	0.6000	0.6000
T10	21	FSJ4-50B(1/2)	0.00 - 20.00	0.6000	0.6000
T10	25	561(1-5/8")	0.00 - 20.00	0.6000	0.6000
T10	27	Feedline Ladder (Af)	0.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
***									
PD10017	A	From Leg	0.500 0.000 6.000	0.000	178.000	No Ice 1/2" Ice 1" Ice	4.114 5.641 7.185	4.114 5.641 7.185	0.025 0.055 0.095
170' Metro PCS									
800 10504 w/ Mount Pipe	A	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	3.589 4.007 4.422	3.178 3.905 4.581	0.038 0.070 0.109
800 10504 w/ Mount Pipe	B	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice	3.589 4.007 4.422	3.178 3.905 4.581	0.038 0.070 0.109

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice			
800 10504 w/ Mount Pipe	C	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	3.589 4.007 4.422	3.178 3.905 4.581	0.038 0.070 0.109
860 10025	A	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	0.137 0.190 0.252	0.116 0.167 0.225	0.001 0.003 0.005
860 10025	B	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	0.137 0.190 0.252	0.116 0.167 0.225	0.001 0.003 0.005
860 10025	C	From Leg	2.000 0.000 1.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	0.137 0.190 0.252	0.116 0.167 0.225	0.001 0.003 0.005
6' x 2" Mount Pipe	A	From Leg	2.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
6' x 2" Mount Pipe	B	From Leg	2.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
6' x 2" Mount Pipe	C	From Leg	2.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
Side Arm Mount [SO 103-3]	C	None		0.000	170.000	No Ice 1/2" Ice 1" Ice	9.500 11.800 14.100	9.500 11.800 14.100	0.224 0.317 0.410
163' Verizon									
(2) APL868013-42T0 w/ Mount Pipe	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	3.104 3.476 3.848	4.802 5.416 6.040	0.025 0.063 0.108
(2) APL868013-42T0 w/ Mount Pipe	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	3.104 3.476 3.848	4.802 5.416 6.040	0.025 0.063 0.108
(2) APL868013-42T0 w/ Mount Pipe	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	3.104 3.476 3.848	4.802 5.416 6.040	0.025 0.063 0.108
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	3.570 3.979 4.387	3.418 4.119 4.784	0.035 0.068 0.108
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	3.570 3.979 4.387	3.418 4.119 4.784	0.035 0.068 0.108
MG D3-800Tx w/ Mount Pipe	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	3.570 3.979 4.387	3.418 4.119 4.784	0.035 0.068 0.108
(2) FD9R6004/2C-3L	A	From Leg	4.000 0.000 -2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	0.314 0.386 0.466	0.076 0.119 0.169	0.003 0.005 0.009
(2) FD9R6004/2C-3L	B	From Leg	4.000 0.000 -2.000	0.000	164.000	No Ice 1/2" Ice	0.314 0.386 0.466	0.076 0.119 0.169	0.003 0.005 0.009

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice			
(2) FD9R6004/2C-3L	C	From Leg	4.000 0.000 -2.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	0.314 0.386 0.466	0.076 0.119 0.169	0.003 0.005 0.009
LNX-6512DS-VTM w/ Mount Pipe	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	5.328 5.718 6.115	4.527 5.146 5.771	0.047 0.095 0.150
LNX-6512DS-VTM w/ Mount Pipe	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	5.328 5.718 6.115	4.527 5.146 5.771	0.047 0.095 0.150
LNX-6512DS-VTM w/ Mount Pipe	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	5.328 5.718 6.115	4.527 5.146 5.771	0.047 0.095 0.150
742 213 w/ Mount Pipe	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	5.373 5.950 6.501	4.620 6.000 6.982	0.049 0.094 0.146
742 213 w/ Mount Pipe	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	5.373 5.950 6.501	4.620 6.000 6.982	0.049 0.094 0.146
742 213 w/ Mount Pipe	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	5.373 5.950 6.501	4.620 6.000 6.982	0.049 0.094 0.146
RRH4X45-AWS4 B66	A	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	2.660 2.878 3.104	1.586 1.769 1.959	0.064 0.084 0.108
RRH4X45-AWS4 B66	B	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	2.660 2.878 3.104	1.586 1.769 1.959	0.064 0.084 0.108
RRH4X45-AWS4 B66	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	2.660 2.878 3.104	1.586 1.769 1.959	0.064 0.084 0.108
DB-T1-6Z-8AB-0Z	C	From Leg	4.000 0.000 -1.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	4.800 5.070 5.348	2.000 2.193 2.393	0.044 0.080 0.120
(2) 6' x 2" Mount Pipe	A	From Leg	3.000 0.000 0.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
(2) 6' x 2" Mount Pipe	B	From Leg	3.000 0.000 0.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
(2) 6' x 2" Mount Pipe	C	From Leg	3.000 0.000 0.000	0.000	164.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
Sector Mount [SM 702-3]	C	None		0.000	164.000	No Ice 1/2" Ice 1" Ice	37.400 54.200 71.000	37.400 54.200 71.000	1.551 2.352 3.153
154' AT&T									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice	5.746 6.179 6.607	4.254 5.014 5.711	0.055 0.103 0.157

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						1" Ice			
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	5.746 6.179 6.607	4.254 5.014 5.711	0.055 0.103 0.157
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	5.746 6.179 6.607	4.254 5.014 5.711	0.055 0.103 0.157
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	8.371 8.931 9.457	6.362 7.538 8.427	0.079 0.144 0.218
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	8.371 8.931 9.457	6.362 7.538 8.427	0.079 0.144 0.218
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	8.371 8.931 9.457	6.362 7.538 8.427	0.079 0.144 0.218
(2) LGP21401	A	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	1.104 1.239 1.381	0.207 0.274 0.348	0.014 0.021 0.030
(2) LGP21401	B	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	1.104 1.239 1.381	0.207 0.274 0.348	0.014 0.021 0.030
(2) LGP21401	C	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	1.104 1.239 1.381	0.207 0.274 0.348	0.014 0.021 0.030
(2) LGP21901	A	From Leg	1.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	0.231 0.294 0.365	0.158 0.213 0.276	0.006 0.008 0.011
(2) LGP21901	B	From Leg	1.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	0.231 0.294 0.365	0.158 0.213 0.276	0.006 0.008 0.011
(2) LGP21901	C	From Leg	1.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	0.231 0.294 0.365	0.158 0.213 0.276	0.006 0.008 0.011
(2) RRUS-11	A	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	2.784 2.992 3.207	1.187 1.334 1.490	0.048 0.068 0.092
(2) RRUS-11	B	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	2.784 2.992 3.207	1.187 1.334 1.490	0.048 0.068 0.092
(2) RRUS-11	C	From Leg	4.000 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	2.784 2.992 3.207	1.187 1.334 1.490	0.048 0.068 0.092
DC6-48-60-18-8F	B	From Leg	4.000 0.000 0.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	1.266 1.456 1.658	1.266 1.456 1.658	0.019 0.034 0.051
(2) 5' x 2" Pipe Mount	A	From Leg	4.000 0.000 0.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	1.000 1.393 1.703	1.000 1.393 1.703	0.029 0.037 0.048

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) 5' x 2" Pipe Mount	B	From Leg	4.000 0.000 0.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	1.000 1.393 1.703	1.000 1.393 1.703	0.029 0.037 0.048
(2) 5' x 2" Pipe Mount	C	From Leg	4.000 0.000 0.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	1.000 1.393 1.703	1.000 1.393 1.703	0.029 0.037 0.048
3' x 2" Pipe Mount	A	From Leg	0.500 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	0.583 0.770 0.967	0.583 0.770 0.967	0.011 0.017 0.024
3' x 2" Pipe Mount	B	From Leg	0.500 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	0.583 0.770 0.967	0.583 0.770 0.967	0.011 0.017 0.024
3' x 2" Pipe Mount	C	From Leg	0.500 0.000 4.000	0.000	154.000	No Ice 1/2" Ice 1" Ice	0.583 0.770 0.967	0.583 0.770 0.967	0.011 0.017 0.024
Pipe Mount [PM 601-3]	C	None		0.000	154.000	No Ice 1/2" Ice 1" Ice	4.390 5.480 6.570	4.390 5.480 6.570	0.195 0.237 0.280
Sector Mount [SM 602-3]	C	None		0.000	154.000	No Ice 1/2" Ice 1" Ice	33.110 44.900 56.690	33.110 44.900 56.690	1.541 2.159 2.777
146' Sprint									
TME-800MHZ 2X50W RRH	A	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	2.490 2.706 2.931	2.068 2.271 2.481	0.053 0.074 0.098
TME-800MHZ 2X50W RRH	B	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	2.490 2.706 2.931	2.068 2.271 2.481	0.053 0.074 0.098
TME-800MHZ 2X50W RRH	C	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	2.490 2.706 2.931	2.068 2.271 2.481	0.053 0.074 0.098
PCS 1900 MHz 4x45W-65MHz	A	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	2.709 2.948 3.195	2.611 2.847 3.092	0.060 0.083 0.110
PCS 1900 MHz 4x45W-65MHz	B	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	2.709 2.948 3.195	2.611 2.847 3.092	0.060 0.083 0.110
PCS 1900 MHz 4x45W-65MHz	C	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	2.709 2.948 3.195	2.611 2.847 3.092	0.060 0.083 0.110
800 EXTERNAL NOTCH FILTER	A	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	0.660 0.763 0.873	0.321 0.398 0.483	0.011 0.017 0.024
800 EXTERNAL NOTCH FILTER	B	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	0.660 0.763 0.873	0.321 0.398 0.483	0.011 0.017 0.024
800 EXTERNAL NOTCH FILTER	C	From Leg	1.000 0.000 0.000	0.000	146.000	No Ice 1/2" Ice 1" Ice	0.660 0.763 0.873	0.321 0.398 0.483	0.011 0.017 0.024

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
143' Sprint									
APXVSPP18-C-A20	A	From Leg	2.000 0.000 0.000	0.000	143.000	No Ice 1/2" Ice 1" Ice	8.024 8.480 8.943	5.283 5.736 6.196	0.057 0.107 0.162
APXVSPP18-C-A20	B	From Leg	2.000 0.000 0.000	0.000	143.000	No Ice 1/2" Ice 1" Ice	8.024 8.480 8.943	5.283 5.736 6.196	0.057 0.107 0.162
APXVSPP18-C-A20	C	From Leg	2.000 0.000 0.000	0.000	143.000	No Ice 1/2" Ice 1" Ice	8.024 8.480 8.943	5.283 5.736 6.196	0.057 0.107 0.162
(3) ACU-A20-N	A	From Leg	1.000 0.000 0.000	0.000	143.000	No Ice 1/2" Ice 1" Ice	0.067 0.104 0.148	0.117 0.162 0.215	0.001 0.002 0.004
(3) ACU-A20-N	B	From Leg	1.000 0.000 0.000	0.000	143.000	No Ice 1/2" Ice 1" Ice	0.067 0.104 0.148	0.117 0.162 0.215	0.001 0.002 0.004
(3) ACU-A20-N	C	From Leg	1.000 0.000 0.000	0.000	143.000	No Ice 1/2" Ice 1" Ice	0.067 0.104 0.148	0.117 0.162 0.215	0.001 0.002 0.004
Pipe Mount [PM 601-3]	C	None		0.000	143.000	No Ice 1/2" Ice 1" Ice	4.390 5.480 6.570	4.390 5.480 6.570	0.195 0.237 0.280
Sector Mount [SM 701-3]	C	None		0.000	143.000	No Ice 1/2" Ice 1" Ice	19.730 27.410 35.090	19.730 27.410 35.090	0.825 1.166 1.507
124' Wilton									
1142-2C	B	From Leg	4.000 0.000 7.000	0.000	124.000	No Ice 1/2" Ice 1" Ice	2.092 3.374 4.673	2.092 3.374 4.673	0.024 0.041 0.066
1142-2C	C	From Leg	4.000 0.000 7.000	0.000	124.000	No Ice 1/2" Ice 1" Ice	2.092 3.374 4.673	2.092 3.374 4.673	0.024 0.041 0.066
Side Arm Mount [SO 302-1]	B	From Leg	2.000 0.000 0.000	0.000	124.000	No Ice 1/2" Ice 1" Ice	1.670 2.510 3.350	3.270 4.990 6.710	0.055 0.088 0.121
Side Arm Mount [SO 302-1]	C	From Leg	2.000 0.000 0.000	0.000	124.000	No Ice 1/2" Ice 1" Ice	1.670 2.510 3.350	3.270 4.990 6.710	0.055 0.088 0.121
104' Wilton									
220-3BN	B	From Leg	4.000 0.000 4.000	0.000	104.000	No Ice 1/2" Ice 1" Ice	5.720 7.831 9.959	5.720 7.831 9.959	0.024 0.066 0.120
1142-2C	C	From Leg	4.000 0.000 7.000	0.000	104.000	No Ice 1/2" Ice 1" Ice	2.092 3.374 4.673	2.092 3.374 4.673	0.024 0.041 0.066
Side Arm Mount [SO 302-1]	B	From Leg	2.000 0.000 0.000	0.000	104.000	No Ice 1/2" Ice 1" Ice	1.670 2.510 3.350	3.270 4.990 6.710	0.055 0.088 0.121
Side Arm Mount [SO 302-1]	C	From Leg	2.000 0.000	0.000	104.000	No Ice 1/2"	1.670 2.510	3.270 4.990	0.055 0.088

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			Ice	3.350	6.710	0.121
						1" Ice			
93' T-Mobile									
ERICSSON AIR 21 B2A B4P	A	From Leg	3.000	0.000	93.000	No Ice	6.092	4.297	0.092
			0.000			1/2"	6.462	4.649	0.133
			0.000			Ice	6.838	5.005	0.180
						1" Ice			
ERICSSON AIR 21 B2A B4P	B	From Leg	3.000	0.000	93.000	No Ice	6.092	4.297	0.092
			0.000			1/2"	6.462	4.649	0.133
			0.000			Ice	6.838	5.005	0.180
						1" Ice			
ERICSSON AIR 21 B2A B4P	C	From Leg	3.000	0.000	93.000	No Ice	6.092	4.297	0.092
			0.000			1/2"	6.462	4.649	0.133
			0.000			Ice	6.838	5.005	0.180
						1" Ice			
ERICSSON AIR 21 B4A B2P	A	From Leg	3.000	0.000	93.000	No Ice	6.079	4.288	0.092
			0.000			1/2"	6.448	4.639	0.133
			0.000			Ice	6.825	4.994	0.180
						1" Ice			
ERICSSON AIR 21 B4A B2P	B	From Leg	3.000	0.000	93.000	No Ice	6.079	4.288	0.092
			0.000			1/2"	6.448	4.639	0.133
			0.000			Ice	6.825	4.994	0.180
						1" Ice			
ERICSSON AIR 21 B4A B2P	C	From Leg	3.000	0.000	93.000	No Ice	6.079	4.288	0.092
			0.000			1/2"	6.448	4.639	0.133
			0.000			Ice	6.825	4.994	0.180
						1" Ice			
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	3.000	0.000	93.000	No Ice	11.683	9.842	0.083
			0.000			1/2"	12.404	11.366	0.173
			0.000			Ice	13.135	12.914	0.273
						1" Ice			
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	3.000	0.000	93.000	No Ice	11.683	9.842	0.083
			0.000			1/2"	12.404	11.366	0.173
			0.000			Ice	13.135	12.914	0.273
						1" Ice			
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	3.000	0.000	93.000	No Ice	11.683	9.842	0.083
			0.000			1/2"	12.404	11.366	0.173
			0.000			Ice	13.135	12.914	0.273
						1" Ice			
KRY 112 144/1	A	From Leg	3.000	0.000	93.000	No Ice	0.350	0.175	0.011
			0.000			1/2"	0.426	0.234	0.014
			0.000			Ice	0.509	0.301	0.019
						1" Ice			
KRY 112 144/1	B	From Leg	3.000	0.000	93.000	No Ice	0.350	0.175	0.011
			0.000			1/2"	0.426	0.234	0.014
			0.000			Ice	0.509	0.301	0.019
						1" Ice			
KRY 112 144/1	C	From Leg	3.000	0.000	93.000	No Ice	0.350	0.175	0.011
			0.000			1/2"	0.426	0.234	0.014
			0.000			Ice	0.509	0.301	0.019
						1" Ice			
RRUS 11 B12	A	From Leg	3.000	0.000	93.000	No Ice	2.833	1.182	0.051
			0.000			1/2"	3.043	1.330	0.072
			0.000			Ice	3.259	1.485	0.095
						1" Ice			
RRUS 11 B12	B	From Leg	3.000	0.000	93.000	No Ice	2.833	1.182	0.051
			0.000			1/2"	3.043	1.330	0.072
			0.000			Ice	3.259	1.485	0.095
						1" Ice			
RRUS 11 B12	C	From Leg	3.000	0.000	93.000	No Ice	2.833	1.182	0.051
			0.000			1/2"	3.043	1.330	0.072
			0.000			Ice	3.259	1.485	0.095
						1" Ice			
Sector Mount [SM 402-3]	C	None		0.000	93.000	No Ice	18.910	18.910	0.851
						1/2"	26.780	26.780	1.233

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						Ice 1" Ice	34.650	34.650	1.616
62' Verizon GPS_A	C	From Leg	2.000 0.000 3.000	0.000	62.000	No Ice 1/2" Ice 1" Ice	0.255 0.320 0.393	0.255 0.320 0.393	0.001 0.005 0.010
Side Arm Mount [SO 301-1]	C	From Leg	1.000 0.000 0.000	0.000	62.000	No Ice 1/2" Ice 1" Ice	1.000 1.390 1.780	0.900 1.420 1.940	0.023 0.033 0.042
42' Verizon GPS_A	C	From Leg	2.000 0.000 2.000	0.000	42.000	No Ice 1/2" Ice 1" Ice	0.255 0.320 0.393	0.255 0.320 0.393	0.001 0.005 0.010
Side Arm Mount [SO 301-1]	C	From Leg	1.000 0.000 0.000	0.000	42.000	No Ice 1/2" Ice 1" Ice	1.000 1.390 1.780	0.900 1.420 1.940	0.023 0.033 0.042
31' Verizon GPS_A	C	From Leg	2.000 0.000 1.000	0.000	31.000	No Ice 1/2" Ice 1" Ice	0.255 0.320 0.393	0.255 0.320 0.393	0.001 0.005 0.010
Side Arm Mount [SO 701-1]	C	From Leg	1.000 0.000 0.000	0.000	31.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
C *** Knife Plates *** (2) 3'x8" Knife Plate	A	From Leg	0.000 0.000 0.000	0.000	20.000	No Ice 1/2" Ice 1" Ice	2.333 2.625 2.917	0.250 0.500 0.750	0.048 0.054 0.060
(2) 3'x8" Knife Plate	B	From Leg	0.000 0.000 0.000	0.000	20.000	No Ice 1/2" Ice 1" Ice	2.333 2.625 2.917	0.250 0.500 0.750	0.048 0.054 0.060
(2) 3'x8" Knife Plate	C	From Leg	0.000 0.000 0.000	0.000	20.000	No Ice 1/2" Ice 1" Ice	2.333 2.625 2.917	0.250 0.500 0.750	0.048 0.054 0.060
(2) 3'x8" Knife Plate	A	From Leg	0.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice	2.333 2.625 2.917	0.250 0.500 0.750	0.048 0.054 0.060
(2) 3'x8" Knife Plate	B	From Leg	0.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice	2.333 2.625 2.917	0.250 0.500 0.750	0.048 0.054 0.060
(2) 3'x8" Knife Plate	C	From Leg	0.000 0.000 0.000	0.000	60.000	No Ice 1/2" Ice 1" Ice	2.333 2.625 2.917	0.250 0.500 0.750	0.048 0.054 0.060

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 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
T1	180 - 168	Leg	Max Tension	7	1.583	-0.075	0.037
			Max. Compression	10	-2.168	-0.065	-0.036
			Max. Mx	8	1.233	0.146	-0.036
			Max. My	14	1.545	-0.000	0.150
			Max. Vy	8	0.146	-0.144	0.005
			Max. Vx	3	-0.140	-0.036	0.125
		Diagonal	Max Tension	11	0.551	0.000	0.000
			Max. Compression	22	-0.579	0.000	0.000
			Max. Mx	30	-0.010	0.014	0.000
			Max. My	4	-0.563	-0.000	0.002
			Max. Vy	30	-0.017	0.014	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	4	-0.001	0.006	0.002
		Top Girt	Max Tension	18	0.135	0.000	0.000
			Max. Compression	7	-0.118	0.000	0.000
			Max. Mx	26	0.031	-0.024	0.000
			Max. Vy	26	0.024	0.000	0.000
T2	168 - 160	Leg	Max Tension	15	6.742	-0.001	-0.024
			Max. Compression	18	-8.524	-0.012	0.013
			Max. Mx	8	-0.439	-0.144	0.005
			Max. My	16	-0.473	0.068	-0.128
			Max. Vy	8	-1.039	0.002	0.050
			Max. Vx	14	-1.033	-0.001	-0.025
		Diagonal	Max Tension	5	2.469	0.000	0.000
			Max. Compression	16	-2.549	0.000	0.000
			Max. Mx	37	0.647	0.021	0.001
			Max. My	4	-2.523	-0.004	0.004
			Max. Vy	37	-0.019	0.021	0.001
			Max. Vx	4	-0.002	0.012	0.004
T3	160 - 140	Leg	Max Tension	7	35.868	-0.302	-0.001
			Max. Compression	18	-44.099	0.266	0.006
			Max. Mx	6	10.979	-0.425	-0.008
			Max. My	4	-3.219	-0.021	0.576
			Max. Vy	22	-0.817	-0.425	-0.000
			Max. Vx	16	0.769	-0.022	0.189
		Diagonal	Max Tension	9	3.879	0.000	0.000
			Max. Compression	8	-3.928	0.000	0.000
			Max. Mx	31	1.003	0.025	0.002
			Max. My	24	2.279	0.010	0.003
			Max. Vy	31	-0.023	0.024	0.002
			Max. Vx	30	0.001	0.000	0.000
T4	140 - 120	Leg	Max Tension	7	65.436	-0.253	-0.035
			Max. Compression	18	-76.919	0.299	0.041
			Max. Mx	14	64.011	-0.311	0.006
			Max. My	16	-4.307	-0.022	0.374
			Max. Vy	14	0.082	-0.311	0.006
			Max. Vx	19	0.119	-0.132	0.280
		Diagonal	Max Tension	8	4.619	0.000	0.000
			Max. Compression	8	-4.644	0.000	0.000
			Max. Mx	31	1.102	0.038	-0.005
			Max. My	29	1.150	0.035	-0.005
			Max. Vy	33	0.032	0.035	-0.005
			Max. Vx	29	0.002	0.000	0.000
T5	120 - 100	Leg	Max Tension	7	92.120	-0.331	-0.052
			Max. Compression	18	-106.958	0.402	0.063
			Max. Mx	3	-104.544	0.412	-0.034
			Max. My	16	-6.758	-0.007	0.547
			Max. Vy	14	-0.101	-0.337	0.025
			Max. Vx	19	0.149	-0.174	0.376
		Diagonal	Max Tension	8	4.874	0.000	0.000
			Max. Compression	8	-4.915	0.000	0.000
			Max. Mx	31	1.149	0.059	-0.007
			Max. My	29	1.135	0.055	-0.007
			Max. Vy	33	0.043	0.055	-0.007
			Max. Vx	29	0.002	0.000	0.000
T6	100 - 80	Leg	Max Tension	15	118.251	-0.411	0.005
			Max. Compression	18	-138.194	0.767	0.020
			Max. Mx	18	-138.194	0.767	0.020
			Max. My	16	-9.411	0.002	0.615
			Max. Vy	22	-0.703	-0.543	-0.008
			Max. Vx	16	0.610	-0.007	0.304
		Diagonal	Max Tension	8	6.068	0.000	0.000
			Max. Compression	8	-6.059	0.000	0.000
			Max. Mx	33	1.501	0.075	0.009
			Max. My	29	-1.467	0.064	-0.010
			Max. Vy	33	0.054	0.075	0.009
			Max. Vx	29	0.003	0.000	0.000
T7	80 - 60	Leg	Max Tension	15	142.440	-0.657	0.013
			Max. Compression	18	-166.733	1.050	0.032
			Max. Mx	18	-166.733	1.050	0.032
			Max. My	16	-10.475	-0.085	0.954

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	22	0.130	-0.966	-0.001
			Max. Vx	16	-0.124	-0.085	0.954
		Diagonal	Max Tension	20	7.207	0.000	0.000
			Max. Compression	20	-7.279	0.000	0.000
			Max. Mx	29	1.912	0.125	0.016
			Max. My	35	1.756	0.122	0.017
			Max. Vy	29	0.071	0.125	0.016
			Max. Vx	35	-0.004	0.000	0.000
T8	60 - 40	Leg	Max Tension	15	167.611	-0.882	0.015
			Max. Compression	18	-197.359	-0.101	0.012
			Max. Mx	18	-181.325	1.050	0.032
			Max. My	16	-14.301	-0.068	0.934
			Max. Vy	22	-0.180	-0.900	-0.008
			Max. Vx	4	-0.118	0.018	-0.771
		Diagonal	Max Tension	20	7.743	0.000	0.000
			Max. Compression	20	-7.818	0.000	0.000
			Max. Mx	31	2.300	0.176	0.023
			Max. My	34	2.355	0.171	0.023
			Max. Vy	29	0.092	0.173	0.022
			Max. Vx	34	-0.005	0.000	0.000
T9	40 - 20	Leg	Max Tension	15	191.253	1.368	0.007
			Max. Compression	18	-226.637	-0.371	0.014
			Max. Mx	31	-118.750	-3.529	-0.003
			Max. My	16	-16.224	-0.356	1.761
			Max. Vy	31	1.150	-3.529	-0.003
			Max. Vx	16	-0.426	-0.356	1.761
		Diagonal	Max Tension	21	8.199	0.091	-0.002
			Max. Compression	20	-8.626	0.000	0.000
			Max. Mx	31	1.412	0.205	0.015
			Max. My	28	-1.815	0.167	-0.019
			Max. Vy	29	0.098	0.190	0.015
			Max. Vx	28	-0.004	0.000	0.000
		Secondary Horizontal	Max Tension	18	3.930	0.000	0.000
			Max. Compression	18	-3.930	0.065	0.008
			Max. Mx	36	-0.360	0.179	0.037
			Max. My	30	-0.059	0.156	0.040
			Max. Vy	35	-0.101	0.160	0.038
			Max. Vx	30	-0.007	0.000	0.000
T10	20 - 0	Leg	Max Tension	15	214.352	-1.656	0.013
			Max. Compression	18	-257.102	0.000	-0.000
			Max. Mx	31	-125.732	4.785	-0.010
			Max. My	4	-19.155	-0.162	-2.310
			Max. Vy	31	-0.863	-3.529	-0.003
			Max. Vx	4	-0.321	-0.162	-2.310
		Diagonal	Max Tension	20	8.760	0.000	0.000
			Max. Compression	20	-9.014	0.000	0.000
			Max. Mx	29	0.346	0.262	-0.028
			Max. My	28	4.611	0.183	-0.032
			Max. Vy	29	0.107	0.262	-0.028
			Max. Vx	28	0.006	0.000	0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	18	264.255	23.957	-13.526
	Max. H_x	18	264.255	23.957	-13.526
	Max. H_z	5	-197.345	-18.041	11.903
	Min. Vert	7	-219.662	-20.710	11.672
	Min. H_x	7	-219.662	-20.710	11.672
	Min. H_z	18	264.255	23.957	-13.526
Leg B	Max. Vert	10	264.211	-23.799	-13.759
	Max. H_x	23	-218.908	20.553	11.879

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg A	Max. H_z	25	-196.521	17.797	12.252
	Min. Vert	23	-218.908	20.553	11.879
	Min. H_x	10	264.211	-23.799	-13.759
	Min. H_z	10	264.211	-23.799	-13.759
	Max. Vert	2	264.208	0.258	27.521
	Max. H_x	20	20.456	2.998	1.506
	Max. H_z	2	264.208	0.258	27.521
	Min. Vert	15	-219.638	-0.234	-23.783
	Min. H_x	9	15.796	-2.991	1.158
	Min. H_z	15	-219.638	-0.234	-23.783

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	52.148	0.000	0.000	2.073	-3.384	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	62.578	0.024	-43.668	-4214.926	-8.555	8.792
0.9 Dead+1.6 Wind 0 deg - No Ice	46.933	0.024	-43.668	-4215.548	-7.539	8.792
1.2 Dead+1.6 Wind 30 deg - No Ice	62.578	22.021	-38.167	-3684.545	-2133.163	9.959
0.9 Dead+1.6 Wind 30 deg - No Ice	46.933	22.021	-38.167	-3685.167	-2132.147	9.959
1.2 Dead+1.6 Wind 60 deg - No Ice	62.578	36.164	-20.921	-2038.074	-3530.109	8.715
0.9 Dead+1.6 Wind 60 deg - No Ice	46.933	36.164	-20.921	-2038.696	-3529.094	8.715
1.2 Dead+1.6 Wind 90 deg - No Ice	62.578	44.001	-0.024	-2.007	-4254.481	4.964
0.9 Dead+1.6 Wind 90 deg - No Ice	46.933	44.001	-0.024	-2.629	-4253.466	4.964
1.2 Dead+1.6 Wind 120 deg - No Ice	62.578	37.757	21.814	2107.302	-3650.387	-0.474
0.9 Dead+1.6 Wind 120 deg - No Ice	46.933	37.757	21.814	2106.680	-3649.372	-0.474
1.2 Dead+1.6 Wind 150 deg - No Ice	62.578	21.980	38.143	3685.026	-2125.379	-4.840
0.9 Dead+1.6 Wind 150 deg - No Ice	46.933	21.980	38.143	3684.404	-2124.363	-4.840
1.2 Dead+1.6 Wind 180 deg - No Ice	62.578	-0.024	41.802	4075.826	0.434	-8.211
0.9 Dead+1.6 Wind 180 deg - No Ice	46.933	-0.024	41.802	4075.204	1.449	-8.211
1.2 Dead+1.6 Wind 210 deg - No Ice	62.578	-22.021	38.167	3689.520	2125.042	-9.959
0.9 Dead+1.6 Wind 210 deg - No Ice	46.933	-22.021	38.167	3688.898	2126.057	-9.959
1.2 Dead+1.6 Wind 240 deg - No Ice	62.578	-37.780	21.854	2115.086	3646.760	-9.108
0.9 Dead+1.6 Wind 240 deg - No Ice	46.933	-37.780	21.854	2114.464	3647.775	-9.108
1.2 Dead+1.6 Wind 270 deg - No Ice	62.578	-44.001	0.024	6.981	4246.360	-4.964
0.9 Dead+1.6 Wind 270 deg - No Ice	46.933	-44.001	0.024	6.359	4247.375	-4.964
1.2 Dead+1.6 Wind 300 deg - No Ice	62.578	-36.141	-20.881	-2030.290	3517.494	0.286
0.9 Dead+1.6 Wind 300 deg - No Ice	46.933	-36.141	-20.881	-2030.912	3518.509	0.286
1.2 Dead+1.6 Wind 330 deg - No Ice	62.578	-21.980	-38.143	-3680.051	2117.258	4.840
0.9 Dead+1.6 Wind 330 deg - No Ice	46.933	-21.980	-38.143	-3680.673	2118.273	4.840

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 Ice+1.0 Temp	160.745	0.000	0.000	25.770	-91.823	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	160.745	0.002	-13.962	-1340.810	-92.596	2.875
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	160.745	6.830	-11.864	-1142.108	-764.504	3.812
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	160.745	11.808	-6.839	-647.524	-1253.696	3.727
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	160.745	13.656	-0.002	24.997	-1435.847	2.476
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	160.745	12.055	6.979	708.390	-1271.396	0.582
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	160.745	6.827	11.862	1192.874	-763.165	-1.234
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	160.745	-0.002	13.675	1371.018	-91.050	-2.771
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	160.745	-6.830	11.864	1193.647	580.858	-3.812
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	160.745	-12.056	6.983	709.729	1088.523	-3.806
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	160.745	-13.656	0.002	26.543	1252.200	-2.476
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	160.745	-11.806	-6.836	-646.185	1069.276	-0.607
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	160.745	-6.827	-11.862	-1141.335	579.519	1.234
Dead+Wind 0 deg - Service	52.148	0.006	-11.360	-1095.069	-4.553	2.287
Dead+Wind 30 deg - Service	52.148	5.729	-9.929	-957.093	-557.260	2.591
Dead+Wind 60 deg - Service	52.148	9.408	-5.443	-528.771	-920.670	2.267
Dead+Wind 90 deg - Service	52.148	11.447	-0.006	0.904	-1109.112	1.291
Dead+Wind 120 deg - Service	52.148	9.822	5.675	549.631	-951.960	-0.123
Dead+Wind 150 deg - Service	52.148	5.718	9.923	960.069	-555.236	-1.259
Dead+Wind 180 deg - Service	52.148	-0.006	10.875	1061.734	-2.215	-2.136
Dead+Wind 210 deg - Service	52.148	-5.729	9.929	961.238	550.493	-2.591
Dead+Wind 240 deg - Service	52.148	-9.828	5.685	551.656	946.361	-2.369
Dead+Wind 270 deg - Service	52.148	-11.447	0.006	3.242	1102.345	-1.291
Dead+Wind 300 deg - Service	52.148	-9.402	-5.432	-526.746	912.733	0.074
Dead+Wind 330 deg - Service	52.148	-5.718	-9.923	-955.924	548.468	1.259

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.000	-52.148	0.000	0.000	52.148	0.000	0.000%
2	0.024	-62.578	-43.668	-0.024	62.578	43.668	0.000%
3	0.024	-46.933	-43.668	-0.024	46.933	43.668	0.000%
4	22.021	-62.578	-38.167	-22.021	62.578	38.167	0.000%
5	22.021	-46.933	-38.167	-22.021	46.933	38.167	0.000%
6	36.164	-62.578	-20.921	-36.164	62.578	20.921	0.000%
7	36.164	-46.933	-20.921	-36.164	46.933	20.921	0.000%
8	44.001	-62.578	-0.024	-44.001	62.578	0.024	0.000%
9	44.001	-46.933	-0.024	-44.001	46.933	0.024	0.000%
10	37.757	-62.578	21.814	-37.757	62.578	-21.814	0.000%
11	37.757	-46.933	21.814	-37.757	46.933	-21.814	0.000%
12	21.980	-62.578	38.143	-21.980	62.578	-38.143	0.000%
13	21.980	-46.933	38.143	-21.980	46.933	-38.143	0.000%
14	-0.024	-62.578	41.802	0.024	62.578	-41.802	0.000%
15	-0.024	-46.933	41.802	0.024	46.933	-41.802	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
16	-22.021	-62.578	38.167	22.021	62.578	-38.167	0.000%
17	-22.021	-46.933	38.167	22.021	46.933	-38.167	0.000%
18	-37.780	-62.578	21.854	37.780	62.578	-21.854	0.000%
19	-37.780	-46.933	21.854	37.780	46.933	-21.854	0.000%
20	-44.001	-62.578	0.024	44.001	62.578	-0.024	0.000%
21	-44.001	-46.933	0.024	44.001	46.933	-0.024	0.000%
22	-36.141	-62.578	-20.881	36.141	62.578	20.881	0.000%
23	-36.141	-46.933	-20.881	36.141	46.933	20.881	0.000%
24	-21.980	-62.578	-38.143	21.980	62.578	38.143	0.000%
25	-21.980	-46.933	-38.143	21.980	46.933	38.143	0.000%
26	0.000	-160.745	0.000	-0.000	160.745	-0.000	0.000%
27	0.002	-160.745	-13.962	-0.002	160.745	13.962	0.000%
28	6.830	-160.745	-11.864	-6.830	160.745	11.864	0.000%
29	11.808	-160.745	-6.839	-11.808	160.745	6.839	0.000%
30	13.656	-160.745	-0.002	-13.656	160.745	0.002	0.000%
31	12.055	-160.745	6.979	-12.055	160.745	-6.979	0.000%
32	6.827	-160.745	11.862	-6.827	160.745	-11.862	0.000%
33	-0.002	-160.745	13.675	0.002	160.745	-13.675	0.000%
34	-6.830	-160.745	11.864	6.830	160.745	-11.864	0.000%
35	-12.056	-160.745	6.983	12.056	160.745	-6.983	0.000%
36	-13.656	-160.745	0.002	13.656	160.745	-0.002	0.000%
37	-11.806	-160.745	-6.836	11.806	160.745	6.836	0.000%
38	-6.827	-160.745	-11.862	6.827	160.745	11.862	0.000%
39	0.006	-52.148	-11.360	-0.006	52.148	11.360	0.000%
40	5.729	-52.148	-9.929	-5.729	52.148	9.929	0.000%
41	9.408	-52.148	-5.443	-9.408	52.148	5.443	0.000%
42	11.447	-52.148	-0.006	-11.447	52.148	0.006	0.000%
43	9.822	-52.148	5.675	-9.822	52.148	-5.675	0.000%
44	5.718	-52.148	9.923	-5.718	52.148	-9.923	0.000%
45	-0.006	-52.148	10.875	0.006	52.148	-10.875	0.000%
46	-5.729	-52.148	9.929	5.729	52.148	-9.929	0.000%
47	-9.828	-52.148	5.685	9.828	52.148	-5.685	0.000%
48	-11.447	-52.148	0.006	11.447	52.148	-0.006	0.000%
49	-9.402	-52.148	-5.432	9.402	52.148	5.432	0.000%
50	-5.718	-52.148	-9.923	5.718	52.148	9.923	0.000%

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	180	Diagonal	A325N	0.625	1	0.551	7.875	0.070 ✔	1	Member Block Shear
		Top Girt	A325N	0.625	1	0.135	5.836	0.023 ✔	1	Member Block Shear
T2	168	Leg	A325N	0.625	4	1.382	20.709	0.067 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	2.469	7.875	0.314 ✔	1	Member Block Shear
T3	160	Leg	A325N	0.625	4	8.967	20.709	0.433 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	3.879	7.875	0.493 ✔	1	Member Block Shear
T4	140	Leg	A325N	0.750	4	16.359	29.821	0.549 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	4.619	7.875	0.587 ✔	1	Member Block Shear
T5	120	Leg	A325N	0.750	4	23.030	29.821	0.772 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	4.874	9.914	0.492 ✔	1	Member Block Shear
T6	100	Leg	A325N	0.875	4	29.563	40.589	0.728 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	6.068	9.914	0.612 ✔	1	Member Block Shear
T7	80	Leg	A325N	0.875	4	35.610	40.589	0.877 ✔	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	0.625	1	7.207	10.934	0.659 ✔	1	Member Block Shear
T8	60	Leg	A325N	1.000	4	41.903	53.014	0.790 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	7.818	12.425	0.629 ✔	1	Bolt Shear
T9	40	Leg	A325N	1.000	4	47.721	53.014	0.900 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	8.626	12.425	0.694 ✔	1	Bolt Shear
		Secondary Horizontal	A325N	0.500	1	3.930	7.952	0.494 ✔	1	Bolt Shear
T10	20	Leg	A36	1.500	6	35.725	57.653	0.620 ✔	1	Bolt Tension
		Diagonal	A325N	0.625	1	9.014	12.425	0.725 ✔	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 168	P2x.154	12.000	4.000	61.0 K=1.00	1.075	-2.168	27.981	0.077 [1] ✔
T2	168 - 160	P2x.154 (GR)	8.000	4.000	61.0 K=1.00	1.075	-8.524	38.430	0.222 [1] ✔
T3	160 - 140	P3x.216 (GR)	20.033	5.008	51.7 K=1.00	2.228	-44.099	87.013	0.507 [1] ✔
T4	140 - 120	P3.5x.318 (GR)	20.033	6.678	61.3 K=1.00	3.678	-76.919	122.133	0.630 [1] ✔
T5	120 - 100	P4x.337 (GR)	20.033	6.678	54.3 K=1.00	4.407	-106.958	157.190	0.680 [1] ✔
T6	100 - 80	P5x.375 (GR)	20.033	6.678	43.6 K=1.00	6.112	-138.194	242.300	0.570 [1] ✔
T7	80 - 60	P6x.432 (GR)	20.033	10.017	54.8 K=1.00	8.405	-166.733	314.315	0.530 [1] ✔
T8	60 - 40	P6x.432 (GR)	20.033	10.017	54.8 K=1.00	8.405	-197.359	314.315	0.628 [1] ✔
T9	40 - 20	P6x.432 (GR)	20.033	5.151	28.2 K=1.00	8.405	-226.637	362.711	0.625 [1] ✔
T10	20 - 0	P8x.5 (GR)	20.033	10.017	41.8 K=1.00	12.763	-257.102	543.634	0.473 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 168	L2x1 1/2x3/16	5.657	2.543	101.1 K=1.07	0.621	-0.579	11.752	0.049 [1] ✔
T2	168 - 160	L2x1 1/2x3/16	5.657	2.543	101.1	0.621	-2.549	11.752	0.217 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	160 - 140	L2x1 1/2x3/16	7.621	3.637	135.6 K=1.07	0.621	-3.928	7.635	0.515 [1] ✔
T4	140 - 120	L2x2x3/16	10.162	4.935	150.3 K=1.00	0.715	-4.574	7.150	0.640 [1] ✔
T5	120 - 100	L2 1/2x2x3/16	11.744	5.701	160.2 K=1.00	0.809	-4.915	7.120	0.690 [1] ✔
T6	100 - 80	L2 1/2x2 1/2x3/16	13.438	6.498	157.5 K=1.00	0.902	-6.059	8.211	0.738 [1] ✔
T7	80 - 60	L3x3x3/16	16.803	8.223	165.6 K=1.00	1.090	-7.279	8.983	0.810 [1] ✔
T8	60 - 40	L3 1/2x3x1/4	18.448	9.047	172.1 K=1.00	1.560	-7.818	11.905	0.657 [1] ✔
T9	40 - 20	L3 1/2x3x1/4	20.158	10.049	191.1 K=1.00	1.560	-8.626	9.650	0.894 [1] ✔
T10	20 - 0	L3 1/2x3 1/2x1/4	21.916	10.690	184.8 K=1.00	1.690	-9.014	11.176	0.807 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	40 - 20	L3 1/2x3 1/2x1/4	17.486	16.934	93.2 K=0.50	1.690	-3.930	34.656	0.113 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 168	L1 1/2x2x3/16	4.000	3.510	130.8 K=1.00	0.621	-0.118	8.172	0.014 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 168	P2x.154	12.000	4.000	61.0	1.075	1.583	33.848	0.047 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	168 - 160	P2x.154 (GR)	8.000	4.000	61.0	1.075	5.528	33.848	0.163 [1]
T3	160 - 140	P3x.216 (GR)	20.033	5.008	51.7	2.228	35.868	70.197	0.511 [1]
T4	140 - 120	P3.5x.318 (GR)	20.033	6.678	61.3	3.678	65.436	115.870	0.565 [1]
T5	120 - 100	P4x.337 (GR)	20.033	6.678	54.3	4.407	92.120	138.834	0.664 [1]
T6	100 - 80	P5x.375 (GR)	20.033	6.678	43.6	6.112	118.251	192.527	0.614 [1]
T7	80 - 60	P6x.432 (GR)	20.033	10.017	54.8	8.405	142.440	264.756	0.538 [1]
T8	60 - 40	P6x.432 (GR)	20.033	10.017	54.8	8.405	167.611	264.756	0.633 [1]
T9	40 - 20	P6x.432 (GR)	20.033	4.865	26.6	8.405	191.253	264.756	0.722 [1]
T10	20 - 0	P8x.5 (GR)	20.033	10.017	41.8	12.763	214.352	402.026	0.533 [1]

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 168	L2x1 1/2x3/16	5.657	2.543	73.4	0.360	0.551	15.675	0.035 [1]
T2	168 - 160	L2x1 1/2x3/16	5.657	2.543	73.4	0.360	2.469	15.675	0.157 [1]
T3	160 - 140	L2x1 1/2x3/16	7.621	3.637	103.3	0.360	3.879	15.675	0.247 [1]
T4	140 - 120	L2x2x3/16	9.197	4.474	89.9	0.431	4.619	18.739	0.247 [1]
T5	120 - 100	L2 1/2x2x3/16	11.744	5.701	117.0	0.501	4.874	21.806	0.224 [1]
T6	100 - 80	L2 1/2x2 1/2x3/16	13.438	6.498	102.5	0.571	6.068	24.840	0.244 [1]
T7	80 - 60	L3x3x3/16	16.803	8.223	107.0	0.712	7.207	30.973	0.233 [1]
T8	60 - 40	L3 1/2x3x1/4	18.448	9.047	120.8	1.029	7.743	44.778	0.173 [1]
T9	40 - 20	L3 1/2x3x1/4	20.158	10.049	132.1	1.029	8.199	44.778	0.183 [1]
T10	20 - 0	L3 1/2x3 1/2x1/4	21.916	10.690	119.3	1.127	8.760	49.019	0.179 [1]

[1] $P_u / \phi P_n$ controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	40 - 20	L3 1/2x3 1/2x1/4	17.486	16.934	186.4	1.150	3.930	50.039	0.079 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 168	L1 1/2x2x3/16	4.000	3.510	103.8	0.360	0.135	15.675	0.009 [1] ✔

[1] $P_u / \phi P_n$ controls

Section Capacity Table

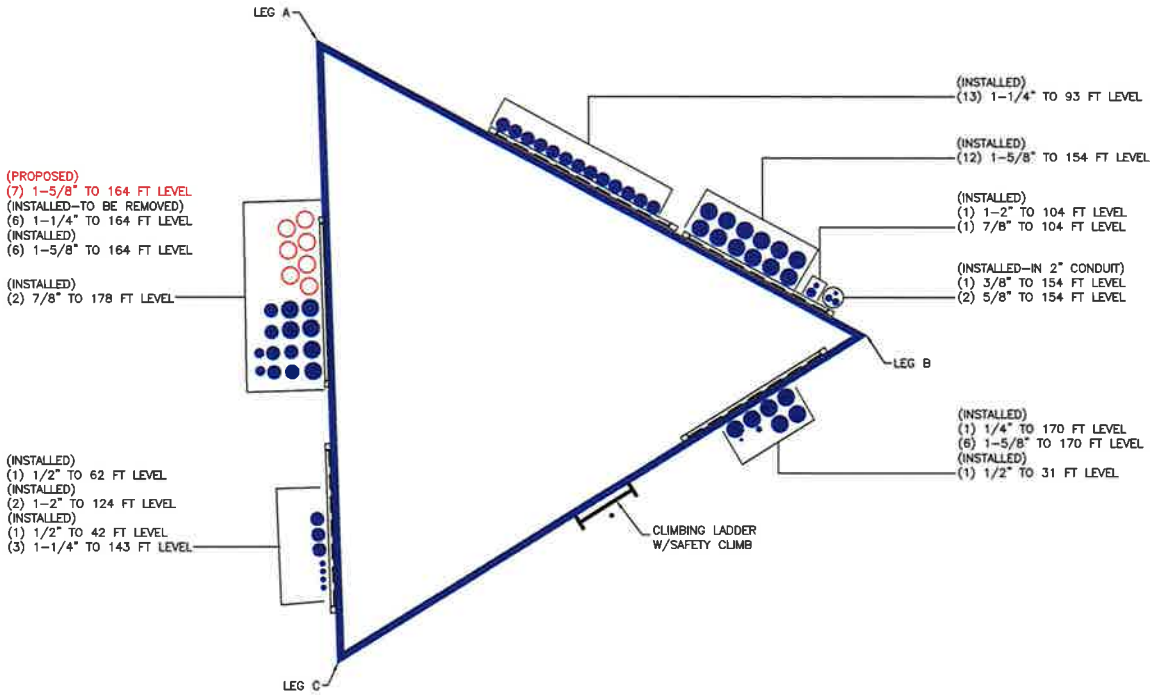
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 168	Leg	P2x.154	2	-2.168	27.981	7.7	Pass
T2	168 - 160	Leg	P2x.154 (GR)	25	-8.524	38.430	22.2	Pass
T3	160 - 140	Leg	P3x.216 (GR)	40	35.868	70.197	51.1	Pass
T4	140 - 120	Leg	P3.5x.318 (GR)	67	-76.919	122.133	63.0	Pass
T5	120 - 100	Leg	P4x.337 (GR)	88	-106.958	157.190	68.0	Pass
							77.2 (b)	
T6	100 - 80	Leg	P5x.375 (GR)	111	118.251	192.527	61.4	Pass
							72.8 (b)	
T7	80 - 60	Leg	P6x.432 (GR)	132	142.440	264.756	53.8	Pass
							87.7 (b)	
T8	60 - 40	Leg	P6x.432 (GR)	147	167.611	264.756	63.3	Pass
							79.0 (b)	
T9	40 - 20	Leg	P6x.432 (GR)	162	191.253	264.756	72.2	Pass
							90.0 (b)	
T10	20 - 0	Leg	P8x.5 (GR)	183	214.352	402.026	53.3	Pass
							62.0 (b)	
T1	180 - 168	Diagonal	L2x1 1/2x3/16	10	-0.579	11.752	4.9	Pass
							7.0 (b)	
T2	168 - 160	Diagonal	L2x1 1/2x3/16	33	-2.549	11.752	21.7	Pass
							31.4 (b)	
T3	160 - 140	Diagonal	L2x1 1/2x3/16	44	-3.928	7.635	51.5	Pass
T4	140 - 120	Diagonal	L2x2x3/16	71	-4.574	7.150	64.0	Pass
T5	120 - 100	Diagonal	L2 1/2x2x3/16	92	-4.915	7.120	69.0	Pass
T6	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	113	-6.059	8.211	73.8	Pass
T7	80 - 60	Diagonal	L3x3x3/16	133	-7.279	8.983	81.0	Pass
T8	60 - 40	Diagonal	L3 1/2x3x1/4	148	-7.818	11.905	65.7	Pass
T9	40 - 20	Diagonal	L3 1/2x3x1/4	163	-8.626	9.650	89.4	Pass
T10	20 - 0	Diagonal	L3 1/2x3 1/2x1/4	184	-9.014	11.176	80.7	Pass
T9	40 - 20	Secondary Horizontal	L3 1/2x3 1/2x1/4	169	-3.930	34.656	11.3	Pass
							49.4 (b)	
T1	180 - 168	Top Girt	L1 1/2x2x3/16	5	-0.118	8.172	1.4	Pass
							2.3 (b)	
							Summary	
						Leg (T9)	90.0	Pass
						Diagonal (T9)	89.4	Pass
						Secondary Horizontal (T9)	49.4	Pass
						Top Girt	2.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						(T1) Bolt Checks	90.0	Pass
						RATING =	**90.0***	**Pass**

*Due to limitations of the TNXTOWER software when analyzing leg connection with additional knife plates, the above output has not been used to determine the governing tower usage. Please see additional calculation results in Appendix C which are based on the Section forces generated in this output.

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806353 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

CALCULATION SHEET

Leg Splice Connection Check - 60'

Input Properties:

$E := 60ft$	Elevation of leg splice connection
$F_y := 35ksi$	Yield stress of leg
$F_u := 60ksi$	Tensile stress of leg
$b := 3 \cdot in$	Knife Plate Width
$t := 1.0 \cdot in$	Knife Plate thickness
$F_{ukp} := 65ksi$	Ultimate strength of Knife plate steel
$F_{ykp} := 50ksi$	Yield Strength of Knife plate Steel
$n_{pl} := 2$	Number of Knife Plates
$\phi_{bo} := 0.875 \cdot in$	Diameter of flange bolts
$n_b := 4$	Number of flange bolts

Input Loads:

$Code := "TIA-G"$	Version of the TIA
$T_u := 142.44kip$	Maximum leg tension load
$P_u := 166.73kip$	Maximum leg compression load
$U := 1.00$	Shear lag coefficient
$\phi_t := 0.90$	Tension Yielding
$\phi_{tr} := 0.75$	Tension Rupture
$\phi_b := 0.75$	Bolt Shear

CALCULATION SHEET

DESTEK ENGINEERING

Leg Capacity:

leg above splice

$A_{gt} := 7.88in^2$ Gross area of top leg (P6x0.432)

$GrossAllowableTension_{tm} := \phi_t \cdot F_y \cdot A_{gt} = 248.22 \cdot kip$

$A_{gtnm} := 7.88 \cdot in^2$ Gross area of top leg (P6x0.432)

$GrossAllowableTension_{tnm} := \phi_t \cdot F_y \cdot A_{gtnm} = 248.22 \cdot kip$

Leg below splice

$A_{gb} := 7.88in^2$ Gross area of top leg (P6x0.432)

$GrossAllowableTension_{bm} := \phi_t \cdot F_y \cdot A_{gb} = 248.22 \cdot kip$

$A_{gbnm} := 7.88in^2$ Gross area of top leg (P6x0.432)

$GrossAllowableTension_{bnm} := \phi_t \cdot F_y \cdot A_{gbnm} = 248.22 \cdot kip$

Knife Plate Capacity:

COMPRESSION CHECK

$A_{kp} := b \cdot t = 3 \cdot in^2$ Area of the knife plate

$K := 1$

$L_{kp} := 2ft$ Unbraced length of the knife plate

$I_{kp} := \frac{(b \cdot t^3)}{12} = 0.25 \cdot in^4$

$r_{kp} := \sqrt{\frac{I_{kp}}{A_{kp}}} = 0.2887 \cdot in$

$E := 29000ksi$

$\frac{K \cdot L_{kp}}{r_{kp}} = 83.1384$

$F_e := \frac{(\pi^2 \cdot E)}{\left(\frac{K \cdot L_{kp}}{r_{kp}}\right)^2} = 41.4089 \cdot ksi$

$$F_{cr} := \begin{cases} 0.658^{\frac{F_{ykp}}{F_e}} \cdot F_{ykp} & \text{if } \frac{K \cdot L_{kp}}{r_{kp}} \le 4.71 \cdot \sqrt{\frac{E}{F_{ykp}}} \\ 0.877 \cdot F_e & \text{otherwise} \end{cases} = 30.1636 \cdot ksi$$

$\phi_c := 0.9$

$KPUltimateComp := \phi_c \cdot F_{cr} \cdot n_{pl} \cdot A_{kp} = 162.8835 \cdot kip$

TENSILE CHECK

$\phi := 0.9$

$R_{tkp} := F_{ykp} \cdot n_{pl} \cdot A_{kp} = 300 \cdot kip$ Nominal Tensile strength of Knife Plates

$KPUltimateTen := \phi_c \cdot R_{tkp} = 270 \cdot kip$

$R_{kpc} := \frac{n_{pl} A_{kp}}{(A_{gtnm} + n_{pl} A_{kp})} = 43.2277 \cdot \%$ Percent of compressive load in knife plates

$R_{lc} := 1 - R_{kpc} = 56.7723 \cdot \%$ Percent of compressive load in tower legs

$R_{kpt} := \frac{n_{pl} A_{kp}}{(A_{gtnm} + n_{pl} A_{kp})} = 43.2277 \cdot \%$ Percent of tensile load in knife plates

$R_{lt} := 1 - R_{kpt} = 56.7723 \cdot \%$ Percent of tensile load in tower legs

CALCULATION SHEET

DESTEK ENGINEERING

Flange Bolt Capacity:

$F_u := 120 \cdot ksi$ — Specified Minimum Tensile strength of A325 bolts between 0.5" & 1" Diameter.

$A_{gb} := \frac{\phi_{bo}^{2} \cdot \pi}{4} = 0.6013 \cdot in^2$ — Nominal area of one flange bolt.

$A_{nb} := 0.75 \cdot A_{gb}$ — Net are of one flange bolt.

$BoltUltimateTen := \phi_b \cdot A_{nb} \cdot F_u \cdot n_b = 162.3565 \cdot kip$ — Ultimate resistance of flange bolt grouping.

CALCULATION SHEET

Summary:

$LegAboveTension := T_u = 142.44 \cdot kip$

$$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension < GrossAllowableTension_{tm} \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

Test = "Pass"

$$StressRatio := \frac{LegAboveTension}{GrossAllowableTension_{tm}} = 57.38 \cdot \%$$

$$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension \cdot R_{lt} < GrossAllowableTension_{tnm} \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

Test = "Pass"

$$StressRatio := \frac{LegAboveTension \cdot R_{lt}}{GrossAllowableTension_{tnm}} = 32.58 \cdot \%$$

$$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension \cdot R_{kpt} < KPUltimateTen \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

Test = "Pass"

$$StressRatio := \frac{LegAboveTension \cdot R_{kpt}}{KPUltimateTen} = 22.8 \cdot \%$$

$$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension \cdot R_{lt} < BoltUltimateTen \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

Test = "Pass"

$$StressRatio := \frac{LegAboveTension \cdot R_{lt}}{BoltUltimateTen} = 49.81 \cdot \%$$

$$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension \cdot R_{lt} < GrossAllowableTension_{bnm} \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

Test = "Pass"

$$StressRatio := \frac{LegAboveTension \cdot R_{lt}}{GrossAllowableTension_{bnm}} = 32.58 \cdot \%$$

$$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveTension < GrossAllowableTension_{bm} \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

Test = "Pass"

$$StressRatio := \frac{LegAboveTension}{GrossAllowableTension_{bm}} = 57.38 \cdot \%$$

CALCULATION SHEET

DESTEK ENGINEERING

$LegAboveCompression := P_u = 166.73 \cdot kip$

$$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveCompression \cdot R_{kpc} < KPUltimateComp \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

$Test = \text{"Pass"}$

$$StressRatio := \frac{LegAboveCompression \cdot R_{kpc}}{KPUltimateComp} = 44.25 \cdot \%$$

CALCULATION SHEET

Leg Splice Connection Check - 20'

Input Proporties:

$E := 20ft$	Elevation of leg splice connection
$F_y := 35ksi$	Yield stress of leg
$F_u := 60ksi$	Tensile stress of leg
$b := 3 \cdot in$	Knife Plate Width
$t := 1 \cdot in$	Knife Plate thickness
$F_{ukp} := 65ksi$	Ultimate strength of Knife plate steel
$F_{ykp} := 50ksi$	Yield Strength of Knife plate Steel
$n_{pl} := 2$	Number of Knife Plates
$\phi_{bo} := 1.0 \cdot in$	Diameter of flange bolts
$n_b := 4$	Number of flange bolts

Input Loads:

$Code := "TIA-G"$	Version of the TIA
$T_u := 191.25kip$	Maximum leg tension load
$P_u := 226.64kip$	Maximum leg compression load
$U := 1.00$	Shear lag coefficient
$\phi_t := 0.90$	Tension Yielding
$\phi_{tr} := 0.75$	Tension Rupture
$\phi_b := 0.75$	Bolt Shear

Leg Capacity:

leg above splice

$A_{gt} := 7.88in^2$ Gross area of top leg (P6x0.432)

$GrossAllowableTension_{tm} := \phi_t \cdot F_y \cdot A_{gt} = 248.22 \cdot kip$

$A_{gtnm} := 7.88 \cdot in^2$ Gross area of top leg (P6x0.432)

$GrossAllowableTension_{tnm} := \phi_t \cdot F_y \cdot A_{gtnm} = 248.22 \cdot kip$

Leg below splice

$A_{gb} := 11.9in^2$ Gross area of bottom leg (P8x0.5)

$GrossAllowableTension_{bm} := \phi_t \cdot F_y \cdot A_{gb} = 374.85 \cdot kip$

$A_{gbnm} := 11.9in^2$ Gross area of bottom leg (P8x0.5)

$GrossAllowableTension_{bnm} := \phi_t \cdot F_y \cdot A_{gbnm} = 374.85 \cdot kip$

CALCULATION SHEET

Knife Plate Capacity:

COMPRESSION CHECK

$A_{kp} := b \cdot t = 3 \cdot in^2$ Area of the knife plate

$K := 1$

$L_{kp} := 2ft$ Unbraced length of the knife plate

$I_{kp} := \frac{(b \cdot t^3)}{12} = 0.25 \cdot in^4$

$r_{kp} := \sqrt{\frac{I_{kp}}{A_{kp}}} = 0.2887 \cdot in$

$E := 29000ksi$

$\frac{K \cdot L_{kp}}{r_{kp}} = 83.1384$

$F_e := \frac{(\pi^2 \cdot E)}{\left(\frac{K \cdot L_{kp}}{r_{kp}}\right)^2} = 41.4089 \cdot ksi$

$$F_{cr} := \begin{cases} 0.658^{\frac{F_{ykp}}{F_e}} \cdot F_{ykp} & \text{if } \frac{K \cdot L_{kp}}{r_{kp}} \le 4.71 \cdot \sqrt{\frac{E}{F_{ykp}}} \\ 0.877 \cdot F_e & \text{otherwise} \end{cases} = 30.1636 \cdot ksi$$

$\phi_c := 0.9$

$KPUltimateComp := \phi_c \cdot F_{cr} \cdot n_{pl} \cdot A_{kp} = 162.8835 \cdot kip$

TENSILE CHECK

$\phi := 0.9$

$R_{tkp} := F_{ykp} \cdot n_{pl} \cdot A_{kp} = 300 \cdot kip$ Nominal Tensile strength of Knife Plates

$KPUltimateTen := \phi_c \cdot R_{tkp} = 270 \cdot kip$

$R_{kpc} := \frac{n_{pl} A_{kp}}{(A_{gtnm} + n_{pl} A_{kp})} = 43.2277 \cdot \%$ Percent of compressive load in knife plates

$R_{lc} := 1 - R_{kpc} = 56.7723 \cdot \%$ Percent of compressive load in tower legs

$R_{kpt} := \frac{n_{pl} A_{kp}}{(A_{gtnm} + n_{pl} A_{kp})} = 43.2277 \cdot \%$ Percent of tensile load in knife plates

$R_{lt} := 1 - R_{kpt} = 56.7723 \cdot \%$ Percent of tensile load in tower legs

CALCULATION SHEET

DESTEK ENGINEERING

Flange Bolt Capacity:

$F_u := 120 \cdot ksi$ — Specified Minimum Tensile strength of A325 bolts between 0.5" & 1" Diameter.

$A_{gb} := \frac{\phi_{bo}^{2} \cdot \pi}{4} = 0.7854 \cdot in^2$ — Nominal area of one flange bolt.

$A_{nb} := 0.75 \cdot A_{gb}$ — Net are of one flange bolt.

$BoltUltimateTen := \phi_b \cdot A_{nb} \cdot F_u \cdot n_b = 212.0575 \cdot kip$ — Ultimate resistance of flange bolt grouping.

CALCULATION SHEET

DESTEK ENGINEERING

Summary:

LegAboveTension := T_u = 191.25·kip

Test := "Pass" if LegAboveTension < $GrossAllowableTension_{tm}$
"Fail " otherwise

Test = "Pass"

$$StressRatio := \frac{LegAboveTension}{GrossAllowableTension_{tm}} = 77.05 \cdot \%$$

Test := "Pass" if $LegAboveTension \cdot R_{lt} < GrossAllowableTension_{tnm}$
"Fail " otherwise

Test = "Pass"

$$StressRatio := \frac{LegAboveTension \cdot R_{lt}}{GrossAllowableTension_{tnm}} = 43.74 \cdot \%$$

Test := "Pass" if $LegAboveTension \cdot R_{kpt} < KPUltimateTen$
"Fail " otherwise

Test = "Pass"

$$StressRatio := \frac{LegAboveTension \cdot R_{kpt}}{KPUltimateTen} = 30.62 \cdot \%$$

Test := "Pass" if $LegAboveTension \cdot R_{lt} < BoltUltimateTen$
"Fail " otherwise

Test = "Pass"

$$StressRatio := \frac{LegAboveTension \cdot R_{lt}}{BoltUltimateTen} = 51.2 \cdot \%$$

Test := "Pass" if $LegAboveTension \cdot R_{lt} < GrossAllowableTension_{bnm}$
"Fail " otherwise

Test = "Pass"

$$StressRatio := \frac{LegAboveTension \cdot R_{lt}}{GrossAllowableTension_{bnm}} = 28.97 \cdot \%$$

Test := "Pass" if $LegAboveTension < GrossAllowableTension_{bm}$
"Fail " otherwise

Test = "Pass"

$$StressRatio := \frac{LegAboveTension}{GrossAllowableTension_{bm}} = 51.02 \cdot \%$$

CALCULATION SHEET

DESTEK ENGINEERING

$LegAboveCompression := P_u = 226.64 \cdot kip$

$$Test := \begin{cases} \text{"Pass"} & \text{if } LegAboveCompression \cdot R_{kpc} < KPUltimateComp \\ \text{"Fail "} & \text{otherwise} \end{cases}$$

$Test = \text{"Pass"}$

$$StressRatio := \frac{LegAboveCompression \cdot R_{kpc}}{KPUltimateComp} = 60.15 \cdot \%$$

Anchor Rod Check for Self Supporting Towers

TIA-222-G, Section 4.9.9 Rev. 6.1

CROWN CASTLE

Site Data	
BU#:	806353
Site Name:	BRG 124 943066
App #:	320434 rev 9

Reactions		
Eta Factor, η	0.55	Detail Type
Uplift, Pu:	220	kips
Shear, Vu:	24	kips

I_{ar}:		in
Mu = 0.65*I_{ar}*V_u		ft-kips

Anchor Rod Data		
Qty:	6	
Diam:	1.5	in
Rod Material:	A36	
Strength (Fu):	58	ksi
Yield (Fy):	36	ksi

* Rod Circle:		in
* e:		in
* # of Rods		1 or 2

Mu= Pu x e:		ft-kips

** Only enter rod circle, offset (e) and number of anchor rods at the extreme fiber to consider if eccentric load due to leg reinforcement exist.*

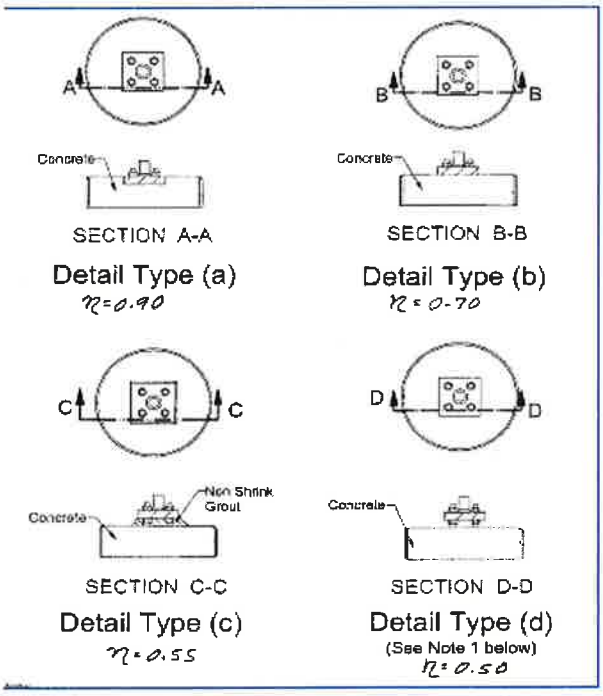


Figure 4-4 of TIA-222-G

Anchor Rod Results:

Max Rod (Cu+ Vu/ń):	43.9	Kips
Design Axial, Φ*Fu*Anet:	65.4	Kips
Anchor Rod Stress Ratio:	67.2%	

If Applicable;

Anchor Rod Results with Bending Considered:

When the clear distance from the top of concrete to the bottom of level nut excceeds 1.0 times the diameter of the anchor rod, the following interaction equation shall also be satisfied (see Figure 4-4 of Rev. G):

$$(V_u/\phi R_{nv})^2 + [(P_u/\phi R_{nt}) + (M_u/\phi R_{nm})]^2 <= 1$$

$\phi R_{nv}=\phi*0.45*F_{ub}*A_b$=		kips
$\phi R_{nt}=\phi*F_u*A_{net}$ =		kips
$\phi R_{nm}=\phi*F_y*Z$ =		ft-kips

Maximum Acceptable Ratio: 105 %

Governing Stress Ratio: 67.2% **Pass**

CCI Foundation Tool Suite - SS Drilled Pier

CCIFTS 1.2.108.14286 - Phase 1-2 Date: 9/29/2016

BU:	806353
Site Name:	BRG 124 943066
App Number:	320434 Rev 9
Work Order:	1306102

CROWN CASTLE

Self-Support Drilled Pier

Input

Criteria

TIA Revision:	G
ACI 318 Revision:	2008
Seismic Category:	B

Forces

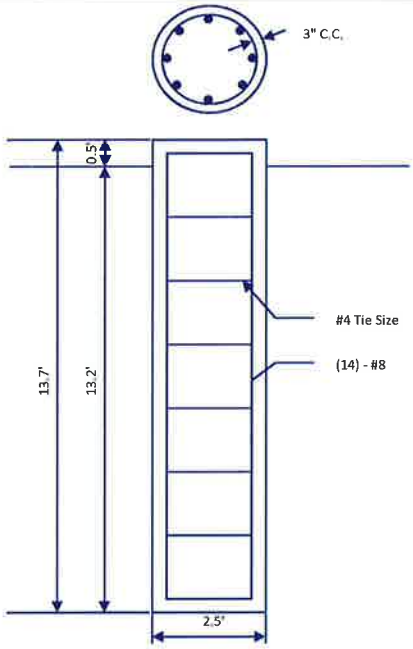
Compression	264 kips
Compression Shear	28 kips
Uplift	220 kips
Uplift Shear	24 kips
Add'l Moment	0 k-ft
Swelling Force	0 kips

Foundation Dimensions

Pier Diameter:	2.5 ft
Ext. above grade:	0.5 ft
Depth below grade:	13.2 ft
Bell Diameter:	ft
Bell Angle:	deg

Material Properties

Number of Rebar:	14
Rebar Size:	8
Tie Size	4
Rebar tensile strength:	60 ksi
Concrete Strength:	3000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	3 in



Soil Profile 806353 - SOIL

Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	5	0	5	110	0	0	0	0	0	
2	1	5	6	110	0	30	0.772	0.772	0	
3	7.2	6	13.2	140	8000	0	4.402	4.402	56.3	

Analysis Results

Soil Lateral Capacity	Uplift case	Comp. case
Depth to Zero Shear:	7.2 ft	7.2 ft
Max Moment, Mu:	168.2 k-ft	196.3 k-ft
Soil Safety Factor:	8.6	7.3
Safety Factor Req'd:	1.33	1.33
RATING:	15.53%	18.12%

Soil Axial Capacity

Concrete Weight:	9.1 kips
Skin Friction:	191.2 kips
Rock Anchor Capacity (Moc	240.0 kips
Uplift Capacity (k), ϕTn:	440.3 kips
Uplift (k), Tu:	220.0 kips
RATING:	49.96%

Skin Friction (k):	191.2 kips
End Bearing (k):	207.3 kips
Rock Anchor Capacity (Moc	240.0 kips
Comp. Capacity (k), ϕCn:	638.5 kips
Comp. (k), Cu:	264.0 kips
RATING:	41.35%

Concrete/Steel Check	Uplift Case	Comp case
Mu (from soil analysis)	168.2 k-ft	196.3 k-ft
ϕMn	338.7 k-ft	616.4 k-ft
RATING:	49.67%	31.84%

rho provided	1.56
rho required	0.33 OK
Rebar Spacing	3.9
Spacing required	16.0 OK
Dev. Length required	5.8
Dev. Length provided	43.8 OK

Overall Foundation Rating: 49.96%