Date: **January 26, 2017**

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Subject: Structural Analysis Report

Carrier Designation:	***AT&T Mobility Reconfiguration***	
	Carrier Site Number:	CTL01129
	Carrier Site Name:	Middlebury Straits TPKE
	FA Location Code:	10035253
Phoenix Tower Designation:	**PTI Site Number:**	US-CT-1003
	PTI Site Name:	Straits Turnpike
Engineering Firm Designation:	**TEP Project Number:**	25628.105719
Site Data:	**1021 Straits Turnpike, Middlebury, New Haven County, CT 06762** **Latitude *41° 32' 8.78"*, Longitude *-73° 05' 21.27"*** **195 Foot - Self Support Tower**	

Dear David Rodriguez,

Tower Engineering Professionals is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

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

LC1: Existing + Proposed + Future Equipment **Sufficient Capacity**
Note: See Table 1 for the existing, proposed, and future loading

Structure Capacity	Controlling Component
88.8%	Diagonal (T1): 180' – 195'

The analysis has been performed in accordance with the ANSI/TIA-222-G-2-2009 Structural Standard for Antenna Supporting Structures and Antennas – Addendum 2 and the 2016 Connecticut State Building Code.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Table 1 and the attached drawings for the determined available structural capacity to be effective.

We at *Tower Engineering Professionals* appreciate the opportunity of providing our continuing professional services to you and *Phoenix Tower International*. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Christopher J. Bean, E.I.

Respectfully submitted by:

Andrew T. Haldane, P.E.

STATE OF CONNECTICUT
ANDREW T. HALDANE
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LICENSED
PROFESSIONAL ENGINEER
1/26/2017

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1) INTRODUCTION

This tower is a 195-ft self support tower designed by Fred A. Nudd Corporation in May of 1998. The tower was originally designed for a fastest mile wind speed of 85 mph per ANSI/EIA/TIA-222-F for the appurtenances listed in Table 2. TEP visited the site in June of 2010 to gather existing steel and appurtenance information. This tower has been modified multiple times in the past to accommodate additional loading. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the ANSI/TIA-222-G-2-2009 Structural Standard for Antenna Supporting Structures and Antennas – Addendum 2 and 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

Type of Analysis: **Rigorous**
Classification of Structure: **Class II**
Exposure Category: **Exposure B**
Topographic Category: **Category 1**
Earthquake Category: **Not Considered**
Earthquake effects may be ignored per this standard for site locations where Ss does not exceed 1.0. (County Max Ss = 0.32).

Table 1 - Existing/Proposed/Future Antenna and Cable Information

Existing/ Proposed	Elevation (ft)	Qty	Antenna Model	Mount Type	Qty Coax	Coax Size	Coax[1] Location	Owner/ Tenant
Future	***195.0***	***-***	***T-Mobile Future Loading[2]***	(3) 12.5' Sector Frames	***6***	***1 5/8***	***AB Face***	***T-Mobile***
Existing	195.0	3	RFS APX16DWV-16DWVS		18	1-5/8	AB Face	T-Mobile
		6	Ericsson KRY-112-71					
Existing	193.0	3	Commscope LNX-6515DS-VTM					
Proposed	***188.0***	***3***	***Ericsson RRUS-12***	(3) 15.0' T-Frames with Catwalk and MT195-14 Handrail Kit	***-***	***-***	***-***	***AT&T***
Existing	188.0	3	Powerwave 7770		12 1 2	1-5/8 7/16"Ø Fiber 3/8"Ø Power	CA Face	AT&T
		4	Powerwave P65-17-XLH-RR					
		6	Powerwave LGP 21401 TMA					
		3	Ericsson RRUS-11					
		2	Raycap DC6-48-60-18-8F					
		3	Ericsson RRUS-12					
		3	Ericsson RRUS-32					
		6	CCI TPX-070621					
		2	KMW AM-X-CD-16-65-00T-RET					
To Be Removed	*188.0*	*3*	*Ericsson RRUS-11*	-	-	-	-	*AT&T*

Table 1 - Existing/Proposed/Future Antenna and Cable Information (Continued)

Existing/ Proposed	Elevation (ft)	Qty	Antenna Model	Mount Type	Qty Coax	Coax Size	Coax[1] Location	Owner/ Tenant
Existing	169.0	2	Antel BXA-70063-6CF	(3) 15.0' T-Frames with Catwalk	12 1	1-5/8 Fiber	AB Face	Verizon
		4	Decibel DB844G65ZAXY					
		1	Antel BXA 70080/6CF					
		2	Decibel DB846F65ZAXY					
		6	RFS FD9R6004/2C-3L					
		3	Alcatel Lucent RRH2x60-AWS					
		3	Alcatel Lucent RRH2x60-PCS					
		1	RFS DB-T1-6Z-8AB-0Z					
		6	HBXX-6517DS-A2M					
Existing	152.0	3	RFS APXVTM14-C-120	(3) 12.0' Sector Frames	7	1-1/4"Ø Fiber	BC Face	Sprint
		3	Decibel DB980H90T3E-M					
		3	RFS APXVSPP18-C-A20					
		3	RFS RRU 800MHz 2x50W					
		3	Alcatel-Lucent TD-RRH 8x20-25					
		3	RFS RRU 1900MHz 2x40W					
Existing	75.5	1	GPS Antenna	4.5' Standoff	1	5/8"Ø	BC Face	Unknown

Notes:
1) See "Appendix B – Coax Configuration" for assumed coax configuration.
2) T-Mobile Future Loading consists of 8,798.26 in^2 wind area and (6) feed lines at 193-ft elevation.

Table 2 - Detailed Future Loading Information

Existing/ Proposed	Elevation (ft)	Wind Area (in^2) (includes Ca factors)	Weight (lb)	Qty Coax	Coax Size	% Capacity	Owner/ Tenant
Existing	195	13,201.74	1,715.47	18	1 5/8	72.3	T-Mobile
Future	***195***	***8798.26***	***1,143.27***	***6***	***1 5/8***	***-***	***T-Mobile***
Total	195	22,000.00	2858.74	24	1 5/8	86.7	T-Mobile

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Qty Coax	Coax Size (in)	Coax Location
197.5	197.5	6	Unknown	RV90-17-00DP	6	1-5/8	Unknown
197.5	197.5	6	Unknown	FE15SO1P72-P73	12	1/2	Unknown
185.0	185.0	12	Unknown	DAPA 58000	12	1-5/8	Unknown
170.0	170.0	3	Unknown	PD 128	3	1-5/8	Unknown
160.0	160.0	12	Unknown	DAPA 58000	12	1-5/8	Unknown
150.0	150.0	3	Unknown	PD128	3	1-5/8	Unknown
140.0	140.0	1	Unknown	PD128	1	1-5/8	Unknown

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Tower and Foundation Drawings	Fred A. Nudd Corporation, dated May 5, 1998 Project No. 5974	25628	TEP
Structural Modification Drawings	Fred A. Nudd Corporation, dated April 30, 1999 Drawing No. 99-6726-1	25628	TEP
Steel and Appurtenance Mapping	Tower Engineering Professionals, Inc. dated June 3, 2010	102056	TEP
Post-Modification Inspection	Tower Engineering Professionals, Inc. dated April 21, 2011	102056	TEP
Geotechnical Report	Dr. Clarence Welti, P.E., P.C., dated April 17, 1998	25628	TEP
Structural Modification Drawings	Tower Engineering Professionals, Inc. dated August 29, 2011	102056	TEP
Structural Modification Drawings	Tower Engineering Professionals, Inc. dated July 26, 2012	102056	TEP
Structural Modification Analysis	Tower Engineering Professionals, Inc. dated August 1, 2013	25628_4865	TEP
Previous Structural Analysis	Tower Engineering Professionals, Inc. dated February 26, 2016	25628_44243	TEP
Structural Modification Analysis	Tower Engineering Professionals, Inc., dated August 24, 2016	25628.93911	TEP
Structural Modification Drawings	Tower Engineering Professionals, Inc., dated April 19, 2016	25628.47301	TEP
Post Modification Inspection	Tower Engineering Professionals, Inc., dated October 26, 2016	25628.58752	TEP
Correspondence	Correspondence with Phoenix Tower International with regards to the existing, proposed, and future loading.	-	PTI

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) The tower and foundation were built in accordance with the manufacturer's specifications.
2) The tower and foundation 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 Table 1 and "Appendix B – Coax Configuration".
4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by the standard.
5) All tower components are in sufficient condition to carry their full design capacity.
6) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
7) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_{allow} (lb)	% Capacity	Pass / Fail
T1	195 - 180	Leg	PIPE 2.5 STD (SCH 40)	3	-38730.50	70532.50	54.9	Pass
T2	180 - 175	Leg	PIPE 2.5 STD (SCH 40)	45	-42524.00	77102.10	55.2	Pass
T3	175 - 170	Leg	PIPE 2.5 STD (SCH 40)	57	-52573.90	77205.80	68.1	Pass
T4	170 - 160	Leg	2.5SCH40 w/ 3SCH80 Half Sleeve	Note 1	Note 1	Note 1	71.1	Pass
T5	160 - 150	Leg	Pipe 3.5 Std (SCH40)	90	-95851.20	126932.00	75.5	Pass
T6	150 - 140	Leg	3.5SCH40 w/ 4SCH40 Half Sleeve	Note 1	Note 1	Note 1	62.6	Pass
T7	140 - 133.333	Leg	5 STD w/ 6 XH Half Sleeve	Note 1	Note 1	Note 1	48.8	Pass
T8	133.333 - 126.667	Leg	5 STD w/ 6 XH Half Sleeve	Note 1	Note 1	Note 1	48.8	Pass
T9	126.667 - 120	Leg	5 STD w/ 6 XH Half Sleeve	Note 1	Note 1	Note 1	48.8	Pass
T10	120 - 113.333	Leg	PIPE 6 STD (SCH40)	159	-169661.00	269041.00	63.1	Pass
T11	113.333 - 106.667	Leg	PIPE 6 STD (SCH40)	171	-182216.00	269071.00	67.7	Pass
T12	106.667 - 100	Leg	PIPE 6 STD (SCH40)	183	-193974.00	269098.00	72.1	Pass
T13	100 - 80	Leg	6 STD w/ 7 XH Half Sleeve	Note 1	Note 1	Note 1	52.0	Pass
T14	80 - 60	Leg	PIPE 8 STD (SCH40)	225	-265382.00	391613.00	67.8	Pass
T15	60 - 50	Leg	PIPE 8 STD (SCH40)	246	-277558.00	401143.00	69.2	Pass
T16	50 - 40	Leg	PIPE 8 STD (SCH40)	258	-294558.00	401194.00	73.4	Pass
T17	40 - 20	Leg	PIPE 8 X-STR (SCH80)	270	-328068.00	549495.00	59.7	Pass
T18	20 - 0	Leg	PIPE 8 X-STR (SCH80)	285	-358619.00	550136.00	65.2	Pass
T1	195 - 180	Diagonal	5/8	12	8822.77	9940.20	88.8	Pass
T2	180 - 175	Diagonal	L1 1/2x1 1/2x3/16	48	-4150.08	7609.55	54.5 73.1 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_{allow} (lb)	% Capacity	Pass / Fail
T3	175 - 170	Diagonal	L2x2x3/16	60	-3251.08	12363.90	26.3 47.9 (b)	Pass
T4	170 - 160	Diagonal	2L1 1/2x1 1/2x3/16x1/4	84	-5238.02	19298.30	27.1 58.4 (b)	Pass
T5	160 - 150	Diagonal	2L2x2x3/16x1/4	93	-5718.41	28526.20	20.0 66.6 (b)	Pass
T6	150 - 140	Diagonal	2L2x2x3/16x1/4	114	-5732.84	26601.10	21.6 68.1 (b)	Pass
T7	140 - 133.333	Diagonal	L2 1/2x2 1/2x1/4	135	-5943.22	17991.90	33.0 45.9 (b)	Pass
T8	133.333 - 126.667	Diagonal	L2 1/2x2 1/2x1/4	144	-6156.29	16560.40	37.2 47.3 (b)	Pass
T9	126.667 - 120	Diagonal	L2 1/2x2 1/2x3/16	153	-5990.09	11588.10	51.7 75.5 (b)	Pass
T10	120 - 113.333	Diagonal	L3x3x1/4	163	-7072.90	22906.10	30.9 50.5 (b)	Pass
T11	113.333 - 106.667	Diagonal	L3x3x1/4	175	-7183.14	21593.20	33.3 52.4 (b)	Pass
T12	106.667 - 100	Diagonal	L2 1/2x2 1/2x1/4	187	-7278.92	11557.60	63.0	Pass
T13	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	199	-7434.66	30316.40	24.5 31.0 (b)	Pass
T14	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	229	-7891.60	26091.70	30.2 33.2 (b)	Pass
T15	60 - 50	Diagonal	L3x3x5/16	250	-9778.67	13914.00	70.3	Pass
T16	50 - 40	Diagonal	L3x3x5/16	262	-9589.07	12883.30	74.4	Pass
T17	40 - 20	Diagonal	L4x4x3/8	274	-9494.49	28926.60	32.8 38.2 (b)	Pass
T18	20 - 0	Diagonal	L5x5x5/16	289	-10153.50	38816.00	26.2 40.9 (b)	Pass
T1	195 - 180	Horizontal	L1 1/2x1 1/2x3/16	17	-6008.35	7512.48	80.0	Pass
T2	180 - 175	Secondary Horizontal	L2x2x3/16	54	-737.46	15868.60	4.6 10.8 (b)	Pass
T3	175 - 170	Secondary Horizontal	L2x2x3/16	65	911.74	18739.00	4.9 13.3 (b)	Pass
T4	170 - 160	Secondary Horizontal	L2x2x3/16	77	-1294.90	17128.60	7.6 19.0 (b)	Pass
T5	160 - 150	Secondary Horizontal	L2x2x3/16	98	-1662.26	15131.00	11.0 24.3 (b)	Pass
T6	150 - 140	Secondary Horizontal	L2x2x3/16	120	-2066.85	13027.80	15.9 30.3 (b)	Pass
T10	120 - 113.333	Secondary Horizontal	L3x3x3/16	167	-2942.92	19381.00	15.2 37.6 (b)	Pass
T11	113.333 - 106.667	Secondary Horizontal	L3x3x3/16	179	-3161.65	20509.90	15.4 40.4 (b)	Pass
T12	106.667 - 100	Secondary Horizontal	L3x3x3/16	191	-3365.14	17992.10	18.7 43.0 (b)	Pass
T13	100 - 80	Secondary Horizontal	L3x3x1/4	203	-3998.15	19981.80	20.0 28.8 (b)	Pass
T15	60 - 50	Secondary Horizontal	L4x4x3/8	254	-4813.45	44960.90	10.7 38.7 (b)	Pass
T16	50 - 40	Secondary Horizontal	L4x4x1/4	267	-5108.25	28993.60	17.6 35.6 (b)	Pass
T1	195 - 180	Top Girt	L1 1/2x1 1/2x3/16	5	-1487.50	7512.48	19.8	Pass
T1	195 - 180	Bottom Girt	L1 1/2x1 1/2x3/16	8	-2964.33	7512.48	39.5	Pass
							Summary	
						Leg (T4)	71.1	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_{allow} (lb)	% Capacity	Pass / Fail
						Diagonal (T1)	88.8	Pass
						Horizontal (T1)	80.0	Pass
						Secondary Horizontal (T12)	43.0	Pass
						Top Girt (T1)	19.8	Pass
						Bottom Girt (T1)	39.5	Pass
						Bolt Checks	75.5	Pass
						RATING =	**88.8**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
-	Anchor Rods	-	71.2	Pass
1	Base Foundation - Soil Interaction	-	36.6	Pass
1	Base Foundation - Structural	-	53.1	Pass

Structure Rating (max from all components) =	88.8%

Note:
1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.

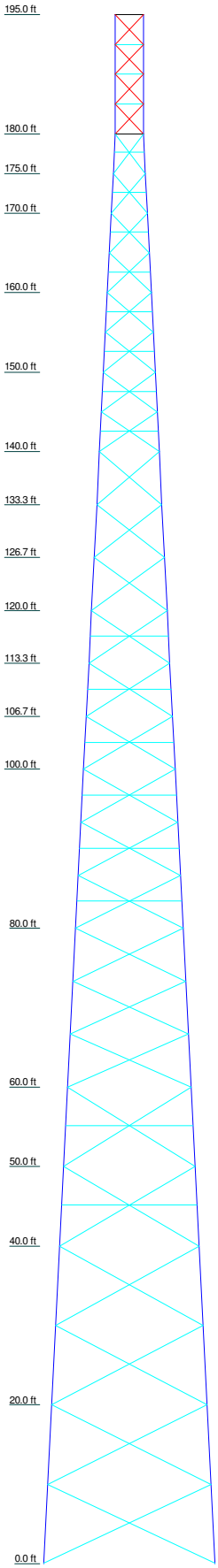
4.1) Recommendations

1) If the load differs from that described in Table 1 of this report or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The tower and its foundation have sufficient capacity to carry the existing, proposed, and future loading. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18
Legs	PIPE 2.5 STD (SCH 40)			A	B	C	5 STD w/ 6 XH Half Sleeve			P/PE 6 STD (SCH40)			6 STD w/ 7 XH Half Sleeve	P/PE 8 STD (SCH40)				P/PE 8 X-STR (SCH80)
Leg Grade	A572-55			A53-B-35	A572-55	A500-50	A500-46			A572-55			A53-B-42	A572-55				
Diagonals	SR 5/8	D	E	F	2L2x2x3/16x1/4		L2 1/2x2 1/2x1/4		G	L3x3x1/4		H	L3 1/2x3 1/2x1/4		L3x3x5/16		L4x4x3/8	L5x5x5/16
Diagonal Grade	A36																	
Top Girts	L1 1/2x1 1/2x3/16												N.A.					
Bottom Girts	L1 1/2x1 1/2x3/16												N.A.					
Horizontals	L1 1/2x1 1/2x3/16												N.A.					
Sec. Horizontals	N.A.				L2x2x3/16			N.A.			L3x3x3/16		L3x3x1/4	N.A.		L4x4x1/4	L4x4x3/8	N.A.
Face Width (ft) 21.5	3.5		4	4.5	5.5	6.5	7.5	8.16667	8.83333	9.5	10.1667	10.8333	11.5	13.5	15.5	16.5	17.5	19.5
# Panels @ (ft)	4 @ 3.75			8 @ 5				12 @ 6.66667								4 @ 10		2 @ 9.95833
Weight (lb) 30526.3	494.2	181.8	214.0	707.8	817.6	1040.7	829.5	842.1	788.4	839.4	863.2	820.9	4304.0	3370.0	2011.3	1912.1	5068.0	5431.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Sector Mount [SM 802-3]	195	DC6-48-60-18-8F	188
HSS Top Mount	195	(3) Sector Mounts 169-ft	169
APX16DWV-16DWVS-A	195	(2) BXA-70063/6CF w/ Mount Pipe	169
APX16DWV-16DWVS-A	195	(2) DB844G65ZAXY w/Mount Pipe	169
APX16DWV-16DWVS-A	195	(2) DB844G65ZAXY w/Mount Pipe	169
(2) KRY 112 71	195	DB-B1/T1 w/ Mount Pipe	169
(2) KRY 112 71	195	(2) HBXX-6517DS-A2M w/ Mount Pipe	169
(2) KRY 112 71	195	(2) HBXX-6517DS-A2M w/ Mount Pipe	169
T-Mobile Reserved	195	(2) HBXX-6517DS-A2M w/ Mount Pipe	169
LNX-6515DS-VTM w/ Mount Pipe	193	RRH2x60-AWS	169
LNX-6515DS-VTM w/ Mount Pipe	193	RRH2x60-AWS	169
LNX-6515DS-VTM w/ Mount Pipe	193	RRH2x60-AWS	169
(3) Sector Mounts 188-ft	188	RRH2X60-PCS	169
Miscellaneous [NA 510-1]	188	RRH2X60-PCS	169
7770.00 w/ Mount Pipe	188	RRH2X60-PCS	169
7770.00 w/ Mount Pipe	188	BXA-70080/6CF w/ Mount Pipe	169
7770.00 w/ Mount Pipe	188	DB846F65ZAXY w/Mount Pipe	169
P65-17-XLH-RR w/Mount Pipe	188	DB846F65ZAXY w/Mount Pipe	169
AM-X-CD-16-65-00T-RET w/ Mount Pipe	188	(2) FD9R6004	169
AM-X-CD-16-65-00T-RET w/ Mount Pipe	188	(2) FD9R6004	169
P65-17-XLH-RR w/Mount Pipe	188	(2) FD9R6004	169
P65-17-XLH-RR w/Mount Pipe	188	TD-RRH8x20-25	152
P65-17-XLH-RR w/Mount Pipe	188	DB980H90T2E-M w/ Mount Pipe	152
(2) TPX - 070621	188	APXVTM14-C-120 w/ Mount Pipe	152
(2) TPX - 070621	188	APXVTM14-C-120 w/ Mount Pipe	152
(2) TPX - 070621	188	APXVTM14-C-120 w/ Mount Pipe	152
RRUS-12	188	TD-RRH8x20-25	152
RRUS-12	188	TD-RRH8x20-25	152
RRUS-12	188	DB980H90T2E-M w/ Mount Pipe	152
RRUS-12	188	DB980H90T2E-M w/ Mount Pipe	152
RRUS-12	188	1900MHz 2X40W RRH	152
RRUS-12	188	1900MHz 2X40W RRH	152
(2) LGP21401	188	1900MHz 2X40W RRH	152
(2) LGP21401	188	Sector Mount [SM 502-3]	152
(2) LGP21401	188	APXVSPP18-C-A20 w/ Mount Pipe	152
RRUS-11	188	APXVSPP18-C-A20 w/ Mount Pipe	152
RRUS-11	188	APXVSPP18-C-A20 w/ Mount Pipe	152
RRUS-11	188	800MHZ 2X50W RRH	152
RRUS-32 B30	188	800MHZ 2X50W RRH	152
RRUS-32 B30	188	800MHZ 2X50W RRH	152
RRUS-32 B30	188	1.75" Dia x 5-ft Pipe	75.5
DC6-48-60-18-8F	188	GPS0015	75.5

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	2.5SCH40 w/ 3SCH80 Half Sleeve	E	L2x2x3/16
B	Pipe 3.5 Std (SCH40)	F	2L1 1/2x1 1/2x3/16x1/4
C	3.5SCH40 w/ 4SCH40 Half Sleeve	G	L2 1/2x2 1/2x3/16
D	L1 1/2x1 1/2x3/16	H	L2 1/2x2 1/2x1/4

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-55	55 ksi	70 ksi	A500-50	50 ksi	62 ksi
A36	36 ksi	58 ksi	A500-46	46 ksi	62 ksi
A53-B-35	35 ksi	60 ksi	A53-B-42	42 ksi	63 ksi

TOWER DESIGN NOTES

1. Tower is located in New Haven 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 0.00 ft

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 366546 lb
SHEAR: 35631 lb

UPLIFT: -316039 lb
SHEAR: 31117 lb

AXIAL 177620 lb
SHEAR 16869 lb *MOMENT 2076785 lb-ft*

TORQUE 4400 lb-ft
50 mph WIND - 0.7500 in ICE

AXIAL 63842 lb
SHEAR 55298 lb *MOMENT 6428754 lb-ft*

TORQUE 12686 lb-ft
REACTIONS - 93 mph WIND

Tower Engineering Professionals

Tower Engineering Professionals, Inc.
326 Tryon Road
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job:	**US-CT-1003 - Straits Turnpike**
Project:	**TEP #25628.93911**
Client: Phoenix Tower International	Drawn by: Christopher Bean, E.I. / App'd:
Code: TIA-222-G	Date: 01/26/17 / Scale: NTS
Path:	Dwg No. E-1

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 195.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.50 ft at the top and 21.50 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

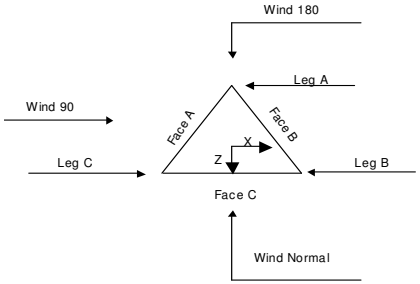
Tower is located in New Haven County, Connecticut.
Basic wind speed of 93 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
√ SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
√ Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder

Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
√ SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
√ Offset Girt At Foundation
√ Consider Feed Line Torque
√ Include Angle Block Shear Check
√ Use TIA-222-G Bracing Resist. Exemption
√ Use TIA-222-G Tension Splice Exemption
Poles
Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	195.00-180.00			3.50	1	15.00
T2	180.00-175.00			3.50	1	5.00
T3	175.00-170.00			4.00	1	5.00
T4	170.00-160.00			4.50	1	10.00
T5	160.00-150.00			5.50	1	10.00
T6	150.00-140.00			6.50	1	10.00
T7	140.00-133.33			7.50	1	6.67
T8	133.33-126.67			8.17	1	6.67
T9	126.67-120.00			8.83	1	6.67
T10	120.00-113.33			9.50	1	6.67
T11	113.33-106.67			10.17	1	6.67
T12	106.67-100.00			10.83	1	6.67
T13	100.00-80.00			11.50	1	20.00
T14	80.00-60.00			13.50	1	20.00
T15	60.00-50.00			15.50	1	10.00
T16	50.00-40.00			16.50	1	10.00
T17	40.00-20.00			17.50	1	20.00
T18	20.00-0.00			19.50	1	20.00

Tower Section Geometry *(cont'd)*

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
T1	195.00-180.00	3.75	TX Brace	No	Yes	0.0000	0.0000
T2	180.00-175.00	5.00	X Brace	No	Yes	0.0000	0.0000
T3	175.00-170.00	5.00	X Brace	No	Yes	0.0000	0.0000
T4	170.00-160.00	5.00	X Brace	No	Yes	0.0000	0.0000
T5	160.00-150.00	5.00	X Brace	No	Yes	0.0000	0.0000
T6	150.00-140.00	5.00	X Brace	No	Yes	0.0000	0.0000
T7	140.00-133.33	6.67	X Brace	No	No	0.0000	0.0000
T8	133.33-126.67	6.67	X Brace	No	No	0.0000	0.0000
T9	126.67-120.00	6.67	X Brace	No	No	0.0000	0.0000
T10	120.00-113.33	6.67	X Brace	No	Yes	0.0000	0.0000
T11	113.33-106.67	6.67	X Brace	No	Yes	0.0000	0.0000
T12	106.67-100.00	6.67	X Brace	No	Yes	0.0000	0.0000
T13	100.00-80.00	6.67	X Brace	No	Yes	0.0000	0.0000
T14	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T15	60.00-50.00	10.00	X Brace	No	Yes	0.0000	0.0000
T16	50.00-40.00	10.00	X Brace	No	Yes	0.0000	0.0000
T17	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T18	20.00-0.00	9.96	X Brace	No	No	0.0000	1.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 195.00-180.00	Pipe	PIPE 2.5 STD (SCH 40)	A572-55 (55 ksi)	Solid Round	5/8	A36 (36 ksi)
T2 180.00-175.00	Pipe	PIPE 2.5 STD (SCH 40)	A572-55 (55 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 175.00-170.00	Pipe	PIPE 2.5 STD (SCH 40)	A572-55 (55 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T4 170.00-160.00	Arbitrary Shape	2.5SCH40 w/ 3SCH80 Half Sleeve	A53-B-35 (35 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16x1/4	A36 (36 ksi)
T5 160.00-150.00	Pipe	Pipe 3.5 Std (SCH40)	A572-55 (55 ksi)	Double Angle	2L2x2x3/16x1/4	A36 (36 ksi)
T6 150.00-140.00	Arbitrary Shape	3.5SCH40 w/ 4SCH40 Half Sleeve	A500-50 (50 ksi)	Double Angle	2L2x2x3/16x1/4	A36 (36 ksi)
T7 140.00-133.33	Arbitrary Shape	5 STD w/ 6 XH Half Sleeve	A500-46 (46 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T8 133.33-126.67	Arbitrary Shape	5 STD w/ 6 XH Half Sleeve	A500-46 (46 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T9 126.67-120.00	Arbitrary Shape	5 STD w/ 6 XH Half Sleeve	A500-46 (46 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T10 120.00-113.33	Pipe	PIPE 6 STD (SCH40)	A572-55 (55 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T11 113.33-106.67	Pipe	PIPE 6 STD (SCH40)	A572-55 (55 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T12 106.67-100.00	Pipe	PIPE 6 STD (SCH40)	A572-55 (55 ksi)	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T13 100.00-80.00	Arbitrary Shape	6 STD w/ 7 XH Half Sleeve	A53-B-42 (42 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T14 80.00-60.00	Pipe	PIPE 8 STD (SCH40)	A572-55 (55 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T15 60.00-50.00	Pipe	PIPE 8 STD (SCH40)	A572-55 (55 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T16 50.00-40.00	Pipe	PIPE 8 STD (SCH40)	A572-55 (55 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T17 40.00-20.00	Pipe	PIPE 8 X-STR (SCH80)	A572-55	Equal Angle	L4x4x3/8	A36

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
			(55 ksi)			(36 ksi)
T18 20.00-0.00	Pipe	PIPE 8 X-STR (SCH80)	A572-55 (55 ksi)	Equal Angle	L5x5x5/16	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 195.00-180.00	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 195.00-180.00	None	Flat Bar		A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	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
T2 180.00-175.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T3 175.00-170.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T4 170.00-160.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T5 160.00-150.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T6 150.00-140.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T10 120.00-113.33	Equal Angle	L3x3x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T11 113.33-106.67	Equal Angle	L3x3x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T12 106.67-100.00	Equal Angle	L3x3x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T13 100.00-80.00	Equal Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T15 60.00-50.00	Equal Angle	L4x4x3/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T16 50.00-40.00	Equal Angle	L4x4x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 195.00-180.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T2 180.00-175.00	0.00	0.2500	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T3 175.00-170.00	0.00	0.2500	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T4 170.00-160.00	0.00	0.2500	A36 (36 ksi)	1	1	1	Mid-Pt	0.0000	36.0000
T5 160.00-150.00	0.00	0.2500	A36 (36 ksi)	1	1	1	Mid-Pt	0.0000	36.0000
T6 150.00-140.00	0.00	0.2500	A36 (36 ksi)	1	1	1	Mid-Pt	0.0000	36.0000
T7 140.00-133.33	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T8 133.33-126.67	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T9 126.67-120.00	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T10 120.00-113.33	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T11 113.33-106.67	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T12 106.67-100.00	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T13 100.00-80.00	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T14 80.00-60.00	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T15 60.00-50.00	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T16 50.00-40.00	0.00	0.3750	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T17 40.00-20.00	0.00	0.4375	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T18 20.00-0.00	0.00	0.4375	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000

Tower Section Geometry *(cont'd)*

K Factors[1]

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	0.96	0.96	1	1
195.00-180.00				1	1	1	0.96	0.96	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
180.00-175.00				1	1	1	1	1	0.5	1
T3	No	Yes	1	1.09	1	1	1	1	1	1
175.00-170.00				1.09	1	1	1	1	0.5	1
T4	No	Yes	1	1.15	1	1	1	1	1	1
170.00-160.00				1.15	1	1	1	1	0.5	1
T5	No	Yes	1	1.25	1	1	1	1	1	1
160.00-150.00				1.25	1	1	1	1	0.5	1
T6	No	Yes	1	1.22	1	1	1	1	1	1
150.00-140.00				1.22	1	1	1	1	0.5	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
140.00-133.33				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
133.33-126.67				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
126.67-120.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
120.00-113.33				1	1	1	1	1	0.5	1
T11	No	Yes	1	0.98	1	1	1	1	1	1
113.33-106.67				0.98	1	1	1	1	0.5	1
T12	Yes	Yes	1	1	1	1	1	1	1	1
106.67-100.00				1	1	1	1	1	0.5	1
T13	No	Yes	1	0.85	1	1	1	1	1	1
100.00-80.00				0.85	1	1	1	1	0.5	1
T14	No	Yes	1	0.85	1	1	1	1	1	1
80.00-60.00				0.85	1	1	1	1	1	1
T15	Yes	Yes	1	1	1	1	1	1	1	1
60.00-50.00				1	1	1	1	1	0.5	1
T16	Yes	Yes	1	1	1	1	1	1	1	1
50.00-40.00				1	1	1	1	1	0.5	1
T17	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T18	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				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 195.00-180.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1
T2 180.00-175.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 175.00-170.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower 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
T4 170.00-160.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 160.00-150.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 150.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 140.00-133.33	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 133.33-126.67	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 126.67-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 120.00-113.33	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 113.33-106.67	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T12 106.67-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T13 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T14 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T15 60.00-50.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T16 50.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T17 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T18 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 195.00-180.00	Flange	0.7500 A325N	4	0.0000 A325N	0	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T2 180.00-175.00	Flange	0.7500 A325N	0	0.5000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T3 175.00-170.00	Flange	0.7500 A325N	0	0.5000 A325X	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T4 170.00-160.00	Flange	0.7500 A325N	6	0.5000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T5 160.00-150.00	Flange	1.0000 A325N	0	0.5000 A325X	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T6 150.00-140.00	Flange	1.0000 A325N	6	0.5000 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T7 140.00-133.33	Flange	1.0000 A325N	0	0.6250 A325X	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0

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.
T8 133.33-126.67	Flange	1.0000 A325N	0	0.6250 A325X	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T9 126.67-120.00	Flange	1.0000 A325N	8	0.6250 A325N	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T10 120.00-113.33	Flange	1.0000 A325N	0	0.6250 A325X	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T11 113.33-106.67	Flange	1.0000 A325N	0	0.6250 A325X	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T12 106.67-100.00	Flange	1.0000 A325N	8	0.6250 A325X	1	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T13 100.00-80.00	Flange	1.2500 A325N	8	0.6250 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.7500 A325N	1
T14 80.00-60.00	Flange	1.2500 A325N	8	0.6250 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.7500 A325X	0
T15 60.00-50.00	Flange	1.2500 A325N	0	0.6250 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	1
T16 50.00-40.00	Flange	1.2500 A325N	8	0.6250 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.7500 A325X	1
T17 40.00-20.00	Flange	1.2500 A325N	8	0.6250 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0
T18 20.00-0.00	Flange	1.5000 A36	8	0.6250 A325N	2	0.0000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	169.00 - 8.00	-2.0000	0.35	12	12	0.5000	1.9800		0.82
HB158-1-08U8-S8J18(1-5/8)	B	No	Ar (CaAa)	169.00 - 8.00	-4.0000	0.29	1	1	0.5000	0.0001		1.30
WG Rail 1.5x1.5x1/4 ****	B	No	Af (CaAa)	170.00 - 8.00	-2.0000	0.35	2	2	36.5000	1.5000		2.40
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	195.00 - 8.00	0.0000	0	24	9	0.5000	1.9800		0.82
WG Rail 1.5x1.5x3/16 ****	B	No	Af (CaAa)	181.00 - 0.00	0.0000	0	2	2	36.0000	1.5000		1.81
5/8" dia. coax	C	No	Ar (CaAa)	75.50 - 10.00	0.0000	0	1	1	0.5000	0.6250		0.15
1 1/4" Fiber	C	No	Ar (CaAa)	152.00 - 10.00	0.0000	0.04	7	4	0.5000	1.2500		0.38
WG Rail 1.5x1.5x3/16 ****	C	No	Af (CaAa)	160.00 - 0.00	0.0000	0.1	2	2	35.0000	1.5000		1.81
LDF7-50A (1-5/8 FOAM)	A	No	Ar (CaAa)	188.00 - 8.00	0.0000	0.3	12	6	0.5000	1.9800		0.82
7/16" Fiber Cable (24 fibers Max)	A	No	Ar (CaAa)	188.00 - 8.00	0.0000	0.375	2	2	0.5000	0.4375		0.03
8AWG7	A	No	Ar (CaAa)	188.00 - 8.00	0.0000	0.35	4	4	0.5000	0.3750		0.15
WG Rail 1.5x1.5x1/8	A	No	Af (CaAa)	180.00 - 2.00	0.0000	0.3	2	2	1.5000	1.5000		1.23

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 plf
***												
Safety Line 3/8	A	No	Ar (CaAa)	195.00 - 0.00	0.0000	0.5	1	1	0.3750	0.3750		0.22
Step Pegs (5/8" SR) 7-in. w/30" step	A	No	Ar (CaAa)	195.00 - 0.00	0.0000	0.5	1	1	0.3500	0.3500		0.49
Step Pegs (5/8" SR) 7-in. w/30" step	B	No	Ar (CaAa)	60.00 - 0.00	0.0000	0.5	1	1	0.3500	0.3500		0.49
Step Pegs (5/8" SR) 7-in. w/30" step	C	No	Ar (CaAa)	60.00 - 0.00	0.0000	0.5	1	1	0.3500	0.3500		0.49
*****												
Rung L1.5x1.5x1/8 (36.25"w, 34"s)	B	No	Af (CaAa)	170.00 - 8.00	-2.0000	0.35	1	1	0.5000	0.0001		1.31
Rung L1.5x1.5x1/8 (36"w, 34"s)	B	No	Af (CaAa)	181.00 - 0.00	0.0000	0	1	1	0.5000	0.0001		1.29
Rung L2x1.5x1/8 (35"w, 48"s)	C	No	Af (CaAa)	160.00 - 0.00	0.0000	0.1	1	1	0.5000	0.0001		1.05
Rung L1.5x1.5x1/8 (36"w, 34"s)	A	No	Af (CaAa)	180.00 - 2.00	0.0000	0.3	1	1	0.5000	0.0001		1.29
****												

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft²/ft	Weight plf
****							
****							
****							
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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
T1	195.00-180.00	A	0.000	0.000	21.996	0.000	94.61
		B	0.000	0.000	71.780	0.000	300.12
		C	0.000	0.000	0.000	0.000	0.00
T2	180.00-175.00	A	0.000	0.000	15.930	0.000	74.81
		B	0.000	0.000	26.260	0.000	122.97
		C	0.000	0.000	0.000	0.000	0.00
T3	175.00-170.00	A	0.000	0.000	15.930	0.000	74.81
		B	0.000	0.000	26.260	0.000	122.97

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
		C	0.000	0.000	0.000	0.000	0.00
T4	170.00-160.00	A	0.000	0.000	31.860	0.000	149.62
		B	0.000	0.000	78.904	0.000	407.34
		C	0.000	0.000	0.000	0.000	0.00
T5	160.00-150.00	A	0.000	0.000	31.860	0.000	149.62
		B	0.000	0.000	81.280	0.000	418.48
		C	0.000	0.000	6.750	0.000	51.97
T6	150.00-140.00	A	0.000	0.000	31.860	0.000	149.62
		B	0.000	0.000	81.280	0.000	418.48
		C	0.000	0.000	13.750	0.000	73.16
T7	140.00-133.33	A	0.000	0.000	21.240	0.000	99.75
		B	0.000	0.000	54.187	0.000	278.99
		C	0.000	0.000	9.167	0.000	48.77
T8	133.33-126.67	A	0.000	0.000	21.240	0.000	99.75
		B	0.000	0.000	54.187	0.000	278.99
		C	0.000	0.000	9.167	0.000	48.77
T9	126.67-120.00	A	0.000	0.000	21.240	0.000	99.75
		B	0.000	0.000	54.187	0.000	278.99
		C	0.000	0.000	9.167	0.000	48.77
T10	120.00-113.33	A	0.000	0.000	21.240	0.000	99.75
		B	0.000	0.000	54.187	0.000	278.99
		C	0.000	0.000	9.167	0.000	48.77
T11	113.33-106.67	A	0.000	0.000	21.240	0.000	99.75
		B	0.000	0.000	54.187	0.000	278.99
		C	0.000	0.000	9.167	0.000	48.77
T12	106.67-100.00	A	0.000	0.000	21.240	0.000	99.75
		B	0.000	0.000	54.187	0.000	278.99
		C	0.000	0.000	9.167	0.000	48.77
T13	100.00-80.00	A	0.000	0.000	63.720	0.000	299.24
		B	0.000	0.000	162.561	0.000	836.96
		C	0.000	0.000	27.500	0.000	146.32
T14	80.00-60.00	A	0.000	0.000	63.720	0.000	299.24
		B	0.000	0.000	162.561	0.000	836.96
		C	0.000	0.000	28.469	0.000	148.65
T15	60.00-50.00	A	0.000	0.000	31.860	0.000	149.62
		B	0.000	0.000	81.630	0.000	423.35
		C	0.000	0.000	14.725	0.000	79.53
T16	50.00-40.00	A	0.000	0.000	31.860	0.000	149.62
		B	0.000	0.000	81.630	0.000	423.35
		C	0.000	0.000	14.725	0.000	79.53
T17	40.00-20.00	A	0.000	0.000	63.720	0.000	299.24
		B	0.000	0.000	163.261	0.000	846.70
		C	0.000	0.000	29.450	0.000	159.06
T18	20.00-0.00	A	0.000	0.000	41.812	0.000	207.73
		B	0.000	0.000	102.237	0.000	551.24
		C	0.000	0.000	20.075	0.000	131.07

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
T1	195.00-180.00	A	1.785	0.000	0.000	45.484	0.000	666.72
		B		0.000	0.000	53.092	0.000	1295.55
		C		0.000	0.000	0.000	0.000	0.00
T2	180.00-175.00	A	1.775	0.000	0.000	32.632	0.000	498.87
		B		0.000	0.000	24.983	0.000	573.14
		C		0.000	0.000	0.000	0.000	0.00

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 lb
T3	175.00-170.00	A	1.770	0.000	0.000	32.582	0.000	497.42
		B		0.000	0.000	24.959	0.000	571.93
		C		0.000	0.000	0.000	0.000	0.00
T4	170.00-160.00	A	1.762	0.000	0.000	65.010	0.000	990.34
		B		0.000	0.000	105.987	0.000	2069.09
		C		0.000	0.000	0.000	0.000	0.00
T5	160.00-150.00	A	1.751	0.000	0.000	64.793	0.000	984.08
		B		0.000	0.000	110.273	0.000	2126.09
		C		0.000	0.000	18.488	0.000	337.22
T6	150.00-140.00	A	1.739	0.000	0.000	64.564	0.000	977.46
		B		0.000	0.000	110.039	0.000	2114.25
		C		0.000	0.000	30.308	0.000	501.87
T7	140.00-133.33	A	1.729	0.000	0.000	42.908	0.000	647.76
		B		0.000	0.000	73.221	0.000	1402.55
		C		0.000	0.000	20.140	0.000	332.35
T8	133.33-126.67	A	1.720	0.000	0.000	42.795	0.000	644.52
		B		0.000	0.000	73.106	0.000	1396.73
		C		0.000	0.000	20.086	0.000	330.48
T9	126.67-120.00	A	1.711	0.000	0.000	42.676	0.000	641.12
		B		0.000	0.000	72.984	0.000	1390.65
		C		0.000	0.000	20.029	0.000	328.53
T10	120.00-113.33	A	1.702	0.000	0.000	42.552	0.000	637.57
		B		0.000	0.000	72.857	0.000	1384.27
		C		0.000	0.000	19.969	0.000	326.49
T11	113.33-106.67	A	1.692	0.000	0.000	42.421	0.000	633.85
		B		0.000	0.000	72.723	0.000	1377.58
		C		0.000	0.000	19.906	0.000	324.34
T12	106.67-100.00	A	1.681	0.000	0.000	42.283	0.000	629.93
		B		0.000	0.000	72.582	0.000	1370.53
		C		0.000	0.000	19.840	0.000	322.09
T13	100.00-80.00	A	1.658	0.000	0.000	125.941	0.000	1864.18
		B		0.000	0.000	216.816	0.000	4065.50
		C		0.000	0.000	59.083	0.000	951.55
T14	80.00-60.00	A	1.617	0.000	0.000	124.322	0.000	1818.98
		B		0.000	0.000	215.159	0.000	3983.94
		C		0.000	0.000	64.287	0.000	996.58
T15	60.00-50.00	A	1.579	0.000	0.000	61.404	0.000	888.61
		B		0.000	0.000	110.312	0.000	1996.24
		C		0.000	0.000	36.078	0.000	536.88
T16	50.00-40.00	A	1.547	0.000	0.000	60.788	0.000	871.82
		B		0.000	0.000	109.618	0.000	1964.41
		C		0.000	0.000	35.656	0.000	524.48
T17	40.00-20.00	A	1.486	0.000	0.000	119.161	0.000	1678.82
		B		0.000	0.000	216.518	0.000	3805.60
		C		0.000	0.000	69.658	0.000	1001.27
T18	20.00-0.00	A	1.331	0.000	0.000	80.511	0.000	1074.76
		B		0.000	0.000	138.614	0.000	2301.04
		C		0.000	0.000	48.750	0.000	686.44

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	195.00-180.00	1.6096	-2.2192	0.7360	-1.4186
T2	180.00-175.00	1.0909	-2.7593	1.0631	-2.0518
T3	175.00-170.00	1.1847	-3.0194	1.1506	-2.2502

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T4	170.00-160.00	2.5316	-1.8172	2.7309	-1.0132
T5	160.00-150.00	2.7492	-1.5278	2.7527	-0.2733
T6	150.00-140.00	2.9340	-1.2867	2.9881	-0.1912
T7	140.00-133.33	3.2230	-1.4074	3.3440	-0.2800
T8	133.33-126.67	3.4910	-1.5201	3.6261	-0.3075
T9	126.67-120.00	3.7558	-1.6314	3.9043	-0.3347
T10	120.00-113.33	3.8313	-1.6607	3.9934	-0.3456
T11	113.33-106.67	4.0694	-1.7607	4.2444	-0.3703
T12	106.67-100.00	4.3666	-1.8862	4.5255	-0.3978
T13	100.00-80.00	4.6189	-1.9898	4.8944	-0.4356
T14	80.00-60.00	5.4089	-2.2773	5.7724	-0.3670
T15	60.00-50.00	5.8933	-2.3932	6.1257	0.0252
T16	50.00-40.00	6.2214	-2.5238	6.4814	0.0150
T17	40.00-20.00	6.8592	-2.7786	7.2624	-0.0067
T18	20.00-0.00	5.8256	-2.7017	6.4753	-0.1421

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	7	LDF7-50A (1-5/8 FOAM)	180.00 - 195.00	0.6000	0.3995
T1	8	WG Rail 1.5x1.5x3/16	180.00 - 181.00	0.6000	0.3995
T1	18	LDF7-50A (1-5/8 FOAM)	180.00 - 188.00	0.6000	0.3995
T1	19	7/16" Fiber Cable (24 fibers Max)	180.00 - 188.00	0.6000	0.3995
T1	20	8AWG7	180.00 - 188.00	0.6000	0.3995
T1	29	Safety Line 3/8	180.00 - 195.00	0.6000	0.3995
T1	30	Step Pegs (5/8" SR) 7-in. w/30" step	180.00 - 195.00	0.6000	0.3995
T1	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	180.00 - 181.00	0.6000	0.3995
T2	7	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.4444
T2	8	WG Rail 1.5x1.5x3/16	175.00 - 180.00	0.6000	0.4444
T2	18	LDF7-50A (1-5/8 FOAM)	175.00 - 180.00	0.6000	0.4444
T2	19	7/16" Fiber Cable (24 fibers Max)	175.00 - 180.00	0.6000	0.4444
T2	20	8AWG7	175.00 - 180.00	0.6000	0.4444
T2	21	WG Rail 1.5x1.5x1/8	175.00 - 180.00	0.6000	0.4444
T2	29	Safety Line 3/8	175.00 - 180.00	0.6000	0.4444
T2	30	Step Pegs (5/8" SR) 7-in. w/30" step	175.00 - 180.00	0.6000	0.4444
T2	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	175.00 - 180.00	0.6000	0.4444
T2	44	Rung L1.5x1.5x1/8 (36"w,	175.00 -	0.6000	0.4444

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		34"s)	180.00		
T3	7	LDF7-50A (1-5/8 FOAM)	170.00 - 175.00	0.6000	0.4600
T3	8	WG Rail 1.5x1.5x3/16	170.00 - 175.00	0.6000	0.4600
T3	18	LDF7-50A (1-5/8 FOAM)	170.00 - 175.00	0.6000	0.4600
T3	19	7/16" Fiber Cable (24 fibers Max)	170.00 - 175.00	0.6000	0.4600
T3	20	8AWG7	170.00 - 175.00	0.6000	0.4600
T3	21	WG Rail 1.5x1.5x1/8	170.00 - 175.00	0.6000	0.4600
T3	29	Safety Line 3/8	170.00 - 175.00	0.6000	0.4600
T3	30	Step Pegs (5/8" SR) 7-in. w/30" step	170.00 - 175.00	0.6000	0.4600
T3	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	170.00 - 175.00	0.6000	0.4600
T3	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	170.00 - 175.00	0.6000	0.4600
T4	1	LDF7-50A (1-5/8 FOAM)	160.00 - 169.00	0.6000	0.5462
T4	2	HB158-1-08U8-S8J18(1-5/8)	160.00 - 169.00	0.6000	0.5462
T4	3	WG Rail 1.5x1.5x1/4	160.00 - 170.00	0.6000	0.5462
T4	7	LDF7-50A (1-5/8 FOAM)	160.00 - 170.00	0.6000	0.5462
T4	8	WG Rail 1.5x1.5x3/16	160.00 - 170.00	0.6000	0.5462
T4	18	LDF7-50A (1-5/8 FOAM)	160.00 - 170.00	0.6000	0.5462
T4	19	7/16" Fiber Cable (24 fibers Max)	160.00 - 170.00	0.6000	0.5462
T4	20	8AWG7	160.00 - 170.00	0.6000	0.5462
T4	21	WG Rail 1.5x1.5x1/8	160.00 - 170.00	0.6000	0.5462
T4	29	Safety Line 3/8	160.00 - 170.00	0.6000	0.5462
T4	30	Step Pegs (5/8" SR) 7-in. w/30" step	160.00 - 170.00	0.6000	0.5462
T4	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	160.00 - 170.00	0.6000	0.5462
T4	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	160.00 - 170.00	0.6000	0.5462
T4	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	160.00 - 170.00	0.6000	0.5462
T5	1	LDF7-50A (1-5/8 FOAM)	150.00 - 160.00	0.6000	0.5278
T5	2	HB158-1-08U8-S8J18(1-5/8)	150.00 - 160.00	0.6000	0.5278
T5	3	WG Rail 1.5x1.5x1/4	150.00 - 160.00	0.6000	0.5278
T5	7	LDF7-50A (1-5/8 FOAM)	150.00 - 160.00	0.6000	0.5278
T5	8	WG Rail 1.5x1.5x3/16	150.00 - 160.00	0.6000	0.5278
T5	11	1 1/4" Fiber	150.00 - 152.00	0.6000	0.5278
T5	12	WG Rail 1.5x1.5x3/16	150.00 -	0.6000	0.5278

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			160.00		
T5	18	LDF7-50A (1-5/8 FOAM)	150.00 - 160.00	0.6000	0.5278
T5	19	7/16" Fiber Cable (24 fibers Max)	150.00 - 160.00	0.6000	0.5278
T5	20	8AWG7	150.00 - 160.00	0.6000	0.5278
T5	21	WG Rail 1.5x1.5x1/8	150.00 - 160.00	0.6000	0.5278
T5	29	Safety Line 3/8	150.00 - 160.00	0.6000	0.5278
T5	30	Step Pegs (5/8" SR) 7-in. w/30" step	150.00 - 160.00	0.6000	0.5278
T5	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	150.00 - 160.00	0.6000	0.5278
T5	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	150.00 - 160.00	0.6000	0.5278
T5	42	Rung L2x1.5x1/8 (35"w, 48"s)	150.00 - 160.00	0.6000	0.5278
T5	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	150.00 - 160.00	0.6000	0.5278
T6	1	LDF7-50A (1-5/8 FOAM)	140.00 - 150.00	0.6000	0.5518
T6	2	HB158-1-08U8-S8J18(1-5/8)	140.00 - 150.00	0.6000	0.5518
T6	3	WG Rail 1.5x1.5x1/4	140.00 - 150.00	0.6000	0.5518
T6	7	LDF7-50A (1-5/8 FOAM)	140.00 - 150.00	0.6000	0.5518
T6	8	WG Rail 1.5x1.5x3/16	140.00 - 150.00	0.6000	0.5518
T6	11	1 1/4" Fiber	140.00 - 150.00	0.6000	0.5518
T6	12	WG Rail 1.5x1.5x3/16	140.00 - 150.00	0.6000	0.5518
T6	18	LDF7-50A (1-5/8 FOAM)	140.00 - 150.00	0.6000	0.5518
T6	19	7/16" Fiber Cable (24 fibers Max)	140.00 - 150.00	0.6000	0.5518
T6	20	8AWG7	140.00 - 150.00	0.6000	0.5518
T6	21	WG Rail 1.5x1.5x1/8	140.00 - 150.00	0.6000	0.5518
T6	29	Safety Line 3/8	140.00 - 150.00	0.6000	0.5518
T6	30	Step Pegs (5/8" SR) 7-in. w/30" step	140.00 - 150.00	0.6000	0.5518
T6	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	140.00 - 150.00	0.6000	0.5518
T6	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	140.00 - 150.00	0.6000	0.5518
T6	42	Rung L2x1.5x1/8 (35"w, 48"s)	140.00 - 150.00	0.6000	0.5518
T6	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	140.00 - 150.00	0.6000	0.5518
T7	1	LDF7-50A (1-5/8 FOAM)	133.33 - 140.00	0.6000	0.6000
T7	2	HB158-1-08U8-S8J18(1-5/8)	133.33 - 140.00	0.6000	0.6000
T7	3	WG Rail 1.5x1.5x1/4	133.33 - 140.00	0.6000	0.6000
T7	7	LDF7-50A (1-5/8 FOAM)	133.33 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T7	8	WG Rail 1.5x1.5x3/16	140.00 133.33 - 140.00	0.6000	0.6000
T7	11	1 1/4" Fiber	133.33 - 140.00	0.6000	0.6000
T7	12	WG Rail 1.5x1.5x3/16	133.33 - 140.00	0.6000	0.6000
T7	18	LDF7-50A (1-5/8 FOAM)	133.33 - 140.00	0.6000	0.6000
T7	19	7/16" Fiber Cable (24 fibers Max)	133.33 - 140.00	0.6000	0.6000
T7	20	8AWG7	133.33 - 140.00	0.6000	0.6000
T7	21	WG Rail 1.5x1.5x1/8	133.33 - 140.00	0.6000	0.6000
T7	29	Safety Line 3/8	133.33 - 140.00	0.6000	0.6000
T7	30	Step Pegs (5/8" SR) 7-in. w/30" step	133.33 - 140.00	0.6000	0.6000
T7	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	133.33 - 140.00	0.6000	0.6000
T7	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	133.33 - 140.00	0.6000	0.6000
T7	42	Rung L2x1.5x1/8 (35"w, 48"s)	133.33 - 140.00	0.6000	0.6000
T7	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	133.33 - 140.00	0.6000	0.6000
T8	1	LDF7-50A (1-5/8 FOAM)	126.67 - 133.33	0.6000	0.6000
T8	2	HB158-1-08U8-S8J18(1-5/8)	126.67 - 133.33	0.6000	0.6000
T8	3	WG Rail 1.5x1.5x1/4	126.67 - 133.33	0.6000	0.6000
T8	7	LDF7-50A (1-5/8 FOAM)	126.67 - 133.33	0.6000	0.6000
T8	8	WG Rail 1.5x1.5x3/16	126.67 - 133.33	0.6000	0.6000
T8	11	1 1/4" Fiber	126.67 - 133.33	0.6000	0.6000
T8	12	WG Rail 1.5x1.5x3/16	126.67 - 133.33	0.6000	0.6000
T8	18	LDF7-50A (1-5/8 FOAM)	126.67 - 133.33	0.6000	0.6000
T8	19	7/16" Fiber Cable (24 fibers Max)	126.67 - 133.33	0.6000	0.6000
T8	20	8AWG7	126.67 - 133.33	0.6000	0.6000
T8	21	WG Rail 1.5x1.5x1/8	126.67 - 133.33	0.6000	0.6000
T8	29	Safety Line 3/8	126.67 - 133.33	0.6000	0.6000
T8	30	Step Pegs (5/8" SR) 7-in. w/30" step	126.67 - 133.33	0.6000	0.6000
T8	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	126.67 - 133.33	0.6000	0.6000
T8	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	126.67 - 133.33	0.6000	0.6000
T8	42	Rung L2x1.5x1/8 (35"w, 48"s)	126.67 - 133.33	0.6000	0.6000
T8	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	126.67 - 133.33	0.6000	0.6000
T9	1	LDF7-50A (1-5/8 FOAM)	120.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T9	2	HB158-1-08U8-S8J18(1-5/8)	126.67 120.00 - 126.67	0.6000	0.6000
T9	3	WG Rail 1.5x1.5x1/4	120.00 - 126.67	0.6000	0.6000
T9	7	LDF7-50A (1-5/8 FOAM)	120.00 - 126.67	0.6000	0.6000
T9	8	WG Rail 1.5x1.5x3/16	120.00 - 126.67	0.6000	0.6000
T9	11	1 1/4" Fiber	120.00 - 126.67	0.6000	0.6000
T9	12	WG Rail 1.5x1.5x3/16	120.00 - 126.67	0.6000	0.6000
T9	18	LDF7-50A (1-5/8 FOAM)	120.00 - 126.67	0.6000	0.6000
T9	19	7/16" Fiber Cable (24 fibers Max)	120.00 - 126.67	0.6000	0.6000
T9	20	8AWG7	120.00 - 126.67	0.6000	0.6000
T9	21	WG Rail 1.5x1.5x1/8	120.00 - 126.67	0.6000	0.6000
T9	29	Safety Line 3/8	120.00 - 126.67	0.6000	0.6000
T9	30	Step Pegs (5/8" SR) 7-in. w/30" step	120.00 - 126.67	0.6000	0.6000
T9	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	120.00 - 126.67	0.6000	0.6000
T9	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	120.00 - 126.67	0.6000	0.6000
T9	42	Rung L2x1.5x1/8 (35"w, 48"s)	120.00 - 126.67	0.6000	0.6000
T9	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	120.00 - 126.67	0.6000	0.6000
T10	1	LDF7-50A (1-5/8 FOAM)	113.33 - 120.00	0.6000	0.6000
T10	2	HB158-1-08U8-S8J18(1-5/8)	113.33 - 120.00	0.6000	0.6000
T10	3	WG Rail 1.5x1.5x1/4	113.33 - 120.00	0.6000	0.6000
T10	7	LDF7-50A (1-5/8 FOAM)	113.33 - 120.00	0.6000	0.6000
T10	8	WG Rail 1.5x1.5x3/16	113.33 - 120.00	0.6000	0.6000
T10	11	1 1/4" Fiber	113.33 - 120.00	0.6000	0.6000
T10	12	WG Rail 1.5x1.5x3/16	113.33 - 120.00	0.6000	0.6000
T10	18	LDF7-50A (1-5/8 FOAM)	113.33 - 120.00	0.6000	0.6000
T10	19	7/16" Fiber Cable (24 fibers Max)	113.33 - 120.00	0.6000	0.6000
T10	20	8AWG7	113.33 - 120.00	0.6000	0.6000
T10	21	WG Rail 1.5x1.5x1/8	113.33 - 120.00	0.6000	0.6000
T10	29	Safety Line 3/8	113.33 - 120.00	0.6000	0.6000
T10	30	Step Pegs (5/8" SR) 7-in. w/30" step	113.33 - 120.00	0.6000	0.6000
T10	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	113.33 - 120.00	0.6000	0.6000
T10	41	Rung L1.5x1.5x1/8 (36"w,	113.33 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
		34"s)	120.00		
T10	42	Rung L2x1.5x1/8 (35"w, 48"s)	113.33 - 120.00	0.6000	0.6000
T10	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	113.33 - 120.00	0.6000	0.6000
T11	1	LDF7-50A (1-5/8 FOAM)	106.67 - 113.33	0.6000	0.6000
T11	2	HB158-1-08U8-S8J18(1-5/8)	106.67 - 113.33	0.6000	0.6000
T11	3	WG Rail 1.5x1.5x1/4	106.67 - 113.33	0.6000	0.6000
T11	7	LDF7-50A (1-5/8 FOAM)	106.67 - 113.33	0.6000	0.6000
T11	8	WG Rail 1.5x1.5x3/16	106.67 - 113.33	0.6000	0.6000
T11	11	1 1/4" Fiber	106.67 - 113.33	0.6000	0.6000
T11	12	WG Rail 1.5x1.5x3/16	106.67 - 113.33	0.6000	0.6000
T11	18	LDF7-50A (1-5/8 FOAM)	106.67 - 113.33	0.6000	0.6000
T11	19	7/16" Fiber Cable (24 fibers Max)	106.67 - 113.33	0.6000	0.6000
T11	20	8AWG7	106.67 - 113.33	0.6000	0.6000
T11	21	WG Rail 1.5x1.5x1/8	106.67 - 113.33	0.6000	0.6000
T11	29	Safety Line 3/8	106.67 - 113.33	0.6000	0.6000
T11	30	Step Pegs (5/8" SR) 7-in. w/30" step	106.67 - 113.33	0.6000	0.6000
T11	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	106.67 - 113.33	0.6000	0.6000
T11	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	106.67 - 113.33	0.6000	0.6000
T11	42	Rung L2x1.5x1/8 (35"w, 48"s)	106.67 - 113.33	0.6000	0.6000
T11	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	106.67 - 113.33	0.6000	0.6000
T12	1	LDF7-50A (1-5/8 FOAM)	100.00 - 106.67	0.6000	0.6000
T12	2	HB158-1-08U8-S8J18(1-5/8)	100.00 - 106.67	0.6000	0.6000
T12	3	WG Rail 1.5x1.5x1/4	100.00 - 106.67	0.6000	0.6000
T12	7	LDF7-50A (1-5/8 FOAM)	100.00 - 106.67	0.6000	0.6000
T12	8	WG Rail 1.5x1.5x3/16	100.00 - 106.67	0.6000	0.6000
T12	11	1 1/4" Fiber	100.00 - 106.67	0.6000	0.6000
T12	12	WG Rail 1.5x1.5x3/16	100.00 - 106.67	0.6000	0.6000
T12	18	LDF7-50A (1-5/8 FOAM)	100.00 - 106.67	0.6000	0.6000
T12	19	7/16" Fiber Cable (24 fibers Max)	100.00 - 106.67	0.6000	0.6000
T12	20	8AWG7	100.00 - 106.67	0.6000	0.6000
T12	21	WG Rail 1.5x1.5x1/8	100.00 - 106.67	0.6000	0.6000
T12	29	Safety Line 3/8	100.00 -	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			106.67		
T12	30	Step Pegs (5/8" SR) 7-in. w/30" step	100.00 - 106.67	0.6000	0.6000
T12	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	100.00 - 106.67	0.6000	0.6000
T12	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	100.00 - 106.67	0.6000	0.6000
T12	42	Rung L2x1.5x1/8 (35"w, 48"s)	100.00 - 106.67	0.6000	0.6000
T12	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	100.00 - 106.67	0.6000	0.6000
T13	1	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T13	2	HB158-1-08U8-S8J18(1-5/8)	80.00 - 100.00	0.6000	0.6000
T13	3	WG Rail 1.5x1.5x1/4	80.00 - 100.00	0.6000	0.6000
T13	7	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T13	8	WG Rail 1.5x1.5x3/16	80.00 - 100.00	0.6000	0.6000
T13	11	1 1/4" Fiber	80.00 - 100.00	0.6000	0.6000
T13	12	WG Rail 1.5x1.5x3/16	80.00 - 100.00	0.6000	0.6000
T13	18	LDF7-50A (1-5/8 FOAM)	80.00 - 100.00	0.6000	0.6000
T13	19	7/16" Fiber Cable (24 fibers Max)	80.00 - 100.00	0.6000	0.6000
T13	20	8AWG7	80.00 - 100.00	0.6000	0.6000
T13	21	WG Rail 1.5x1.5x1/8	80.00 - 100.00	0.6000	0.6000
T13	29	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T13	30	Step Pegs (5/8" SR) 7-in. w/30" step	80.00 - 100.00	0.6000	0.6000
T13	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	80.00 - 100.00	0.6000	0.6000
T13	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	80.00 - 100.00	0.6000	0.6000
T13	42	Rung L2x1.5x1/8 (35"w, 48"s)	80.00 - 100.00	0.6000	0.6000
T13	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	80.00 - 100.00	0.6000	0.6000
T14	1	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T14	2	HB158-1-08U8-S8J18(1-5/8)	60.00 - 80.00	0.6000	0.6000
T14	3	WG Rail 1.5x1.5x1/4	60.00 - 80.00	0.6000	0.6000
T14	7	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T14	8	WG Rail 1.5x1.5x3/16	60.00 - 80.00	0.6000	0.6000
T14	10	5/8" dia. coax	60.00 - 75.50	0.6000	0.6000
T14	11	1 1/4" Fiber	60.00 - 80.00	0.6000	0.6000
T14	12	WG Rail 1.5x1.5x3/16	60.00 - 80.00	0.6000	0.6000
T14	18	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.6000
T14	19	7/16" Fiber Cable (24 fibers Max)	60.00 - 80.00	0.6000	0.6000
T14	20	8AWG7	60.00 - 80.00	0.6000	0.6000
T14	21	WG Rail 1.5x1.5x1/8	60.00 - 80.00	0.6000	0.6000
T14	29	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T14	30	Step Pegs (5/8" SR) 7-in. w/30" step	60.00 - 80.00	0.6000	0.6000
T14	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	60.00 - 80.00	0.6000	0.6000
T14	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	60.00 - 80.00	0.6000	0.6000
T14	42	Rung L2x1.5x1/8 (35"w, 48"s)	60.00 - 80.00	0.6000	0.6000
T14	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	60.00 - 80.00	0.6000	0.6000
T15	1	LDF7-50A (1-5/8 FOAM)	50.00 - 60.00	0.6000	0.6000
T15	2	HB158-1-08U8-S8J18(1-5/8)	50.00 - 60.00	0.6000	0.6000
T15	3	WG Rail 1.5x1.5x1/4	50.00 - 60.00	0.6000	0.6000
T15	7	LDF7-50A (1-5/8 FOAM)	50.00 - 60.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T15	8	WG Rail 1.5x1.5x3/16	50.00 - 60.00	0.6000	0.6000
T15	10	5/8" dia. coax	50.00 - 60.00	0.6000	0.6000
T15	11	1 1/4" Fiber	50.00 - 60.00	0.6000	0.6000
T15	12	WG Rail 1.5x1.5x3/16	50.00 - 60.00	0.6000	0.6000
T15	18	LDF7-50A (1-5/8 FOAM)	50.00 - 60.00	0.6000	0.6000
T15	19	7/16" Fiber Cable (24 fibers Max)	50.00 - 60.00	0.6000	0.6000
T15	20	8AWG7	50.00 - 60.00	0.6000	0.6000
T15	21	WG Rail 1.5x1.5x1/8	50.00 - 60.00	0.6000	0.6000
T15	29	Safety Line 3/8	50.00 - 60.00	0.6000	0.6000
T15	30	Step Pegs (5/8" SR) 7-in. w/30" step	50.00 - 60.00	0.6000	0.6000
T15	31	Step Pegs (5/8" SR) 7-in. w/30" step	50.00 - 60.00	0.6000	0.6000
T15	32	Step Pegs (5/8" SR) 7-in. w/30" step	50.00 - 60.00	0.6000	0.6000
T15	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	50.00 - 60.00	0.6000	0.6000
T15	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	50.00 - 60.00	0.6000	0.6000
T15	42	Rung L2x1.5x1/8 (35"w, 48"s)	50.00 - 60.00	0.6000	0.6000
T15	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	50.00 - 60.00	0.6000	0.6000
T16	1	LDF7-50A (1-5/8 FOAM)	40.00 - 50.00	0.6000	0.6000
T16	2	HB158-1-08U8-S8J18(1-5/8)	40.00 - 50.00	0.6000	0.6000
T16	3	WG Rail 1.5x1.5x1/4	40.00 - 50.00	0.6000	0.6000
T16	7	LDF7-50A (1-5/8 FOAM)	40.00 - 50.00	0.6000	0.6000
T16	8	WG Rail 1.5x1.5x3/16	40.00 - 50.00	0.6000	0.6000
T16	10	5/8" dia. coax	40.00 - 50.00	0.6000	0.6000
T16	11	1 1/4" Fiber	40.00 - 50.00	0.6000	0.6000
T16	12	WG Rail 1.5x1.5x3/16	40.00 - 50.00	0.6000	0.6000
T16	18	LDF7-50A (1-5/8 FOAM)	40.00 - 50.00	0.6000	0.6000
T16	19	7/16" Fiber Cable (24 fibers Max)	40.00 - 50.00	0.6000	0.6000
T16	20	8AWG7	40.00 - 50.00	0.6000	0.6000
T16	21	WG Rail 1.5x1.5x1/8	40.00 - 50.00	0.6000	0.6000
T16	29	Safety Line 3/8	40.00 - 50.00	0.6000	0.6000
T16	30	Step Pegs (5/8" SR) 7-in. w/30" step	40.00 - 50.00	0.6000	0.6000
T16	31	Step Pegs (5/8" SR) 7-in. w/30" step	40.00 - 50.00	0.6000	0.6000
T16	32	Step Pegs (5/8" SR) 7-in. w/30" step	40.00 - 50.00	0.6000	0.6000
T16	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	40.00 - 50.00	0.6000	0.6000
T16	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	40.00 - 50.00	0.6000	0.6000
T16	42	Rung L2x1.5x1/8 (35"w, 48"s)	40.00 - 50.00	0.6000	0.6000
T16	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	40.00 - 50.00	0.6000	0.6000
T17	1	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T17	2	HB158-1-08U8-S8J18(1-5/8)	20.00 - 40.00	0.6000	0.6000
T17	3	WG Rail 1.5x1.5x1/4	20.00 - 40.00	0.6000	0.6000
T17	7	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T17	8	WG Rail 1.5x1.5x3/16	20.00 - 40.00	0.6000	0.6000
T17	10	5/8" dia. coax	20.00 - 40.00	0.6000	0.6000
T17	11	1 1/4" Fiber	20.00 - 40.00	0.6000	0.6000
T17	12	WG Rail 1.5x1.5x3/16	20.00 - 40.00	0.6000	0.6000
T17	18	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T17	19	7/16" Fiber Cable (24 fibers	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
		Max)			
T17	20	8AWG7	20.00 - 40.00	0.6000	0.6000
T17	21	WG Rail 1.5x1.5x1/8	20.00 - 40.00	0.6000	0.6000
T17	29	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T17	30	Step Pegs (5/8" SR) 7-in. w/30" step	20.00 - 40.00	0.6000	0.6000
T17	31	Step Pegs (5/8" SR) 7-in. w/30" step	20.00 - 40.00	0.6000	0.6000
T17	32	Step Pegs (5/8" SR) 7-in. w/30" step	20.00 - 40.00	0.6000	0.6000
T17	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	20.00 - 40.00	0.6000	0.6000
T17	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	20.00 - 40.00	0.6000	0.6000
T17	42	Rung L2x1.5x1/8 (35"w, 48"s)	20.00 - 40.00	0.6000	0.6000
T17	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	20.00 - 40.00	0.6000	0.6000
T18	1	LDF7-50A (1-5/8 FOAM)	8.00 - 20.00	0.6000	0.6000
T18	2	HB158-1-08U8-S8J18(1-5/8)	8.00 - 20.00	0.6000	0.6000
T18	3	WG Rail 1.5x1.5x1/4	8.00 - 20.00	0.6000	0.6000
T18	7	LDF7-50A (1-5/8 FOAM)	8.00 - 20.00	0.6000	0.6000
T18	8	WG Rail 1.5x1.5x3/16	0.00 - 20.00	0.6000	0.6000
T18	10	5/8" dia. coax	10.00 - 20.00	0.6000	0.6000
T18	11	1 1/4" Fiber	10.00 - 20.00	0.6000	0.6000
T18	12	WG Rail 1.5x1.5x3/16	0.00 - 20.00	0.6000	0.6000
T18	18	LDF7-50A (1-5/8 FOAM)	8.00 - 20.00	0.6000	0.6000
T18	19	7/16" Fiber Cable (24 fibers Max)	8.00 - 20.00	0.6000	0.6000
T18	20	8AWG7	8.00 - 20.00	0.6000	0.6000
T18	21	WG Rail 1.5x1.5x1/8	2.00 - 20.00	0.6000	0.6000
T18	29	Safety Line 3/8	0.00 - 20.00	0.6000	0.6000
T18	30	Step Pegs (5/8" SR) 7-in. w/30" step	0.00 - 20.00	0.6000	0.6000
T18	31	Step Pegs (5/8" SR) 7-in. w/30" step	0.00 - 20.00	0.6000	0.6000
T18	32	Step Pegs (5/8" SR) 7-in. w/30" step	0.00 - 20.00	0.6000	0.6000
T18	39	Rung L1.5x1.5x1/8 (36.25"w, 34"s)	8.00 - 20.00	0.6000	0.6000
T18	41	Rung L1.5x1.5x1/8 (36"w, 34"s)	0.00 - 20.00	0.6000	0.6000
T18	42	Rung L2x1.5x1/8 (35"w, 48"s)	0.00 - 20.00	0.6000	0.6000
T18	44	Rung L1.5x1.5x1/8 (36"w, 34"s)	2.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
1.75" Dia x 5-ft Pipe	C	From Leg	2.25	-30.0000	75.50	No Ice	0.88	0.88	12.00
			0.00			1/2" Ice	1.32	1.32	19.06
			0.00			1" Ice	1.63	1.63	29.51
GPS0015	C	From Leg	4.50	-30.0000	75.50	No Ice	0.09	0.09	0.50
			0.00			1/2" Ice	0.13	0.13	2.29
			0.75			1" Ice	0.19	0.19	4.89
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Sector Mount [SM 502-3]	C	None		0.0000	152.00	No Ice	33.02	33.02	1673.10
						1/2" Ice	47.36	47.36	2223.90
						1" Ice	61.70	61.70	2774.70
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	5.00	0.0000	152.00	No Ice	8.02	6.71	78.90
			0.00			1/2" Ice	8.48	7.66	144.31
			0.00			1" Ice	8.94	8.49	217.47
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	5.00	0.0000	152.00	No Ice	8.02	6.71	78.90
			0.00			1/2" Ice	8.48	7.66	144.31
			0.00			1" Ice	8.94	8.49	217.47
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	5.00	0.0000	152.00	No Ice	8.02	6.71	78.90
			0.00			1/2" Ice	8.48	7.66	144.31
			0.00			1" Ice	8.94	8.49	217.47
800MHZ 2X50W RRH	A	From Leg	5.00	0.0000	152.00	No Ice	2.13	1.77	53.00
			0.00			1/2" Ice	2.32	1.95	74.19
			0.00			1" Ice	2.51	2.13	98.39
800MHZ 2X50W RRH	B	From Leg	5.00	0.0000	152.00	No Ice	2.13	1.77	53.00
			0.00			1/2" Ice	2.32	1.95	74.19
			0.00			1" Ice	2.51	2.13	98.39
800MHZ 2X50W RRH	C	From Leg	5.00	0.0000	152.00	No Ice	2.13	1.77	53.00
			0.00			1/2" Ice	2.32	1.95	74.19
			0.00			1" Ice	2.51	2.13	98.39
1900MHz 2X40W RRH	A	From Leg	5.00	0.0000	152.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00			1" Ice	3.20	3.09	108.98
1900MHz 2X40W RRH	B	From Leg	5.00	0.0000	152.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00			1" Ice	3.20	3.09	108.98
1900MHz 2X40W RRH	C	From Leg	5.00	0.0000	152.00	No Ice	2.71	2.61	59.50
			0.00			1/2" Ice	2.95	2.84	82.62
			0.00			1" Ice	3.20	3.09	108.98
DB980H90T2E-M w/ Mount Pipe	A	From Leg	5.00	0.0000	152.00	No Ice	4.04	3.62	30.40
			0.00			1/2" Ice	4.50	4.48	66.41
			0.00			1" Ice	4.95	5.22	108.76
DB980H90T2E-M w/ Mount Pipe	B	From Leg	5.00	0.0000	152.00	No Ice	4.04	3.62	30.40
			0.00			1/2" Ice	4.50	4.48	66.41
			0.00			1" Ice	4.95	5.22	108.76
DB980H90T2E-M w/ Mount Pipe	C	From Leg	5.00	0.0000	152.00	No Ice	4.04	3.62	30.40
			0.00			1/2" Ice	4.50	4.48	66.41
			0.00			1" Ice	4.95	5.22	108.76
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	5.00	0.0000	152.00	No Ice	6.34	3.61	56.20
			0.00			1/2" Ice	6.72	3.97	95.73
			0.00			1" Ice	7.10	4.33	140.32
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	5.00	0.0000	152.00	No Ice	6.34	3.61	56.20
			0.00			1/2" Ice	6.72	3.97	95.73
			0.00			1" Ice	7.10	4.33	140.32
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	5.00	0.0000	152.00	No Ice	6.34	3.61	56.20
			0.00			1/2" Ice	6.72	3.97	95.73
			0.00			1" Ice	7.10	4.33	140.32
TD-RRH8x20-25	A	From Leg	5.00	0.0000	152.00	No Ice	4.05	1.53	70.00

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 lb
			0.00			1/2" Ice	4.30	1.71	97.15
			0.00			1" Ice	4.56	1.90	127.83
TD-RRH8x20-25	B	From Leg	5.00	0.0000	152.00	No Ice	4.05	1.53	70.00
			0.00			1/2" Ice	4.30	1.71	97.15
			0.00			1" Ice	4.56	1.90	127.83
TD-RRH8x20-25	C	From Leg	5.00	0.0000	152.00	No Ice	4.05	1.53	70.00
			0.00			1/2" Ice	4.30	1.71	97.15
			0.00			1" Ice	4.56	1.90	127.83
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(3) Sector Mounts 169-ft	C	None		0.0000	169.00	No Ice	21.56	21.56	1395.40
						1/2" Ice	29.77	29.77	2140.10
						1" Ice	37.98	37.98	2884.80
(2) BXA-70063/6CF w/ Mount Pipe	A	From Leg	5.00	0.0000	169.00	No Ice	7.59	5.18	38.90
			0.00			1/2" Ice	8.04	6.11	95.39
			0.00			1" Ice	8.50	6.92	159.37
(2) DB844G65ZAXY w/Mount Pipe	B	From Leg	5.00	0.0000	169.00	No Ice	5.05	5.28	41.55
			0.00			1/2" Ice	5.68	6.31	92.81
			0.00			1" Ice	6.19	7.06	150.42
(2) DB844G65ZAXY w/Mount Pipe	C	From Leg	5.00	0.0000	169.00	No Ice	5.05	5.28	41.55
			0.00			1/2" Ice	5.68	6.31	92.81
			0.00			1" Ice	6.19	7.06	150.42
DB-B1/T1 w/ Mount Pipe	C	From Leg	5.00	0.0000	169.00	No Ice	4.88	4.18	57.55
			0.00			1/2" Ice	5.61	5.12	107.53
			0.00			1" Ice	6.16	5.77	163.14
(2) HBXX-6517DS-A2M w/ Mount Pipe	A	From Leg	5.00	0.0000	169.00	No Ice	8.77	6.96	67.23
			0.00			1/2" Ice	9.34	8.18	136.85
			0.00			1" Ice	9.89	9.14	214.64
(2) HBXX-6517DS-A2M w/ Mount Pipe	B	From Leg	5.00	0.0000	169.00	No Ice	8.77	6.96	67.23
			0.00			1/2" Ice	9.34	8.18	136.85
			0.00			1" Ice	9.89	9.14	214.64
(2) HBXX-6517DS-A2M w/ Mount Pipe	C	From Leg	5.00	0.0000	169.00	No Ice	8.77	6.96	67.23
			0.00			1/2" Ice	9.34	8.18	136.85
			0.00			1" Ice	9.89	9.14	214.64
RRH2x60-AWS	A	From Leg	5.00	0.0000	169.00	No Ice	3.50	1.82	60.00
			0.00			1/2" Ice	3.76	2.05	82.72
			0.00			1" Ice	4.03	2.29	109.06
RRH2x60-AWS	B	From Leg	5.00	0.0000	169.00	No Ice	3.50	1.82	60.00
			0.00			1/2" Ice	3.76	2.05	82.72
			0.00			1" Ice	4.03	2.29	109.06
RRH2x60-AWS	C	From Leg	5.00	0.0000	169.00	No Ice	3.50	1.82	60.00
			0.00			1/2" Ice	3.76	2.05	82.72
			0.00			1" Ice	4.03	2.29	109.06
RRH2X60-PCS	A	From Leg	5.00	0.0000	169.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35
			0.00			1" Ice	2.59	2.09	98.71
RRH2X60-PCS	B	From Leg	5.00	0.0000	169.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35
			0.00			1" Ice	2.59	2.09	98.71
RRH2X60-PCS	C	From Leg	5.00	0.0000	169.00	No Ice	2.20	1.72	55.00
			0.00			1/2" Ice	2.39	1.90	75.35
			0.00			1" Ice	2.59	2.09	98.71
BXA-70080/6CF w/ Mount Pipe	A	From Leg	5.00	0.0000	169.00	No Ice	7.59	5.54	42.90
			0.00			1/2" Ice	8.04	6.48	100.79
			0.00			1" Ice	8.50	7.30	166.25
DB846F65ZAXY w/Mount Pipe	B	From Leg	5.00	0.0000	169.00	No Ice	7.27	7.82	46.55
			0.00			1/2" Ice	7.83	9.01	113.93
			0.00			1" Ice	8.35	9.91	189.25

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 lb
DB846F65ZAXY w/Mount Pipe	C	From Leg	5.00	0.0000	169.00	No Ice	7.27	7.82	46.55
			0.00			1/2" Ice	7.83	9.01	113.93
			0.00			1" Ice	8.35	9.91	189.25
(2) FD9R6004	A	From Leg	5.00	0.0000	169.00	No Ice	0.37	0.08	3.10
			0.00			1/2" Ice	0.45	0.14	5.40
			0.00			1" Ice	0.54	0.20	8.79
(2) FD9R6004	B	From Leg	5.00	0.0000	169.00	No Ice	0.37	0.08	3.10
			0.00			1/2" Ice	0.45	0.14	5.40
			0.00			1" Ice	0.54	0.20	8.79
(2) FD9R6004	C	From Leg	5.00	0.0000	169.00	No Ice	0.37	0.08	3.10
			0.00			1/2" Ice	0.45	0.14	5.40
			0.00			1" Ice	0.54	0.20	8.79
****									
(3) Sector Mounts 188-ft	C	None		0.0000	188.00	No Ice	21.56	21.56	1395.40
						1/2" Ice	29.77	29.77	2140.10
						1" Ice	37.98	37.98	2884.80
Miscellaneous [NA 510-1]	C	None		0.0000	188.00	No Ice	6.00	6.00	255.70
						1/2" Ice	8.50	8.50	339.50
						1" Ice	11.00	11.00	409.12
7770.00 w/ Mount Pipe	A	From Leg	5.00	23.0000	188.00	No Ice	5.84	4.35	56.90
			0.00			1/2" Ice	6.32	5.20	105.42
			3.00			1" Ice	6.77	5.92	160.42
7770.00 w/ Mount Pipe	B	From Leg	5.00	23.0000	188.00	No Ice	5.84	4.35	56.90
			0.00			1/2" Ice	6.32	5.20	105.42
			3.00			1" Ice	6.77	5.92	160.42
7770.00 w/ Mount Pipe	C	From Leg	5.00	23.0000	188.00	No Ice	5.84	4.35	56.90
			0.00			1/2" Ice	6.32	5.20	105.42
			3.00			1" Ice	6.77	5.92	160.42
P65-17-XLH-RR w/Mount Pipe	A	From Leg	5.00	23.0000	188.00	No Ice	11.70	8.94	91.85
			0.00			1/2" Ice	12.42	10.45	177.61
			3.00			1" Ice	13.15	11.99	273.25
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	5.00	23.0000	188.00	No Ice	8.26	6.30	74.05
			0.00			1/2" Ice	8.82	7.48	139.04
			3.00			1" Ice	9.35	8.37	211.91
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	5.00	23.0000	188.00	No Ice	8.26	6.30	74.05
			0.00			1/2" Ice	8.82	7.48	139.04
			3.00			1" Ice	9.35	8.37	211.91
P65-17-XLH-RR w/Mount Pipe	A	From Leg	5.00	23.0000	188.00	No Ice	11.70	8.94	91.85
			0.00			1/2" Ice	12.42	10.45	177.61
			3.00			1" Ice	13.15	11.99	273.25
P65-17-XLH-RR w/Mount Pipe	B	From Leg	5.00	23.0000	188.00	No Ice	11.70	8.94	91.85
			0.00			1/2" Ice	12.42	10.45	177.61
			3.00			1" Ice	13.15	11.99	273.25
P65-17-XLH-RR w/Mount Pipe	C	From Leg	5.00	23.0000	188.00	No Ice	11.70	8.94	91.85
			0.00			1/2" Ice	12.42	10.45	177.61
			3.00			1" Ice	13.15	11.99	273.25
(2) TPX - 070621	A	From Leg	5.00	23.0000	188.00	No Ice	0.47	0.18	7.50
			0.00			1/2" Ice	0.56	0.24	10.95
			3.00			1" Ice	0.66	0.32	15.73
(2) TPX - 070621	B	From Leg	5.00	23.0000	188.00	No Ice	0.47	0.18	7.50
			0.00			1/2" Ice	0.56	0.24	10.95
			3.00			1" Ice	0.66	0.32	15.73
(2) TPX - 070621	C	From Leg	5.00	23.0000	188.00	No Ice	0.47	0.18	7.50
			0.00			1/2" Ice	0.56	0.24	10.95
			3.00			1" Ice	0.66	0.32	15.73
RRUS-12	A	From Leg	5.00	23.0000	188.00	No Ice	2.70	1.21	60.00
			0.00			1/2" Ice	2.90	1.36	81.29

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 lb
			3.00			1" Ice	3.11	1.52	105.63
RRUS-12	B	From Leg	5.00	23.0000	188.00	No Ice	2.70	1.21	60.00
			0.00			1/2" Ice	2.90	1.36	81.29
			3.00			1" Ice	3.11	1.52	105.63
RRUS-12	C	From Leg	5.00	23.0000	188.00	No Ice	2.70	1.21	60.00
			0.00			1/2" Ice	2.90	1.36	81.29
			3.00			1" Ice	3.11	1.52	105.63
RRUS-12	A	From Leg	5.00	23.0000	188.00	No Ice	2.70	1.21	60.00
			0.00			1/2" Ice	2.90	1.36	81.29
			3.00			1" Ice	3.11	1.52	105.63
RRUS-12	B	From Leg	5.00	23.0000	188.00	No Ice	2.70	1.21	60.00
			0.00			1/2" Ice	2.90	1.36	81.29
			3.00			1" Ice	3.11	1.52	105.63
RRUS-12	C	From Leg	5.00	23.0000	188.00	No Ice	2.70	1.21	60.00
			0.00			1/2" Ice	2.90	1.36	81.29
			3.00			1" Ice	3.11	1.52	105.63
(2) LGP21401	A	From Leg	5.00	23.0000	188.00	No Ice	1.10	0.35	14.10
			0.00			1/2" Ice	1.24	0.44	21.26
			3.00			1" Ice	1.38	0.54	30.32
(2) LGP21401	B	From Leg	5.00	23.0000	188.00	No Ice	1.10	0.35	14.10
			0.00			1/2" Ice	1.24	0.44	21.26
			3.00			1" Ice	1.38	0.54	30.32
(2) LGP21401	C	From Leg	5.00	23.0000	188.00	No Ice	1.10	0.35	14.10
			0.00			1/2" Ice	1.24	0.44	21.26
			3.00			1" Ice	1.38	0.54	30.32
RRUS-11	A	From Leg	5.00	23.0000	188.00	No Ice	2.79	1.19	50.00
			0.00			1/2" Ice	3.00	1.34	70.87
			3.00			1" Ice	3.21	1.50	94.78
RRUS-11	B	From Leg	5.00	23.0000	188.00	No Ice	2.79	1.19	50.00
			0.00			1/2" Ice	3.00	1.34	70.87
			3.00			1" Ice	3.21	1.50	94.78
RRUS-11	C	From Leg	5.00	23.0000	188.00	No Ice	2.79	1.19	50.00
			0.00			1/2" Ice	3.00	1.34	70.87
			3.00			1" Ice	3.21	1.50	94.78
RRUS-32 B30	A	From Leg	5.00	23.0000	188.00	No Ice	3.31	2.42	77.00
			0.00			1/2" Ice	3.56	2.64	104.93
			3.00			1" Ice	3.81	2.86	136.47
RRUS-32 B30	B	From Leg	5.00	23.0000	188.00	No Ice	3.31	2.42	77.00
			0.00			1/2" Ice	3.56	2.64	104.93
			3.00			1" Ice	3.81	2.86	136.47
RRUS-32 B30	C	From Leg	5.00	23.0000	188.00	No Ice	3.31	2.42	77.00
			0.00			1/2" Ice	3.56	2.64	104.93
			3.00			1" Ice	3.81	2.86	136.47
DC6-48-60-18-8F	A	From Leg	0.50	0.0000	188.00	No Ice	0.92	0.92	18.90
			0.00			1/2" Ice	1.46	1.46	36.62
			3.00			1" Ice	1.64	1.64	56.82
DC6-48-60-18-8F	B	From Leg	0.50	0.0000	188.00	No Ice	0.92	0.92	18.90
			0.00			1/2" Ice	1.46	1.46	36.62
			3.00			1" Ice	1.64	1.64	56.82
****									
Sector Mount [SM 802-3]	C	None		0.0000	195.00	No Ice	24.41	24.41	930.00
						1/2" Ice	31.39	31.39	1362.00
						1" Ice	38.37	38.37	1794.00
HSS Top Mount	C	None		0.0000	195.00	No Ice	8.08	8.08	328.90
						1/2" Ice	9.70	9.70	415.20
						1" Ice	11.32	11.32	501.50
LNX-6515DS-VTM w/	A	From Leg	3.00	25.0000	193.00	No Ice	11.21	9.36	75.35

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 lb
Mount Pipe			0.00			1/2" Ice	11.83	10.68	158.69
			0.00			1" Ice	12.45	11.71	251.57
LNX-6515DS-VTM w/	B	From Leg	3.00	25.0000	193.00	No Ice	11.21	9.36	75.35
Mount Pipe			0.00			1/2" Ice	11.83	10.68	158.69
			0.00			1" Ice	12.45	11.71	251.57
LNX-6515DS-VTM w/	C	From Leg	3.00	25.0000	193.00	No Ice	11.21	9.36	75.35
Mount Pipe			0.00			1/2" Ice	11.83	10.68	158.69
			0.00			1" Ice	12.45	11.71	251.57
APX16DWV-16DWVS-A	A	From Leg	3.00	25.0000	195.00	No Ice	6.46	2.15	40.70
			0.00			1/2" Ice	6.83	2.49	73.65
			0.00			1" Ice	7.21	2.84	111.47
APX16DWV-16DWVS-A	B	From Leg	3.00	25.0000	195.00	No Ice	6.46	2.15	40.70
			0.00			1/2" Ice	6.83	2.49	73.65
			0.00			1" Ice	7.21	2.84	111.47
APX16DWV-16DWVS-A	C	From Leg	3.00	25.0000	195.00	No Ice	6.46	2.15	40.70
			0.00			1/2" Ice	6.83	2.49	73.65
			0.00			1" Ice	7.21	2.84	111.47
(2) KRY 112 71	A	From Leg	3.00	25.0000	195.00	No Ice	0.63	0.61	18.07
			0.00			1/2" Ice	0.75	0.79	26.97
			0.00			1" Ice	0.89	0.99	38.22
(2) KRY 112 71	B	From Leg	3.00	25.0000	195.00	No Ice	0.63	0.61	18.07
			0.00			1/2" Ice	0.75	0.79	26.97
			0.00			1" Ice	0.89	0.99	38.22
(2) KRY 112 71	C	From Leg	3.00	25.0000	195.00	No Ice	0.63	0.61	18.07
			0.00			1/2" Ice	0.75	0.79	26.97
			0.00			1" Ice	0.89	0.99	38.22
****									
T-Mobile Reserved	C	None		0.0000	195.00	No Ice	61.10	61.10	1143.27
						1/2" Ice	69.55	69.55	1756.80
						1" Ice	77.99	77.99	2370.32
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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

Comb. No.	Description
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	195 - 180	Leg	Max Tension	7	22863.01	-221.50	147.30
			Max. Compression	2	-38730.50	8.55	339.00
			Max. Mx	8	-6314.52	-434.34	-68.55
			Max. My	2	9164.55	-32.06	414.09
			Max. Vy	8	-1238.38	-0.00	-0.00
			Max. Vx	2	1239.04	0.00	-0.00
		Diagonal	Max Tension	24	8822.77	0.00	0.00
		Horizontal	Max Tension	2	670.83	0.00	0.00
			Max. Compression	12	-6008.35	0.00	0.00
			Max. Mx	35	119.87	-16.34	0.00
			Max. My	22	351.64	0.00	0.00
			Max. Vy	35	18.67	0.00	0.00
			Max. Vx	22	-0.00	0.00	0.00
		Top Girt	Max Tension	18	731.26	0.00	0.00
			Max. Compression	10	-1487.50	0.00	0.00
			Max. Mx	35	222.34	-16.34	0.00
			Max. My	22	-733.60	0.00	0.00
			Max. Vy	35	18.67	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	22	-0.00	0.00	0.00
		Bottom Girt	Max Tension	47	1.36	0.00	0.00
			Max. Compression	24	-2964.33	0.00	0.00
			Max. Mx	35	-38.72	-16.34	0.00
			Max. My	10	-2757.13	0.00	-0.00
			Max. Vy	35	18.67	0.00	0.00
			Max. Vx	10	0.00	0.00	0.00
T2	180 - 175	Leg	Max Tension	7	38146.75	324.94	9.47
			Max. Compression	2	-42524.04	-512.17	1.08
			Max. Mx	2	-42524.04	-512.17	1.08
			Max. My	8	-2799.46	-99.80	675.20
			Max. Vy	2	389.07	496.58	1.24
			Max. Vx	8	-336.37	-99.80	675.20
		Diagonal	Max Tension	23	3428.49	0.00	0.00
			Max. Compression	10	-4150.08	-22.46	7.95
			Max. Mx	25	-3954.52	-25.75	-3.77
			Max. My	10	-4012.45	-22.69	16.31
			Max. Vy	28	-14.15	13.91	-0.82
			Max. Vx	10	4.96	0.00	0.00
		Secondary Horizontal	Max Tension	2	737.46	0.00	0.00
			Max. Compression	2	-737.46	-35.76	-5.64
			Max. Mx	8	637.72	-42.83	-6.49
			Max. My	20	-467.21	25.60	13.62
			Max. Vy	8	-25.67	0.00	0.00
			Max. Vx	20	7.38	0.00	0.00
T3	175 - 170	Leg	Max Tension	7	46516.56	-564.97	-1.00
			Max. Compression	2	-52573.88	-202.41	6.76
			Max. Mx	2	-52569.90	695.77	-2.56
			Max. My	8	-3346.71	-99.91	675.18
			Max. Vy	2	-522.90	695.77	-2.56
			Max. Vx	8	390.72	-99.91	675.18
		Diagonal	Max Tension	12	3468.83	49.19	-0.84
			Max. Compression	12	-3251.08	0.00	0.00
			Max. Mx	2	2559.86	82.34	29.54
			Max. My	10	2299.75	81.51	31.00
			Max. Vy	27	-30.65	54.61	13.02
			Max. Vx	10	-10.13	0.00	0.00
		Secondary Horizontal	Max Tension	2	911.74	0.00	0.00
			Max. Compression	2	-911.74	19.80	-24.30
			Max. Mx	8	-59.75	41.20	-4.20
			Max. My	2	911.74	19.11	-24.52
			Max. Vy	30	-28.80	32.16	-3.29
			Max. Vx	2	-11.67	19.11	-24.52
T4	170 - 160	Leg	Max Tension	7	65703.26	-694.03	-2.00
			Max. Compression	2	-74667.78	-584.98	-0.61
			Max. Mx	2	-62036.37	867.75	6.98
			Max. My	4	-3972.59	-85.46	-595.93
			Max. Vy	2	-958.45	867.75	6.98
			Max. Vx	24	919.42	-31.24	381.56
		Diagonal	Max Tension	17	4823.98	-18.71	13.59
			Max. Compression	16	-5238.02	0.00	0.00
			Max. Mx	2	3707.88	-36.04	13.11
			Max. My	18	-5060.73	19.42	18.38
			Max. Vy	27	28.67	-33.48	7.80
			Max. Vx	18	5.24	0.00	0.00
		Secondary Horizontal	Max Tension	2	1294.90	0.00	0.00
			Max. Compression	2	-1294.90	3.52	-14.63
			Max. Mx	35	253.65	17.25	0.44

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	2	-1294.90	3.52	-14.63
			Max. Vy	35	23.34	17.25	0.44
			Max. Vx	22	-5.94	0.00	0.00
T5	160 - 150	Leg	Max Tension	7	84468.74	-1502.70	-1.29
			Max. Compression	2	-95851.17	-821.34	0.06
			Max. Mx	2	-94829.45	1758.34	-1.23
			Max. My	4	-4492.21	-150.67	-1112.19
			Max. Vy	2	1626.79	1758.32	-1.25
			Max. Vx	4	632.09	-96.88	-868.49
		Diagonal	Max Tension	13	5501.16	-66.85	5.97
			Max. Compression	12	-5718.41	0.00	0.00
			Max. Mx	2	2868.30	-95.93	22.55
			Max. My	10	-4862.93	72.64	-29.44
			Max. Vy	27	47.16	-73.18	-12.51
			Max. Vx	10	-7.69	0.00	0.00
		Secondary Horizontal	Max Tension	2	1662.26	0.00	0.00
			Max. Compression	2	-1662.26	6.21	-16.11
			Max. Mx	30	-355.48	22.51	-2.62
			Max. My	4	-1444.49	-4.77	-18.68
			Max. Vy	30	-27.05	22.51	-2.62
			Max. Vx	24	-6.57	-5.33	-18.51
T6	150 - 140	Leg	Max Tension	15	105130.96	651.64	5.39
			Max. Compression	2	-119180.63	1467.52	0.87
			Max. Mx	2	-107824.31	1522.92	0.49
			Max. My	4	-6076.90	-96.93	-868.48
			Max. Vy	2	-998.93	1467.52	0.87
			Max. Vx	4	-431.49	-96.93	-868.48
		Diagonal	Max Tension	13	5628.69	-43.58	-2.50
			Max. Compression	24	-5917.77	0.00	0.00
			Max. Mx	2	3861.96	-59.98	4.59
			Max. My	10	-5453.84	32.71	-10.44
			Max. Vy	27	46.30	-58.34	6.97
			Max. Vx	38	3.12	0.00	0.00
		Secondary Horizontal	Max Tension	2	2066.85	0.00	0.00
			Max. Compression	2	-2066.85	2.33	-7.90
			Max. Mx	34	138.85	21.81	1.84
			Max. My	4	-1157.01	4.56	9.64
			Max. Vy	34	28.87	21.81	1.84
			Max. Vx	8	-3.03	0.00	0.00
T7	140 - 133.333	Leg	Max Tension	15	116944.72	272.77	5.70
			Max. Compression	2	-132200.73	900.05	-10.10
			Max. Mx	2	-132200.73	900.05	-10.10
			Max. My	4	-7179.29	-8.79	-870.86
			Max. Vy	18	-250.66	896.22	-2.03
			Max. Vx	16	-76.59	-3.71	863.99
		Diagonal	Max Tension	12	5834.73	0.00	0.00
			Max. Compression	12	-5943.22	0.00	0.00
			Max. Mx	27	1474.05	55.09	-5.87
			Max. My	27	140.68	36.52	-7.43
			Max. Vy	29	41.78	48.57	-6.78
			Max. Vx	27	2.72	0.00	0.00
T8	133.333 - 126.667	Leg	Max Tension	15	129132.53	-877.73	14.32
			Max. Compression	2	-145656.62	623.09	6.37
			Max. Mx	2	-145372.66	900.05	-10.11
			Max. My	4	-7390.76	-8.96	-870.86
			Max. Vy	22	-110.59	-877.49	-18.96
			Max. Vx	4	-135.07	-8.96	-870.86
		Diagonal	Max Tension	12	6011.88	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Compression	12	-6156.29	0.00	0.00
			Max. Mx	27	1438.08	59.34	-6.23
			Max. My	27	93.76	42.28	-8.16
			Max. Vy	29	44.99	54.87	-7.19
			Max. Vx	27	2.83	0.00	0.00
T9	126.667 - 120	Leg	Max Tension	15	141008.13	-567.72	0.96
			Max. Compression	2	-158888.53	-6.06	-19.53
			Max. Mx	2	-158604.58	623.09	6.37
			Max. My	4	-8238.30	-105.05	-1762.01
			Max. Vy	18	148.86	617.42	2.07
			Max. Vx	4	268.53	-105.05	-1762.01
		Diagonal	Max Tension	12	5913.71	0.00	0.00
			Max. Compression	12	-5990.09	0.00	0.00
			Max. Mx	27	1583.09	55.92	-6.20
			Max. My	27	-20.80	50.01	-8.26
			Max. Vy	29	44.11	54.21	-7.20
			Max. Vx	27	2.72	0.00	0.00
T10	120 - 113.333	Leg	Max Tension	15	150967.45	-178.28	25.71
			Max. Compression	2	-169697.88	3866.07	5.45
			Max. Mx	2	-169555.11	3866.08	5.47
			Max. My	4	-8535.88	-233.30	-1901.31
			Max. Vy	2	1795.03	3866.08	5.47
			Max. Vx	4	557.85	-233.30	-1901.31
		Diagonal	Max Tension	13	6592.39	79.96	4.69
			Max. Compression	24	-7072.90	0.00	0.00
			Max. Mx	2	4152.82	109.34	9.34
			Max. My	8	-4947.50	-42.67	13.97
			Max. Vy	27	-61.42	103.38	10.02
			Max. Vx	27	-3.46	0.00	0.00
		Secondary Horizontal	Max Tension	2	2942.92	0.00	0.00
			Max. Compression	2	-2942.92	6.73	-12.08
			Max. Mx	32	172.71	53.59	9.70
			Max. My	4	-1755.54	16.52	20.56
			Max. Vy	32	-52.18	53.59	9.70
			Max. Vx	8	-4.54	0.00	0.00
T11	113.333 - 106.667	Leg	Max Tension	7	162066.85	1673.84	6.24
			Max. Compression	2	-182310.48	4319.92	4.77
			Max. Mx	2	-182109.86	4319.92	4.78
			Max. My	4	-9147.80	-283.65	-2057.69
			Max. Vy	2	-2053.20	4319.92	4.77
			Max. Vx	4	657.84	-283.65	-2057.69
		Diagonal	Max Tension	13	6843.52	79.34	4.69
			Max. Compression	24	-7183.14	0.00	0.00
			Max. Mx	2	4274.78	107.16	7.46
			Max. My	10	-6920.19	-53.29	13.80
			Max. Vy	27	-63.94	106.80	-10.66
			Max. Vx	27	-3.54	0.00	0.00
		Secondary Horizontal	Max Tension	2	3161.65	0.00	0.00
			Max. Compression	2	-3161.65	7.92	-9.48
			Max. Mx	36	163.67	58.06	10.63
			Max. My	4	-2274.52	19.12	18.30
			Max. Vy	36	-54.89	58.06	10.63
			Max. Vx	30	-4.03	0.00	0.00
T12	106.667 - 100	Leg	Max Tension	7	172576.73	1870.96	6.36
			Max. Compression	2	-194044.24	3956.05	7.63
			Max. Mx	2	-194044.24	3956.05	7.63
			Max. My	4	-9400.42	-283.67	-2057.68
			Max. Vy	2	-2021.53	3956.05	7.63

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	4	-599.81	-283.67	-2057.68
		Diagonal	Max Tension	13	6804.12	49.45	0.14
			Max. Compression	2	-7278.92	0.00	0.00
			Max. Mx	27	1040.47	90.42	7.96
			Max. My	12	1056.34	64.55	8.93
			Max. Vy	29	57.09	82.11	-5.95
			Max. Vx	27	2.73	0.00	0.00
		Secondary Horizontal	Max Tension	2	3365.14	0.00	0.00
			Max. Compression	2	-3365.14	16.56	-4.92
			Max. Mx	28	820.05	70.41	9.53
			Max. My	28	-210.63	65.63	17.35
			Max. Vy	28	58.96	70.41	9.53
			Max. Vx	31	-4.55	0.00	0.00
T13	100 - 80	Leg	Max Tension	7	203653.25	1017.78	4.51
			Max. Compression	2	-230545.43	283.26	6.27
			Max. Mx	2	-206607.00	3260.60	8.93
			Max. My	4	-10033.05	-175.83	-1860.50
			Max. Vy	2	-1484.54	3260.60	8.93
			Max. Vx	4	-539.49	-175.83	-1860.50
		Diagonal	Max Tension	13	7200.25	71.80	-0.34
			Max. Compression	24	-7610.74	0.00	0.00
			Max. Mx	27	1561.05	139.56	-15.69
			Max. My	33	-2324.67	109.36	18.18
			Max. Vy	29	86.29	134.47	-14.89
			Max. Vx	33	4.64	0.00	0.00
		Secondary Horizontal	Max Tension	2	3998.15	0.00	0.00
			Max. Compression	2	-3998.15	23.71	-1.82
			Max. Mx	37	-60.12	95.67	13.73
			Max. My	28	-141.88	95.18	14.74
			Max. Vy	37	-73.19	95.67	13.73
			Max. Vx	31	-4.03	0.00	0.00
T14	80 - 60	Leg	Max Tension	7	233358.32	-2224.73	2.32
			Max. Compression	2	-265381.70	-746.96	-16.12
			Max. Mx	2	-253858.36	2366.13	4.41
			Max. My	4	-13991.69	-169.66	-2732.82
			Max. Vy	2	527.79	2366.13	4.41
			Max. Vx	4	316.32	-169.66	-2732.82
		Diagonal	Max Tension	24	7721.39	0.00	0.00
			Max. Compression	24	-7891.60	0.00	0.00
			Max. Mx	27	2332.36	173.64	-18.31
			Max. My	28	-702.50	134.87	-21.84
			Max. Vy	29	96.67	166.20	-19.64
			Max. Vx	28	-5.03	0.00	0.00
T15	60 - 50	Leg	Max Tension	7	243806.93	399.66	4.72
			Max. Compression	2	-277558.01	-4853.21	13.46
			Max. Mx	2	-277341.99	7380.22	9.59
			Max. My	4	-14829.19	-648.96	-4442.98
			Max. Vy	2	2414.03	7380.22	9.59
			Max. Vx	4	959.81	-648.96	-4442.98
		Diagonal	Max Tension	13	9006.81	98.16	7.48
			Max. Compression	2	-9778.67	0.00	0.00
			Max. Mx	29	1480.64	196.49	-5.28
			Max. My	10	-9707.99	9.12	21.58
			Max. Vy	29	96.52	196.49	-5.28
			Max. Vx	27	-4.11	0.00	0.00
		Secondary Horizontal	Max Tension	2	4813.45	0.00	0.00
			Max. Compression	2	-4813.45	66.64	4.98
			Max. Mx	38	-288.76	213.30	57.36

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	28	-327.47	212.95	58.29
			Max. Vy	38	-129.07	213.30	57.36
			Max. Vx	30	-10.34	0.00	0.00
T16	50 - 40	Leg	Max Tension	7	258060.08	3452.12	9.83
			Max. Compression	2	-294557.53	-169.44	-51.48
			Max. Mx	2	-294494.93	7068.51	13.11
			Max. My	4	-15475.58	-648.98	-4442.97
			Max. Vy	2	-2493.57	7068.51	13.11
			Max. Vx	4	-995.33	-648.98	-4442.97
		Diagonal	Max Tension	13	8961.96	105.16	0.99
			Max. Compression	24	-9589.07	0.00	0.00
			Max. Mx	27	2238.84	206.40	16.22
			Max. My	28	-2234.04	172.62	-17.46
			Max. Vy	29	99.80	204.07	-11.43
			Max. Vx	28	-4.27	0.00	0.00
		Secondary Horizontal	Max Tension	2	5108.25	0.00	0.00
			Max. Compression	2	-5108.25	71.94	1.50
			Max. Mx	28	1253.99	186.23	38.08
			Max. My	28	-6.01	178.30	48.97
			Max. Vy	28	113.36	186.23	38.08
			Max. Vx	30	-8.48	0.00	0.00
T17	40 - 20	Leg	Max Tension	7	285356.55	-1981.97	1.66
			Max. Compression	2	-328067.53	2057.33	-20.38
			Max. Mx	29	46881.38	-4263.14	-3.92
			Max. My	4	-16753.02	-87.12	-2410.84
			Max. Vy	37	679.15	-4242.78	-14.89
			Max. Vx	4	-259.57	-141.45	-2145.74
		Diagonal	Max Tension	24	9142.80	0.00	0.00
			Max. Compression	24	-9494.49	0.00	0.00
			Max. Mx	31	1796.78	354.56	-37.21
			Max. My	28	-1919.26	286.53	-41.96
			Max. Vy	29	147.13	350.96	-39.60
			Max. Vx	28	-7.76	0.00	0.00
T18	20 - 0	Leg	Max Tension	7	317318.17	1054.17	2.70
			Max. Compression	2	-367978.15	-0.00	0.03
			Max. Mx	27	-157093.78	4511.13	57.64
			Max. My	4	-20015.05	-213.33	-3730.66
			Max. Vy	18	-14810.13	-0.00	0.02
			Max. Vx	17	-3003.64	-0.00	-1.33
		Diagonal	Max Tension	24	9624.71	0.00	0.00
			Max. Compression	24	-10153.47	0.00	0.00
			Max. Mx	31	151.80	555.02	46.27
			Max. My	33	-5295.75	462.17	57.29
			Max. Vy	29	181.18	547.55	-47.37
			Max. Vx	33	-9.34	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	18	362966.52	30762.39	-17714.32
	Max. H_x	18	362966.52	30762.39	-17714.32
	Max. H_z	7	-316038.66	-26965.81	15528.53
	Min. Vert	7	-316038.66	-26965.81	15528.53
	Min. H_x	7	-316038.66	-26965.81	15528.53

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
	Min. H_z	18	362966.52	30762.39	-17714.32
Leg B	Max. Vert	10	365366.73	-30598.98	-18062.17
	Max. H_x	23	-313821.46	26762.07	15774.47
	Max. H_z	23	-313821.46	26762.07	15774.47
	Min. Vert	23	-313821.46	26762.07	15774.47
	Min. H_x	10	365366.73	-30598.98	-18062.17
	Min. H_z	10	365366.73	-30598.98	-18062.17
Leg A	Max. Vert	2	366545.59	363.03	35629.29
	Max. H_x	21	16351.24	2953.40	1219.20
	Max. H_z	2	366545.59	363.03	35629.29
	Min. Vert	15	-315450.91	-287.68	-31171.89
	Min. H_x	9	16628.37	-2911.05	1237.36
	Min. H_z	15	-315450.91	-287.68	-31171.89

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	53201.28	-0.00	-0.00	-10907.83	-23521.90	-0.03
1.2 Dead+1.6 Wind 0 deg - No Ice	63841.54	14.23	-55297.81	-6428679.09	-31012.49	12686.07
0.9 Dead+1.6 Wind 0 deg - No Ice	47881.15	14.24	-55297.78	-6413903.22	-23875.09	12634.77
1.2 Dead+1.6 Wind 30 deg - No Ice	63841.53	26665.45	-46339.89	-5443041.86	-3148444.74	8454.00
0.9 Dead+1.6 Wind 30 deg - No Ice	47881.15	26665.60	-46339.85	-5429967.72	-3135716.52	8432.67
1.2 Dead+1.6 Wind 60 deg - No Ice	63841.53	45427.44	-26329.04	-3111240.69	-5363579.32	1302.19
0.9 Dead+1.6 Wind 60 deg - No Ice	47881.15	45427.29	-26329.31	-3102351.10	-5346836.18	1299.88
1.2 Dead+1.6 Wind 90 deg - No Ice	63841.53	53309.24	-12.25	-15747.58	-6264043.23	-6594.38
0.9 Dead+1.6 Wind 90 deg - No Ice	47881.15	53309.29	-12.40	-12437.56	-6245715.72	-6575.34
1.2 Dead+1.6 Wind 120 deg - No Ice	63841.54	47717.45	27636.56	3192311.76	-5554771.64	-12037.55
0.9 Dead+1.6 Wind 120 deg - No Ice	47881.15	47717.43	27636.53	3189895.64	-5537774.93	-11987.03
1.2 Dead+1.6 Wind 150 deg - No Ice	63841.53	26643.69	46323.93	5414072.51	-3144040.73	-12367.18
0.9 Dead+1.6 Wind 150 deg - No Ice	47881.15	26643.60	46324.03	5407634.01	-3131308.35	-12301.88
1.2 Dead+1.6 Wind 180 deg - No Ice	63841.53	-23.77	52636.15	6178576.71	-25780.93	-11622.82
0.9 Dead+1.6 Wind 180 deg - No Ice	47881.15	-23.83	52636.14	6170727.89	-18661.44	-11570.33
1.2 Dead+1.6 Wind 210 deg - No Ice	63841.53	-26668.51	46338.14	5416691.23	3091686.34	-8452.84
0.9 Dead+1.6 Wind 210 deg - No Ice	47881.15	-26668.40	46338.25	5410247.52	3093211.77	-8431.63
1.2 Dead+1.6 Wind 240 deg - No Ice	63841.54	-47731.74	27661.24	3196825.78	5500561.01	-1401.72
0.9 Dead+1.6 Wind 240 deg - No Ice	47881.15	-47731.72	27661.22	3194401.44	5497824.44	-1399.93
1.2 Dead+1.6 Wind 270 deg -	63841.53	-53309.25	16.27	-10578.90	6207269.25	6593.42

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
No Ice						
0.9 Dead+1.6 Wind 270 deg - No Ice	47881.15	-53309.29	16.13	-7277.50	6203206.28	6574.51
1.2 Dead+1.6 Wind 300 deg - No Ice	63841.53	-45413.26	-26304.20	-3106798.13	5304200.90	11076.28
0.9 Dead+1.6 Wind 300 deg - No Ice	47881.15	-45413.07	-26304.52	-3097915.46	5301727.25	11027.72
1.2 Dead+1.6 Wind 330 deg - No Ice	63841.53	-26640.85	-46325.56	-5440489.65	3087135.56	12367.62
0.9 Dead+1.6 Wind 330 deg - No Ice	47881.15	-26640.98	-46325.53	-5427419.47	3088680.73	12302.28
1.2 Dead+1.0 Ice+1.0 Temp	177620.24	0.24	-0.23	-60400.22	-115860.04	0.33
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	177620.24	0.51	-16869.29	-2040079.92	-115953.79	4399.62
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	177620.24	8169.82	-14176.87	-1739871.05	-1082884.87	3778.90
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	177620.24	14249.73	-8242.44	-1035469.67	-1800232.39	2022.45
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	177620.24	16339.15	-0.26	-60412.14	-2049831.89	-449.25
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	177620.24	14582.69	8434.10	929408.46	-1825731.91	-2652.39
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	177620.24	8169.33	14176.34	1619037.26	-1082821.31	-3813.62
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	177620.24	-0.48	16484.17	1889790.00	-115793.05	-4220.83
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	177620.24	-8170.02	14176.75	1619108.24	851172.22	-3778.80
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	177620.24	-14583.06	8434.84	929523.19	1594043.47	-2098.53
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	177620.24	-16339.15	0.51	-60287.68	1818085.95	449.10
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	177620.24	-14249.35	-8241.75	-1035370.33	1568406.93	2554.28
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	177620.24	-8169.13	-14176.46	-1739808.99	851026.67	3813.61
Dead+Wind 0 deg - Service	53201.28	3.81	-14385.49	-1678026.94	-24307.20	3291.83
Dead+Wind 30 deg - Service	53201.28	6937.34	-12054.96	-1421883.85	-834357.11	2194.57
Dead+Wind 60 deg - Service	53201.28	11817.65	-6849.56	-815985.08	-1409952.96	335.50
Dead+Wind 90 deg - Service	53201.28	13868.25	-3.71	-11628.02	-1643930.41	-1711.33
Dead+Wind 120 deg - Service	53201.28	12413.49	7189.54	821984.68	-1459654.85	-3122.73
Dead+Wind 150 deg - Service	53201.28	6930.91	12051.25	1399278.40	-833210.28	-3208.32
Dead+Wind 180 deg - Service	53201.28	-3.73	13693.06	1597930.26	-22956.94	-3016.04
Dead+Wind 210 deg - Service	53201.28	-6937.34	12054.96	1399949.85	787103.49	-2194.54
Dead+Wind 240 deg - Service	53201.28	-12417.22	7195.94	823150.21	1413058.07	-364.19
Dead+Wind 270 deg - Service	53201.28	-13868.25	3.71	-10285.03	1596665.30	1711.21
Dead+Wind 300 deg - Service	53201.28	-11813.97	-6843.09	-814824.72	1362014.66	2878.02
Dead+Wind 330 deg - Service	53201.28	-6930.91	-12051.25	-1421216.58	785926.33	3208.37

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-53201.28	-0.00	0.00	53201.28	0.00	0.000%
2	14.27	-63841.53	-55297.85	-14.23	63841.54	55297.81	0.000%
3	14.27	-47881.15	-55297.85	-14.24	47881.15	55297.78	0.000%
4	26667.14	-63841.53	-46339.29	-26665.45	63841.53	46339.89	0.002%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
5	26667.14	-47881.15	-46339.29	-26665.60	47881.15	46339.85	0.002%
6	45426.63	-63841.53	-26330.42	-45427.44	63841.53	26329.04	0.002%
7	45426.63	-47881.15	-26330.42	-45427.29	47881.15	26329.31	0.002%
8	53309.56	-63841.53	-14.27	-53309.24	63841.53	12.25	0.002%
9	53309.56	-47881.15	-14.27	-53309.29	47881.15	12.40	0.003%
10	47717.48	-63841.53	27636.57	-47717.45	63841.54	-27636.56	0.000%
11	47717.48	-47881.15	27636.57	-47717.43	47881.15	-27636.53	0.000%
12	26642.42	-63841.53	46325.02	-26643.69	63841.53	-46323.93	0.002%
13	26642.42	-47881.15	46325.02	-26643.60	47881.15	-46324.03	0.002%
14	-14.27	-63841.53	52636.12	23.77	63841.53	-52636.15	0.011%
15	-14.27	-47881.15	52636.12	23.83	47881.15	-52636.14	0.013%
16	-26667.14	-63841.53	46339.29	26668.51	63841.53	-46338.14	0.002%
17	-26667.14	-47881.15	46339.29	26668.40	47881.15	-46338.25	0.002%
18	-47731.75	-63841.53	27661.28	47731.74	63841.54	-27661.24	0.000%
19	-47731.75	-47881.15	27661.28	47731.72	47881.15	-27661.22	0.000%
20	-53309.56	-63841.53	14.27	53309.25	63841.53	-16.27	0.002%
21	-53309.56	-47881.15	14.27	53309.29	47881.15	-16.13	0.003%
22	-45412.37	-63841.53	-26305.71	45413.26	63841.53	26304.20	0.002%
23	-45412.37	-47881.15	-26305.71	45413.07	47881.15	26304.52	0.002%
24	-26642.42	-63841.53	-46325.02	26640.85	63841.53	46325.56	0.002%
25	-26642.42	-47881.15	-46325.02	26640.98	47881.15	46325.53	0.002%
26	0.00	-177620.24	-0.00	-0.24	177620.24	0.23	0.000%
27	0.40	-177620.24	-16869.30	-0.51	177620.24	16869.29	0.000%
28	8169.93	-177620.24	-14176.81	-8169.82	177620.24	14176.87	0.000%
29	14249.68	-177620.24	-8242.57	-14249.73	177620.24	8242.44	0.000%
30	16339.15	-177620.24	-0.40	-16339.15	177620.24	0.26	0.000%
31	14582.58	-177620.24	8434.31	-14582.69	177620.24	-8434.10	0.000%
32	8169.24	-177620.24	14176.41	-8169.33	177620.24	-14176.34	0.000%
33	-0.40	-177620.24	16484.44	0.48	177620.24	-16484.17	0.000%
34	-8169.93	-177620.24	14176.81	8170.02	177620.24	-14176.75	0.000%
35	-14582.98	-177620.24	8435.00	14583.06	177620.24	-8434.84	0.000%
36	-16339.15	-177620.24	0.40	16339.15	177620.24	-0.51	0.000%
37	-14249.28	-177620.24	-8241.88	14249.35	177620.24	8241.75	0.000%
38	-8169.24	-177620.24	-14176.41	8169.13	177620.24	14176.46	0.000%
39	3.71	-53201.28	-14385.50	-3.81	53201.28	14385.49	0.000%
40	6937.34	-53201.28	-12054.97	-6937.34	53201.28	12054.96	0.000%
41	11817.54	-53201.28	-6849.74	-11817.65	53201.28	6849.56	0.000%
42	13868.25	-53201.28	-3.71	-13868.25	53201.28	3.71	0.000%
43	12413.50	-53201.28	7189.53	-12413.49	53201.28	-7189.54	0.000%
44	6930.91	-53201.28	12051.25	-6930.91	53201.28	-12051.25	0.000%
45	-3.71	-53201.28	13693.06	3.73	53201.28	-13693.06	0.000%
46	-6937.34	-53201.28	12054.97	6937.34	53201.28	-12054.96	0.000%
47	-12417.21	-53201.28	7195.96	12417.22	53201.28	-7195.94	0.000%
48	-13868.25	-53201.28	3.71	13868.25	53201.28	-3.71	0.000%
49	-11813.83	-53201.28	-6843.32	11813.97	53201.28	6843.09	0.000%
50	-6930.91	-53201.28	-12051.25	6930.91	53201.28	12051.25	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000882
2	Yes	4	0.00000001	0.00004410
3	Yes	4	0.00000001	0.00003843
4	Yes	4	0.00000001	0.00005855
5	Yes	4	0.00000001	0.00005173

6	Yes	6	0.00000001	0.00036896
7	Yes	6	0.00000001	0.00034948
8	Yes	4	0.00000001	0.00006857
9	Yes	4	0.00000001	0.00006141
10	Yes	4	0.00000001	0.00004419
11	Yes	4	0.00000001	0.00003847
12	Yes	4	0.00000001	0.00005668
13	Yes	4	0.00000001	0.00004990
14	Yes	5	0.00000001	0.00077189
15	Yes	5	0.00000001	0.00076732
16	Yes	4	0.00000001	0.00005963
17	Yes	4	0.00000001	0.00005246
18	Yes	4	0.00000001	0.00004449
19	Yes	4	0.00000001	0.00003865
20	Yes	4	0.00000001	0.00006925
21	Yes	4	0.00000001	0.00006178
22	Yes	6	0.00000001	0.00042280
23	Yes	6	0.00000001	0.00040667
24	Yes	4	0.00000001	0.00005620
25	Yes	4	0.00000001	0.00004950
26	Yes	4	0.00000001	0.00047039
27	Yes	5	0.00000001	0.00003627
28	Yes	5	0.00000001	0.00002148
29	Yes	5	0.00000001	0.00002384
30	Yes	5	0.00000001	0.00002302
31	Yes	5	0.00000001	0.00008278
32	Yes	5	0.00000001	0.00001905
33	Yes	4	0.00000001	0.00006466
34	Yes	5	0.00000001	0.00001985
35	Yes	5	0.00000001	0.00003141
36	Yes	5	0.00000001	0.00002301
37	Yes	5	0.00000001	0.00002848
38	Yes	5	0.00000001	0.00002062
39	Yes	5	0.00000001	0.00005612
40	Yes	4	0.00000001	0.00000228
41	Yes	4	0.00000001	0.00024339
42	Yes	4	0.00000001	0.00000229
43	Yes	4	0.00000001	0.00020158
44	Yes	4	0.00000001	0.00000229
45	Yes	4	0.00000001	0.00027722
46	Yes	4	0.00000001	0.00000241
47	Yes	5	0.00000001	0.00001122
48	Yes	4	0.00000001	0.00000232
49	Yes	4	0.00000001	0.00042672
50	Yes	4	0.00000001	0.00000230

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 180	7.073	39	0.4328	0.0481
T2	180 - 175	5.653	39	0.3954	0.0108
T3	175 - 170	5.243	39	0.3675	0.0088
T4	170 - 160	4.873	39	0.3376	0.0076
T5	160 - 150	4.193	39	0.3028	0.0072
T6	150 - 140	3.601	39	0.2559	0.0068
T7	140 - 133.333	3.090	39	0.2244	0.0064
T8	133.333 - 126.667	2.777	39	0.2136	0.0060
T9	126.667 - 120	2.479	39	0.2026	0.0056

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T10	120 - 113.333	2.195	39	0.1915	0.0051
T11	113.333 - 106.667	1.933	39	0.1743	0.0047
T12	106.667 - 100	1.695	39	0.1570	0.0044
T13	100 - 80	1.480	39	0.1397	0.0040
T14	80 - 60	0.929	39	0.1139	0.0030
T15	60 - 50	0.500	39	0.0792	0.0020
T16	50 - 40	0.339	39	0.0620	0.0016
T17	40 - 20	0.217	39	0.0448	0.0011
T18	20 - 0	0.061	39	0.0223	0.0005

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
195.00	Sector Mount [SM 802-3]	39	7.073	0.4328	0.0481	21907
193.00	LNX-6515DS-VTM w/ Mount Pipe	39	6.875	0.4300	0.0415	21907
188.00	(3) Sector Mounts 188-ft	39	6.388	0.4214	0.0261	15648
169.00	(3) Sector Mounts 169-ft	39	4.802	0.3329	0.0074	16355
152.00	Sector Mount [SM 502-3]	39	3.712	0.2653	0.0069	13809
75.50	1.75" Dia x 5-ft Pipe	39	0.821	0.1074	0.0028	39957

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	195 - 180	27.064	2	1.6542	0.1580
T2	180 - 175	21.655	2	1.5125	0.0419
T3	175 - 170	20.085	2	1.4063	0.0342
T4	170 - 160	18.669	2	1.2925	0.0293
T5	160 - 150	16.063	2	1.1595	0.0278
T6	150 - 140	13.797	2	0.9802	0.0263
T7	140 - 133.333	11.838	2	0.8594	0.0246
T8	133.333 - 126.667	10.641	2	0.8181	0.0231
T9	126.667 - 120	9.500	2	0.7759	0.0216
T10	120 - 113.333	8.409	2	0.7336	0.0196
T11	113.333 - 106.667	7.406	2	0.6676	0.0183
T12	106.667 - 100	6.494	2	0.6012	0.0169
T13	100 - 80	5.672	2	0.5350	0.0153
T14	80 - 60	3.559	2	0.4361	0.0117
T15	60 - 50	1.915	2	0.3034	0.0078
T16	50 - 40	1.301	2	0.2374	0.0060
T17	40 - 20	0.832	2	0.1716	0.0043
T18	20 - 0	0.236	2	0.0853	0.0021

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
195.00	Sector Mount [SM 802-3]	2	27.064	1.6542	0.1580	5923
193.00	LNX-6515DS-VTM w/ Mount Pipe	2	26.313	1.6436	0.1374	5923
188.00	(3) Sector Mounts 188-ft	2	24.456	1.6112	0.0894	4231
169.00	(3) Sector Mounts 169-ft	2	18.396	1.2747	0.0288	4307
152.00	Sector Mount [SM 502-3]	2	14.223	1.0160	0.0267	3611
75.50	1.75" Dia x 5-ft Pipe	2	3.147	0.4113	0.0109	10440

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	195	Leg	A325N	0.7500	4	5715.75	29820.60	0.192	1	Bolt Tension
T2	180	Diagonal	A325N	0.5000	1	3428.49	4689.84	0.731	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	1	737.46	6830.86	0.108	1	Member Block Shear
T3	175	Diagonal	A325X	0.5000	1	3468.83	7245.70	0.479	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	1	911.74	6830.86	0.133	1	Member Block Shear
T4	170	Leg	A325N	0.7500	6	10942.70	29820.60	0.367	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4823.98	8265.00	0.584	1	Gusset Bearing
		Secondary Horizontal	A325N	0.6250	1	1294.90	6830.86	0.190	1	Member Block Shear
T5	160	Diagonal	A325X	0.5000	1	5501.16	8265.00	0.666	1	Gusset Bearing
		Secondary Horizontal	A325N	0.6250	1	1662.26	6830.86	0.243	1	Member Block Shear
T6	150	Leg	A325N	1.0000	6	17506.20	53014.40	0.330	1	Bolt Tension
		Diagonal	A325N	0.5000	1	5628.69	8265.00	0.681	1	Gusset Bearing
		Secondary Horizontal	A325N	0.6250	1	2066.85	6830.86	0.303	1	Member Block Shear
T7	140	Diagonal	A325X	0.6250	1	5834.73	12712.50	0.459	1	Member Block Shear
T8	133.333	Diagonal	A325X	0.6250	1	6011.88	12712.50	0.473	1	Member Block Shear
T9	126.667	Leg	A325N	1.0000	8	17626.00	53014.40	0.332	1	Bolt Tension
		Diagonal	A325N	0.6250	1	5913.71	7830.00	0.755	1	Member Bearing
T10	120	Diagonal	A325X	0.6250	1	6592.39	13050.00	0.505	1	Member Bearing
		Secondary Horizontal	A325N	0.6250	1	2942.92	7830.00	0.376	1	Member Bearing
T11	113.333	Diagonal	A325X	0.6250	1	6843.52	13050.00	0.524	1	Member Bearing
		Secondary Horizontal	A325N	0.6250	1	3161.65	7830.00	0.404	1	Member Bearing
T12	106.667	Leg	A325N	1.0000	8	21546.20	53014.40	0.406	1	Bolt Tension
		Diagonal	A325X	0.6250	1	6804.12	12712.50	0.535	1	Member Block Shear
		Secondary Horizontal	A325N	0.6250	1	3365.14	7830.00	0.430	1	Member Bearing
T13	100	Leg	A325N	1.2500	8	25432.30	82835.00	0.307	1	Bolt Tension
		Diagonal	A325N	0.6250	2	3600.12	11622.70	0.310	1	Member Block Shear
		Secondary Horizontal	A325N	0.7500	1	3998.15	13898.40	0.288	1	Member Block Shear
T14	80	Leg	A325N	1.2500	8	29169.80	82835.00	0.352	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	0.6250	2	3860.70	11622.70	0.332	1	Member Block Shear
T15	60	Diagonal	A325N	0.6250	2	4889.33	12425.20	0.394	1	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	4813.45	12425.20	0.387	1	Bolt Shear
T16	50	Leg	A325N	1.2500	8	32220.40	82835.00	0.389	1	Bolt Tension
		Diagonal	A325N	0.6250	2	4794.54	12425.20	0.386	1	Bolt Shear
		Secondary Horizontal	A325X	0.7500	1	5108.25	14355.00	0.356	1	Member Bearing
T17	40	Leg	A325N	1.2500	8	35669.60	82835.00	0.431	1	Bolt Tension
		Diagonal	A325N	0.6250	2	4747.24	12425.20	0.382	1	Bolt Shear
T18	20	Leg	A36	1.5000	8	39664.80	61496.70	0.645	1	Bolt Tension
		Diagonal	A325N	0.6250	2	5076.74	12425.20	0.409	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	PIPE 2.5 STD (SCH 40)	15.00	3.75	47.4 K=1.00	1.7072	-38730.50	70532.50	0.549 [1]
T2	180 - 175	PIPE 2.5 STD (SCH 40)	5.01	2.67	33.8 K=1.00	1.7072	-42524.00	77102.10	0.552 [1]
T3	175 - 170	PIPE 2.5 STD (SCH 40)	5.01	2.65	33.5 K=1.00	1.7072	-52573.90	77205.80	0.681 [1]
T4	170 - 160	2.5SCH40 w/ 3SCH80 Half Sleeve 4.8.1 (1.02 CR) - 69	10.02	2.62	34.2 K=1.00	3.2300	-74667.80	72967.00	**1.023** [1]
T5	160 - 150	Pipe 3.5 Std (SCH40)	10.02	2.60	23.4 K=1.00	2.6795	-95851.20	126932.00	0.755 [1]
T6	150 - 140	3.5SCH40 w/ 4SCH40 Half Sleeve	10.02	2.59	23.8 K=1.00	4.2666	-119164.00	184209.00	0.647 [1]
T7	140 - 133.333	5 STD w/ 6 XH Half Sleeve	6.68	6.68	45.4 K=1.00	8.5023	-132201.00	306442.00	0.431 [1]
T8	133.333 - 126.667	5 STD w/ 6 XH Half Sleeve	6.68	6.68	45.4 K=1.00	8.5023	-145657.00	306442.00	0.475 [1]
T9	126.667 - 120	5 STD w/ 6 XH Half Sleeve	6.68	6.68	45.4 K=1.00	8.5023	-158889.00	306442.00	0.518 [1]
T10	120 - 113.333	PIPE 6 STD (SCH40)	6.68	3.45	18.4 K=1.00	5.5858	-169661.00	269041.00	0.631 [1]
T11	113.333 - 106.667	PIPE 6 STD (SCH40)	6.68	3.44	18.4 K=1.00	5.5858	-182216.00	269071.00	0.677 [1]
T12	106.667 - 100	PIPE 6 STD (SCH40)	6.68	3.44	18.4 K=1.00	5.5858	-193974.00	269098.00	0.721 [1]
T13	100 - 80	6 STD w/ 7 XH Half Sleeve	20.03	3.42	19.5 K=1.00	11.1800	-230545.00	412800.00	0.558 [1]
T14	80 - 60	PIPE 8 STD (SCH40)	20.03	6.68	27.3 K=1.00	8.3993	-265382.00	391613.00	0.678 [1]
T15	60 - 50	PIPE 8 STD (SCH40)	10.02	5.16	21.1 K=1.00	8.3993	-277558.00	401143.00	0.692 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T16	50 - 40	PIPE 8 STD (SCH40)	10.02	5.16	21.1 K=1.00	8.3993	-294558.00	401194.00	0.734 [1]
T17	40 - 20	PIPE 8 X-STR (SCH80)	20.03	10.02	41.7 K=1.00	12.7706	-328068.00	549495.00	0.597 [1]
T18	20 - 0	PIPE 8 X-STR (SCH80)	20.03	9.97	41.6 K=1.00	12.7706	-358619.00	550136.00	0.652 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	180 - 175	L1 1/2x1 1/2x3/16	6.25	3.03	124.0 K=1.00	0.5273	-4150.08	7609.55	0.545 [1]
T3	175 - 170	L2x2x3/16	6.56	3.29	109.2 K=1.09	0.7150	-3251.08	12363.90	0.263 [1]
T4	170 - 160	2L1 1/2x1 1/2x3/16x1/4	6.90	3.45	104.2 K=1.15	1.0547	-5238.02	19298.30	0.271 [1]
T5	160 - 150	2L2x2x3/16x1/4	8.01	3.95	96.0 K=1.25	1.4297	-5718.41	28526.20	0.200 [1]
T6	150 - 140	2L2x2x3/16x1/4	8.81	4.33	102.6 K=1.22	1.4297	-5732.84	26601.10	0.216 [1]
T7	140 - 133.333	L2 1/2x2 1/2x1/4	10.29	4.92	120.3 K=1.00	1.1900	-5943.22	17991.90	0.330 [1]
T8	133.333 - 126.667	L2 1/2x2 1/2x1/4	10.80	5.18	126.7 K=1.00	1.1900	-6156.29	16560.40	0.372 [1]
T9	126.667 - 120	L2 1/2x2 1/2x3/16	11.34	5.47	132.6 K=1.00	0.9020	-5990.09	11588.10	0.517 [1]
T10	120 - 113.333	L3x3x1/4	11.88	5.67	116.2 K=1.01	1.4400	-7072.90	22906.10	0.309 [1]
T11	113.333 - 106.667	L3x3x1/4	12.44	6.09	121.0 K=0.98	1.4400	-7183.14	21593.20	0.333 [1]
T12	106.667 - 100	L2 1/2x2 1/2x1/4	13.01	6.24	152.5 K=1.00	1.1900	-7278.92	11557.60	0.630 [1]
T13	100 - 80	L3 1/2x3 1/2x1/4	14.76	7.21	106.0 K=0.85	1.6900	-7434.66	30316.40	0.245 [1]
T14	80 - 60	L3 1/2x3 1/2x1/4	16.57	8.07	118.7 K=0.85	1.6900	-7891.60	26091.70	0.302 [1]
T15	60 - 50	L3x3x5/16	18.87	9.11	170.0 K=0.92	1.7800	-9778.67	13914.00	0.703 [1]
T16	50 - 40	L3x3x5/16	19.73	9.54	176.7 K=0.91	1.7800	-9589.07	12883.30	0.744 [1]
T17	40 - 20	L4x4x3/8	21.47	10.41	149.5 K=0.94	2.8600	-9494.49	28926.60	0.328 [1]
T18	20 - 0	L5x5x5/16	23.24	11.30	132.5 K=0.97	3.0300	-10153.50	38816.00	0.262 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	L1 1/2x1 1/2x3/16	3.50	3.26	124.9 K=0.94	0.5273	-6008.35	7512.48	0.800 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	180 - 175	L2x2x3/16	3.73	1.63	84.8 K=1.71	0.7150	-737.46	15868.60	0.046 [1]
T3	175 - 170	L2x2x3/16	4.24	2.00	60.8 K=1.00	0.7150	-911.74	19064.10	0.048 [1]
T4	170 - 160	L2x2x3/16	5.24	2.49	75.7 K=1.00	0.7150	-1294.90	17128.60	0.076 [1]
T5	160 - 150	L2x2x3/16	6.24	2.95	89.9 K=1.00	0.7150	-1662.26	15131.00	0.110 [1]
T6	150 - 140	L2x2x3/16	7.24	3.43	104.6 K=1.00	0.7150	-2066.85	13027.80	0.159 [1]
T10	120 - 113.333	L3x3x3/16	9.82	4.51	105.5 K=1.16	1.0900	-2942.92	19381.00	0.152 [1]
T11	113.333 - 106.667	L3x3x3/16	10.49	4.97	100.0 K=1.00	1.0900	-3161.65	20509.90	0.154 [1]
T12	106.667 - 100	L3x3x3/16	11.16	5.18	112.2 K=1.08	1.0900	-3365.14	17992.10	0.187 [1]
T13	100 - 80	L3x3x1/4	13.16	6.26	126.9 K=1.00	1.4400	-3998.15	19981.80	0.200 [1]
T15	60 - 50	L4x4x3/8	15.98	7.51	117.2 K=1.02	2.8600	-4813.45	44960.90	0.107 [1]
T16	50 - 40	L4x4x1/4	16.99	7.99	120.6 K=1.00	1.9400	-5108.25	28993.60	0.176 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	L1 1/2x1 1/2x3/16	3.50	3.26	124.9 K=0.94	0.5273	-1487.50	7512.48	0.198 [1]

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	L1 1/2x1 1/2x3/16	3.50	3.26	124.9 K=0.94	0.5273	-2964.33	7512.48	0.395 [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 lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	PIPE 2.5 STD (SCH 40)	15.00	3.75	47.4	1.7072	22863.00	84508.30	0.271 [1]
T2	180 - 175	PIPE 2.5 STD (SCH 40)	5.01	2.67	33.8	1.7072	38146.80	84508.30	0.451 [1]
T3	175 - 170	PIPE 2.5 STD (SCH 40)	5.01	2.36	29.8	1.7072	46516.60	84508.30	0.550 [1]
T4	170 - 160	2.5SCH40 w/ 3SCH80 Half Sleeve 4.8.1 (1.01 CR) - 67	10.02	2.38	31.1	3.2300	65703.30	101745.00	0.646 [1]
T5	160 - 150	Pipe 3.5 Std (SCH40)	10.02	2.40	21.6	2.6795	84468.70	132637.00	0.637 [1]
T6	150 - 140	3.5SCH40 w/ 4SCH40 Half Sleeve	10.02	2.42	22.2	4.2666	105131.00	191997.00	0.548 [1]
T7	140 - 133.333	5 STD w/ 6 XH Half Sleeve	6.68	6.68	45.4	8.5023	116945.00	351995.00	0.332 [1]
T8	133.333 - 126.667	5 STD w/ 6 XH Half Sleeve	6.68	6.68	45.4	8.5023	129133.00	351995.00	0.367 [1]
T9	126.667 - 120	5 STD w/ 6 XH Half Sleeve	6.68	6.68	45.4	8.5023	141008.00	351995.00	0.401 [1]
T10	120 - 113.333	PIPE 6 STD (SCH40)	6.68	3.23	17.2	5.5858	150967.00	276495.00	0.546 [1]
T11	113.333 - 106.667	PIPE 6 STD (SCH40)	6.68	3.23	17.3	5.5858	162067.00	276495.00	0.586 [1]
T12	106.667 - 100	PIPE 6 STD (SCH40)	6.68	3.24	17.3	5.5858	172577.00	276495.00	0.624 [1]
T13	100 - 80	6 STD w/ 7 XH Half Sleeve	20.03	3.25	18.6	11.1800	203653.00	422604.00	0.482 [1]
T14	80 - 60	PIPE 8 STD (SCH40)	20.03	6.68	27.3	8.3993	233358.00	415763.00	0.561 [1]
T15	60 - 50	PIPE 8 STD (SCH40)	10.02	4.85	19.8	8.3993	243807.00	415763.00	0.586 [1]
T16	50 - 40	PIPE 8 STD (SCH40)	10.02	4.86	19.9	8.3993	258060.00	415763.00	0.621 [1]
T17	40 - 20	PIPE 8 X-STR (SCH80)	20.03	10.02	41.7	12.7706	285357.00	632143.00	0.451 [1]
T18	20 - 0	PIPE 8 X-STR (SCH80)	20.03	0.08	0.3	12.7706	317318.00	632143.00	0.502 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	5/8	5.13	4.78	366.9	0.3068	8822.77	9940.20	0.888 [1]
T2	180 - 175	L1 1/2x1 1/2x3/16	6.25	3.03	82.4	0.3076	3428.49	13381.30	0.256 [1]
T3	175 - 170	L2x2x3/16	6.56	3.29	64.0	0.4484	3468.83	19503.60	0.178 [1]
T4	170 - 160	2L1 1/2x1 1/2x3/16x1/4	6.90	3.45	90.6	0.6152	4823.98	26762.70	0.180 [1]
T5	160 - 150	2L2x2x3/16x1/4	8.01	3.95	76.8	0.8965	5501.16	38997.10	0.141 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T6	150 - 140	2L2x2x3/16x1/4	8.40	4.13	80.3	0.8965	5628.69	38997.10	0.144 [1]
T7	140 - 133.333	L2 1/2x2 1/2x1/4	10.29	4.92	78.9	0.7519	5834.73	32706.60	0.178 [1]
T8	133.333 - 126.667	L2 1/2x2 1/2x1/4	10.80	5.18	83.0	0.7519	6011.88	32706.60	0.184 [1]
T9	126.667 - 120	L2 1/2x2 1/2x3/16	11.34	5.47	86.2	0.5710	5913.71	24839.90	0.238 [1]
T10	120 - 113.333	L3x3x1/4	11.88	5.67	74.9	0.9394	6592.39	40862.80	0.161 [1]
T11	113.333 - 106.667	L3x3x1/4	12.44	6.09	78.6	0.9394	6843.52	40862.80	0.167 [1]
T12	106.667 - 100	L2 1/2x2 1/2x1/4	13.01	6.24	99.5	0.7519	6804.12	32706.60	0.208 [1]
T13	100 - 80	L3 1/2x3 1/2x1/4	14.17	6.92	76.1	1.1269	7200.25	49019.10	0.147 [1]
T14	80 - 60	L3 1/2x3 1/2x1/4	16.57	8.07	88.9	1.1269	7721.39	49019.10	0.158 [1]
T15	60 - 50	L3x3x5/16	18.87	9.11	121.1	1.1592	9006.81	50426.00	0.179 [1]
T16	50 - 40	L3x3x5/16	19.73	9.54	126.7	1.1592	8961.96	50426.00	0.178 [1]
T17	40 - 20	L4x4x3/8	21.47	10.41	103.5	1.9341	9142.80	84131.70	0.109 [1]
T18	20 - 0	L5x5x5/16	23.24	11.30	87.9	2.0967	9624.71	91207.30	0.106 [1]

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	L1 1/2x1 1/2x3/16	3.50	3.26	85.7	0.5273	670.83	17085.90	0.039 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	180 - 175	L2x2x3/16	3.73	1.63	67.9	0.4308	737.46	18739.00	0.039 [1]
T3	175 - 170	L2x2x3/16	4.24	2.00	77.7	0.4308	911.74	18739.00	0.049 [1]
T4	170 - 160	L2x2x3/16	5.24	2.49	96.7	0.4308	1294.90	18739.00	0.069 [1]
T5	160 - 150	L2x2x3/16	6.24	2.95	114.9	0.4308	1662.26	18739.00	0.089 [1]
T6	150 - 140	L2x2x3/16	7.24	3.43	133.5	0.4308	2066.85	18739.00	0.110 [1]
T10	120 - 113.333	L3x3x3/16	9.82	4.51	118.5	0.7120	2942.92	30973.40	0.095 [1]
T11	113.333 - 106.667	L3x3x3/16	10.49	4.97	127.0	0.7120	3161.65	30973.40	0.102 [1]
T12	106.667 - 100	L3x3x3/16	11.16	5.18	135.5	0.7120	3365.14	30973.40	0.109 [1]
T13	100 - 80	L3x3x1/4	13.16	6.26	161.6	0.9159	3998.15	39843.30	0.100 [1]
T15	60 - 50	L4x4x3/8	15.98	7.51	148.9	1.9341	4813.45	84131.70	0.057 [1]
T16	50 - 40	L4x4x1/4	16.99	7.99	156.2	1.2909	5108.25	56155.80	0.091 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	195 - 180	L1 1/2x1 1/2x3/16	3.50	3.26	85.7	0.5273	731.26	17085.90	0.043 [1]

[1] P_u / ϕP_n controls

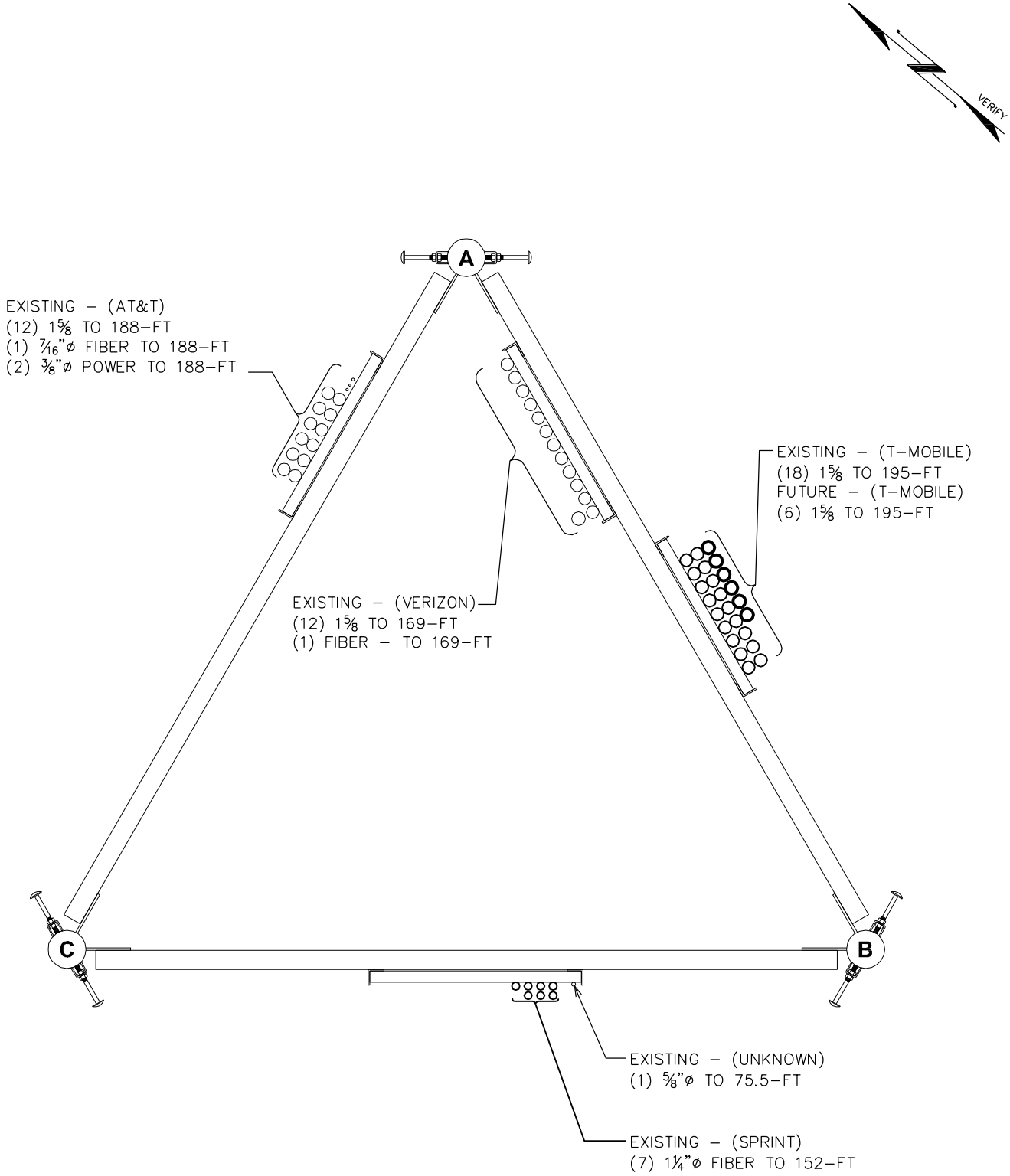
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	195 - 180	Leg	PIPE 2.5 STD (SCH 40)	3	-38730.50	70532.50	54.9	Pass
T2	180 - 175	Leg	PIPE 2.5 STD (SCH 40)	45	-42524.00	77102.10	55.2	Pass
T3	175 - 170	Leg	PIPE 2.5 STD (SCH 40)	57	-52573.90	77205.80	68.1	Pass
T4	170 - 160	Leg	2.5SCH40 w/ 3SCH80 Half Sleeve	Note 1	Note 1	Note 1	71.1	Pass
T5	160 - 150	Leg	Pipe 3.5 Std (SCH40)	90	-95851.20	126932.00	75.5	Pass
T6	150 - 140	Leg	3.5SCH40 w/ 4SCH40 Half Sleeve	Note 1	Note 1	Note 1	62.6	Pass
T7	140 - 133.333	Leg	5 STD w/ 6 XH Half Sleeve	Note 1	Note 1	Note 1	48.8	Pass
T8	133.333 - 126.667	Leg	5 STD w/ 6 XH Half Sleeve	Note 1	Note 1	Note 1	48.8	Pass
T9	126.667 - 120	Leg	5 STD w/ 6 XH Half Sleeve	Note 1	Note 1	Note 1	48.8	Pass
T10	120 - 113.333	Leg	PIPE 6 STD (SCH40)	159	-169661.00	269041.00	63.1	Pass
T11	113.333 - 106.667	Leg	PIPE 6 STD (SCH40)	171	-182216.00	269071.00	67.7	Pass
T12	106.667 - 100	Leg	PIPE 6 STD (SCH40)	183	-193974.00	269098.00	72.1	Pass
T13	100 - 80	Leg	6 STD w/ 7 XH Half Sleeve	Note 1	Note 1	Note 1	52.0	Pass
T14	80 - 60	Leg	PIPE 8 STD (SCH40)	225	-265382.00	391613.00	67.8	Pass
T15	60 - 50	Leg	PIPE 8 STD (SCH40)	246	-277558.00	401143.00	69.2	Pass
T16	50 - 40	Leg	PIPE 8 STD (SCH40)	258	-294558.00	401194.00	73.4	Pass
T17	40 - 20	Leg	PIPE 8 X-STR (SCH80)	270	-328068.00	549495.00	59.7	Pass
T18	20 - 0	Leg	PIPE 8 X-STR (SCH80)	285	-358619.00	550136.00	65.2	Pass
T1	195 - 180	Diagonal	5/8	12	8822.77	9940.20	88.8	Pass
T2	180 - 175	Diagonal	L1 1/2x1 1/2x3/16	48	-4150.08	7609.55	54.5 73.1 (b)	Pass
T3	175 - 170	Diagonal	L2x2x3/16	60	-3251.08	12363.90	26.3 47.9 (b)	Pass
T4	170 - 160	Diagonal	2L1 1/2x1 1/2x3/16x1/4	84	-5238.02	19298.30	27.1 58.4 (b)	Pass
T5	160 - 150	Diagonal	2L2x2x3/16x1/4	93	-5718.41	28526.20	20.0 66.6 (b)	Pass
T6	150 - 140	Diagonal	2L2x2x3/16x1/4	114	-5732.84	26601.10	21.6 68.1 (b)	Pass
T7	140 - 133.333	Diagonal	L2 1/2x2 1/2x1/4	135	-5943.22	17991.90	33.0 45.9 (b)	Pass
T8	133.333 - 126.667	Diagonal	L2 1/2x2 1/2x1/4	144	-6156.29	16560.40	37.2 47.3 (b)	Pass
T9	126.667 - 120	Diagonal	L2 1/2x2 1/2x3/16	153	-5990.09	11588.10	51.7 75.5 (b)	Pass
T10	120 - 113.333	Diagonal	L3x3x1/4	163	-7072.90	22906.10	30.9 50.5 (b)	Pass
T11	113.333 - 106.667	Diagonal	L3x3x1/4	175	-7183.14	21593.20	33.3 52.4 (b)	Pass
T12	106.667 - 100	Diagonal	L2 1/2x2 1/2x1/4	187	-7278.92	11557.60	63.0	Pass
T13	100 - 80	Diagonal	L3 1/2x3 1/2x1/4	199	-7434.66	30316.40	24.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T14	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	229	-7891.60	26091.70	31.0 (b) 30.2 33.2 (b)	Pass
T15	60 - 50	Diagonal	L3x3x5/16	250	-9778.67	13914.00	70.3	Pass
T16	50 - 40	Diagonal	L3x3x5/16	262	-9589.07	12883.30	74.4	Pass
T17	40 - 20	Diagonal	L4x4x3/8	274	-9494.49	28926.60	32.8 38.2 (b)	Pass
T18	20 - 0	Diagonal	L5x5x5/16	289	-10153.50	38816.00	26.2 40.9 (b)	Pass
T1	195 - 180	Horizontal	L1 1/2x1 1/2x3/16	17	-6008.35	7512.48	80.0	Pass
T2	180 - 175	Secondary Horizontal	L2x2x3/16	54	-737.46	15868.60	4.6 10.8 (b)	Pass
T3	175 - 170	Secondary Horizontal	L2x2x3/16	65	911.74	18739.00	4.9 13.3 (b)	Pass
T4	170 - 160	Secondary Horizontal	L2x2x3/16	77	-1294.90	17128.60	7.6 19.0 (b)	Pass
T5	160 - 150	Secondary Horizontal	L2x2x3/16	98	-1662.26	15131.00	11.0 24.3 (b)	Pass
T6	150 - 140	Secondary Horizontal	L2x2x3/16	120	-2066.85	13027.80	15.9 30.3 (b)	Pass
T10	120 - 113.333	Secondary Horizontal	L3x3x3/16	167	-2942.92	19381.00	15.2 37.6 (b)	Pass
T11	113.333 - 106.667	Secondary Horizontal	L3x3x3/16	179	-3161.65	20509.90	15.4 40.4 (b)	Pass
T12	106.667 - 100	Secondary Horizontal	L3x3x3/16	191	-3365.14	17992.10	18.7 43.0 (b)	Pass
T13	100 - 80	Secondary Horizontal	L3x3x1/4	203	-3998.15	19981.80	20.0 28.8 (b)	Pass
T15	60 - 50	Secondary Horizontal	L4x4x3/8	254	-4813.45	44960.90	10.7 38.7 (b)	Pass
T16	50 - 40	Secondary Horizontal	L4x4x1/4	267	-5108.25	28993.60	17.6 35.6 (b)	Pass
T1	195 - 180	Top Girt	L1 1/2x1 1/2x3/16	5	-1487.50	7512.48	19.8	Pass
T1	195 - 180	Bottom Girt	L1 1/2x1 1/2x3/16	8	-2964.33	7512.48	39.5	Pass
							Summary	
						Leg (T4)	71.1	Pass
						Diagonal (T1)	88.8	Pass
						Horizontal (T1)	80.0	Pass
						Secondary Horizontal (T12)	43.0	Pass
						Top Girt (T1)	19.8	Pass
						Bottom Girt (T1)	39.5	Pass
						Bolt Checks	75.5	Pass
						RATING =	**88.8**	**Pass**

APPENDIX B

COAX CONFIGURATION



COAX CONFIGURATION - N.T.S.

PREPARED BY:	PREPARED FOR:	PROJECT INFORMATION:	
TOWER ENGINEERING PROFESSIONALS 326 TRYON RD RALEIGH, NC 27603 (919) 661-6351 www.tepgroup.net	PHOENIX TOWER INTERNATIONAL 1001 YAMATO ROAD, SUITE 105 BOCA RATON, FL 33431	**STRAITS TURNPIKE** **SITE #: US-CT-1003** 1021 STRAITS TURNPIKE MIDDLEBURY, CT 06762 (NEW HAVEN COUNTY)	REVISION: 0 TEP JOB #:25628.105719 SHEET NUMBER: **C-1**

APPENDIX C

ADDITIONAL CALCULATIONS

Project Name:	Straits Turnpike	**Engineer:**	CJB
Project Number:	TEP#25628.105719	**Check:**	RRS
Client Site Number:	US-CT-1003	**Date:**	1/26/2017
Elevation:	80 - 100ft	**CODE:**	TIA-G

Grouted/Un-Grouted Pipe Leg + Half Sleeve R/F

Φc = 0.90 - LRFD strength reduction factor (compression)

ΦT = 0.90 - LRFD strength reduction factor (tension)

Φw = 0.75 - LRFD strength reduction factor (weld shear)

Φv = 0.75 - LRFD strength reduction factor (shear)

Mast St.: 1.00 - from tnxTower

Input - Loads

$P_{initial}$: 12.632 kips - force from initial load (no wind)

P_{wind}: 230.545 kips - force due to final loading including reinforcement

T_u: 203.653 kips - maximum load on leg

Quick Check

Weld Size:	OK
Weld Connection:	37.3%
Crushing Check:	44.0%
Leg Comp. Check:	44.1%
Sleeve Check:	52.0%
Built-up Check:	49.0%
Slenderness Check:	OK
Leg Tension Check:	41.7%

Input - Tower Leg 6 STD

K: 1.00 - effective length factor for leg

L_u: 3.43 ft - unbraced length of tower leg

F_{y_leg}: 55.00 ksi - minimum specified yield strength of tower leg

F_{u_leg}: 70.00 ksi - minimum specified ultimate strength of tower leg

r: 2.25 in - minimum radius of gyration of tower leg

A_{leg}: 5.58 in^2 - area of tower leg

Di: 6.07 in - inside diameter of tower leg

t_{leg}: 0.28 in - thickness of tower leg

$f`_c$: 0.00 ksi - minimum specified compressive strength of grout (If ungrouted enter 0)

Input - Sleeve R/F 7 XH Gap Check: OK

F_{y_sleeve}: 42.00 ksi - minimum specified yield strength of sleeve r/f

F_{u_sleeve}: 63.00 ksi - minimum specified ultimate strength of sleeve r/f

r_{x_sleeve}: 1.10 in - minimum radius of gyration of sleeve r/f about the x-axis

r_{y_sleeve}: 2.53 in - minimum radius of gyration of sleeve r/f about the y-axis

A_{sleeve}: 5.60 in^2 - area of sleeve r/f

t_{sleeve}: 0.50 in - thickness of tower leg

Termination: Connected to Flange

Input - Sleeve Connection to Leg

a: 12.00 in - spacing of connectors connecting the sleeve to the leg

D: 5.00 - weld size for the weld connecting the sleeve to the leg (unit = # of 16ths)

Length //: 12.00 in - length of weld on each side of the leg at the termination

Length ⊥: 11.98 in - length of weld at the bottom/top of the leg sleeve at termination (πD/2)

No: 2.00 - number of longitudinal welds per end of the leg (typically near side & far side, so 2)

F_{EXX}: 70.00 ksi - weld electrode classification

Width: 7.63 in - maximum width of the built-up leg

Gap: 0.00 in - length of leg considered for crushing

Input - Built-up Leg Section 6 STD w/7 XH Half Sleeve

r_{x_bu}: 2.10 in - minimum radius of gyration of the built-up section about the x-axis

r_{y_bu}: 2.39 in - minimum radius of gyration of the built-up section about the y-axis

Input - Grouted Leg

Ec: 0 ksi - Modulus of Elasticity of Grout

E_leg: 29,000 ksi - Modulus of Elasticity of Leg

E_sleeve: 29,000 ksi - Modulus of Elasticity of Sleeve

Project Name:	Straits Turnpike	**Engineer:**	CJB
Project Number:	TEP#25628.105719	**Check:**	RRS
Client Site Number:	US-CT-1003	**Date:**	1/26/2017
Elevation:	120 - 140ft	**CODE:**	TIA-G

Grouted/Un-Grouted Pipe Leg + Half Sleeve R/F

Φc = 0.90 - LRFD strength reduction factor (compression)

ΦT = 0.90 - LRFD strength reduction factor (tension)

Φw = 0.75 - LRFD strength reduction factor (weld shear)

Φv = 0.75 - LRFD strength reduction factor (shear)

Mast St.: 1.00 - from tnxTower

Input - Loads

$P_{initial}$: 8.8 kips - force from initial load (no wind)

P_{wind}: 158.889 kips - force due to final loading including reinforcement

T_u: 141.008 kips - maximum load on leg

Quick Check

Weld Size:	OK
Weld Connection:	26.9%
Crushing Check:	39.8%
Leg Comp. Check:	40.0%
Sleeve Check:	43.4%
Built-up Check:	48.8%
Slenderness Check:	OK
Leg Tension Check:	36.5%

Input - Tower Leg 5 STD

K: 1.00 - effective length factor for leg

L_u: 6.68 ft - unbraced length of tower leg

F_{y_leg}: 55.00 ksi - minimum specified yield strength of tower leg

F_{u_leg}: 70.00 ksi - minimum specified ultimate strength of tower leg

r: 1.88 in - minimum radius of gyration of tower leg

A_{leg}: 4.30 in^2 - area of tower leg

Di: 5.05 in - inside diameter of tower leg

t_{leg}: 0.26 in - thickness of tower leg

$f`_c$: 0.00 ksi - minimum specified compressive strength of grout (If ungrouted enter 0)

Input - Sleeve R/F 6 XH Gap Check: OK

F_{y_sleeve}: 46.00 ksi - minimum specified yield strength of sleeve r/f

F_{u_sleeve}: 62.00 ksi - minimum specified ultimate strength of sleeve r/f

r_{x_sleeve}: 0.96 in - minimum radius of gyration of sleeve r/f about the x-axis

r_{y_sleeve}: 2.19 in - minimum radius of gyration of sleeve r/f about the y-axis

A_{sleeve}: 4.20 in^2 - area of sleeve r/f

t_{sleeve}: 0.43 in - thickness of tower leg

Termination: Connected to Flange

Input - Sleeve Connection to Leg

a: 15.50 in - spacing of connectors connecting the sleeve to the leg

D: 5.00 - weld size for the weld connecting the sleeve to the leg (unit = # of 16ths)

Length //: 12.00 in - length of weld on each side of the leg at the termination

Length ⊥: 10.41 in - length of weld at the bottom/top of the leg sleeve at termination ($\pi D/2$)

No: 2.00 - number of longitudinal welds per end of the leg (typically near side & far side, so 2)

F_{EXX}: 70.00 ksi - weld electrode classification

Width: 6.63 in - maximum width of the built-up leg

Gap: 0.00 in - length of leg considered for crushing

Input - Built-up Leg Section 5 STD w/6 XH Half Sleeve

r_{x_bu}: 1.77 in - minimum radius of gyration of the built-up section about the x-axis

r_{y_bu}: 2.04 in - minimum radius of gyration of the built-up section about the y-axis

Input - Grouted Leg

Ec: 0 ksi - Modulus of Elasticity of Grout

E_leg: 29,000 ksi - Modulus of Elasticity of Leg

E_sleeve: 29,000 ksi - Modulus of Elasticity of Sleeve

Project Name:	Straits Turnpike	**Engineer:**	CJB
Project Number:	TEP#25628.105719	**Check:**	RRS
Client Site Number:	US-CT-1003	**Date:**	1/26/2017
Elevation:	140 - 150ft	**CODE:**	TIA-G

Grouted/Un-Grouted Pipe Leg + Half Sleeve R/F

Φc = 0.90 - LRFD strength reduction factor (compression)

ΦT = 0.90 - LRFD strength reduction factor (tension)

Φw = 0.75 - LRFD strength reduction factor (weld shear)

Φv = 0.75 - LRFD strength reduction factor (shear)

Mast St.: 1.00 - from tnxTower

Input - Loads

$P_{initial}$: 7.15 kips - force from initial load (no wind)

P_{wind}: 119.164 kips - force due to final loading including reinforcement

T_u: 105.131 kips - maximum load on leg

Quick Check

Weld Size:	OK
Weld Connection:	28.8%
Crushing Check:	58.4%
Leg Comp. Check:	58.8%
Sleeve Check:	59.8%
Built-up Check:	62.6%
Slenderness Check:	OK
Leg Tension Check:	51.5%

Input - Tower Leg 3.5 STD

K: 1.00 - effective length factor for leg

L_u: 2.60 ft - unbraced length of tower leg

F_{y_leg}: 55.00 ksi - minimum specified yield strength of tower leg

F_{u_leg}: 70.00 ksi - minimum specified ultimate strength of tower leg

r: 1.34 in - minimum radius of gyration of tower leg

A_{leg}: 2.68 in^2 - area of tower leg

Di: 3.55 in - inside diameter of tower leg

t_{leg}: 0.23 in - thickness of tower leg

$f`_c$: 0.00 ksi - minimum specified compressive strength of grout (If ungrouted enter 0)

Input - Sleeve R/F 4 STD Gap Check: OK

F_{y_sleeve}: 50.00 ksi - minimum specified yield strength of sleeve r/f

F_{u_sleeve}: 62.00 ksi - minimum specified ultimate strength of sleeve r/f

r_{x_sleeve}: 0.66 in - minimum radius of gyration of sleeve r/f about the x-axis

r_{y_sleeve}: 1.51 in - minimum radius of gyration of sleeve r/f about the y-axis

A_{sleeve}: 1.59 in^2 - area of sleeve r/f

t_{sleeve}: 0.24 in - thickness of tower leg

Termination: Connected to Flange

Input - Sleeve Connection to Leg

a: 12.00 in - spacing of connectors connecting the sleeve to the leg

D: 3.00 - weld size for the weld connecting the sleeve to the leg (unit = # of 16ths)

Length //: 12.00 in - length of weld on each side of the leg at the termination

Length ⊥: 7.07 in - length of weld at the bottom/top of the leg sleeve at termination ($\pi D/2$)

No: 2.00 - number of longitudinal welds per end of the leg (typically near side & far side, so 2)

F_{EXX}: 70.00 ksi - weld electrode classification

Width: 4.50 in - maximum width of the built-up leg

Gap: 0.00 in - length of leg considered for crushing

Input - Built-up Leg Section 3.5 STD w/4 STD Half Sleeve

r_{x_bu}: 1.31 in - minimum radius of gyration of the built-up section about the x-axis

r_{y_bu}: 1.40 in - minimum radius of gyration of the built-up section about the y-axis

Input - Grouted Leg

Ec: 0 ksi - Modulus of Elasticity of Grout

E_leg: 29,000 ksi - Modulus of Elasticity of Leg

E_sleeve: 29,000 ksi - Modulus of Elasticity of Sleeve

Project Name:	Straits Turnpike	**Engineer:**	CJB
Project Number:	TEP#25628.105719	**Check:**	RRS
Client Site Number:	US-CT-1003	**Date:**	1/26/2017
Elevation:	160 - 170ft	**CODE:**	TIA-G

Grouted/Un-Grouted Pipe Leg + Half Sleeve R/F

Φc = 0.90 - LRFD strength reduction factor (compression)

ΦT = 0.90 - LRFD strength reduction factor (tension)

Φw = 0.75 - LRFD strength reduction factor (weld shear)

Φv = 0.75 - LRFD strength reduction factor (shear)

Mast St.: 1.00 - from tnxTower

Input - Loads

$P_{initial}$: 4.833 kips - force from initial load (no wind)

P_{wind}: 74.667 kips - force due to final loading including reinforcement

T_u: 65.703 kips - maximum load on leg

Quick Check

Weld Size:	OK
Weld Connection:	24.3%
Crushing Check:	49.7%
Leg Comp. Check:	50.3%
Sleeve Check:	71.1%
Built-up Check:	63.7%
Slenderness Check:	OK
Leg Tension Check:	49.8%

Input - Tower Leg 2.5 STD

K: 1.00 - effective length factor for leg

L_u: 2.64 ft - unbraced length of tower leg

F_{y_leg}: 55.00 ksi - minimum specified yield strength of tower leg

F_{u_leg}: 70.00 ksi - minimum specified ultimate strength of tower leg

r: 0.95 in - minimum radius of gyration of tower leg

A_{leg}: 1.70 in^2 - area of tower leg

Di: 2.47 in - inside diameter of tower leg

t_{leg}: 0.20 in - thickness of tower leg

$f`_c$: 0.00 ksi - minimum specified compressive strength of grout (If ungrouted enter 0)

Input - Sleeve R/F 3 XS Gap Check: OK

F_{y_sleeve}: 35.00 ksi - minimum specified yield strength of sleeve r/f

F_{u_sleeve}: 60.00 ksi - minimum specified ultimate strength of sleeve r/f

r_{x_sleeve}: 0.50 in - minimum radius of gyration of sleeve r/f about the x-axis

r_{y_sleeve}: 1.14 in - minimum radius of gyration of sleeve r/f about the y-axis

A_{sleeve}: 1.51 in^2 - area of sleeve r/f

t_{sleeve}: 0.30 in - thickness of tower leg

Termination: Connected to Flange

Input - Sleeve Connection to Leg

a: 12.00 in - spacing of connectors connecting the sleeve to the leg

D: 3.00 - weld size for the weld connecting the sleeve to the leg (unit = # of 16ths)

Length //: 12.00 in - length of weld on each side of the leg at the termination

Length ⊥: 5.50 in - length of weld at the bottom/top of the leg sleeve at termination (πD/2)

No: 2.00 - number of longitudinal welds per end of the leg (typically near side & far side, so 2)

F_{EXX}: 70.00 ksi - weld electrode classification

Width: 3.50 in - maximum width of the built-up leg

Gap: 0.00 in - length of leg considered for crushing

Input - Built-up Leg Section 2.5 STD w/3 XS Half Sleeve

r_{x_bu}: 0.92 in - minimum radius of gyration of the built-up section about the x-axis

r_{y_bu}: 1.04 in - minimum radius of gyration of the built-up section about the y-axis

Input - Grouted Leg

Ec: 0 ksi - Modulus of Elasticity of Grout

E_leg: 29,000 ksi - Modulus of Elasticity of Leg

E_sleeve: 29,000 ksi - Modulus of Elasticity of Sleeve

TOWER ENGINEERING PROFESSIONALS

JOB:	Straits Turnpike (US-CT-1003); TEP No. 25628.105719		
SHEET #:	1	OF	2
CALCULATED BY:	CJB	DATE	1/26/2017
CHECKED BY:	RRS	DATE	1/26/2017

Mat Foundation Design for Self Supporting Tower - TIA-222-G

q_a, ALLOWABLE SOIL PRESS. (ksf)	6
NET OR GROSS BEARING?	NET
SAFETY FACTOR IN q_a	2
SOIL DENSITY (pcf)	125
TOWER FACE WIDTH (ft.)	21.5
Tower Eccentricity (ft)	0.00

φ^*q_n = 9.0 ksf

F'c (ksi)	3
F'y (ksi)	60

Distance between tower centroid and the foundation centroid

Base Reactions LC1: 1.2D + 1.6W

M_u, MOMENT (k-ft)	6428.8
P_t, AXIAL (k)	63.8
H, SHEAR (k)	55.3

Base Reactions LC2: 0.9D + 1.6W

M, MOMENT (k-ft)	6428.8
P_t, AXIAL (k)	47.9
H, SHEAR (k)	55.3

Try:	L (ft.)	B (ft.)	t (ft.)	Soil depth to TOP of mat (ft.)	Soil depth to BOT. of mat (ft.)	Pier dia./width (ft.)	Pier Height, h (ft.)	Pier Shape
	33	33	4	5.416	9.416	4.00	5.67	Square

W_f, WEIGHT OF FOUNDATION (k) =	694.2
W_s, WEIGHT OF SOIL (k) =	704.8

Concrete Volume (cu yd) 171.4

CHECK BEARING CAPACITY FOR LC1: 1.2D + 1.6W

$P = P_t + 1.2*W_f + 1.2*W_s$ =	1742.6 k
$e = (M_{ot} + P_t*e_t)/P$ =	4.00 ft
L/6 =	5.50 ft
90 Axis: q_{max} =	1.59 ksf
Diag. Axis: q_{max} =	2.07 ksf

Capacity: 22.97%

CHECK BEARING FAILURE[1] FOR LC2: 0.9D +1.6W

$P = P_t + 0.9*W_f + 0.9*W_s$ =		1307.0 k
90° Axis	$M_{\varphi Qn}$[2]=	19021.8 k-ft
	$M_{ot}/M_{\varphi Qn}$=	0.366
Diag. Axis	$M_{\varphi Qn}$=	20024.4 k-ft
	$M_{ot}/M_{\varphi Qn}$=	0.348

Capacity: 36.61%

[1] Per effective bearing area (AASHTO LRFD Bridge Design Specifications, 4th Ed.)

[2] $M_{\varphi Qn}$ is the applied moment for which qmax = φQ_n

CHECK OVERTURNING: LC2 CONTROLS

$M_{ot} = M+H*(t+h)$ =	6963.5 k-ft
$M_{st}=P*(L/2-e_t)+(W_{f+s}*L/2)$ =	21564.9 k-ft
M_{ot}/M_{st} =	0.323

Capacity: 32.29%

TOWER ENGINEERING PROFESSIONALS

JOB:	Straits Turnpike (US-CT-1003); TEP No. 25628.105719		
SHEET NUMBER:	2	OF	2
CALCULATED BY:	CJB	DATE	1/26/2017

Stress and capacity calculations of reinforced concrete mat assume a fully rigid foundation and a linear (triangular or trapeziodal) contact stress distribution based on factored loads.

CHECK BEAM SHEAR

Vu = 145.3 k
φVc = 1415.3 k Vc > Vu **O.K** **Capacity:** **10.27%**

CHECK PUNCHING SHEAR

Vu = 293.0 k
φVc = 2009.1 k Vc > Vu **O.K** **Capacity:** **14.58%**

CALCULATE REINFORCING REQUIRED

F'c = 3.0 ksi F'y = 60.0 ksi

Temp & Shrinkage Reinforcement, As, temp = 0.39 in^2/ft (ACI 318 Sec. 10.5.4)

BOTTOM REINFORCING

Bar Size= 8
Bar Spacing = 11.8 in.
d = 43.5 in.
Mu= -542.6 in-k/ft

φMn=0.9*As*Fy*(d-1/2*As*Fy/(0.85*b*F'c))

Solution: As,req = 0.23 in^2/ft As,temp controls
Check, As= 0.80 in^2/ft **Capacity:** **48.54%**

TOP REINFORCING

Bar Size= 8
Bar Spacing = 11.8 in.
d= 43.5 in.
Mu= 503.8 in-k/ft

φMn=0.9*As*Fy*d(1-0.59*As*Fy/(b*d*F'c))

Solution: As,req = 0.22 in^2/ft As,temp controls
Check, As= 0.80 in^2/ft **Capacity:** **48.54%**

		PASS	PASS			
	Results Summary:	LC1	LC2	Straits Turnpike (US-CT-1003)		
	Soil Interaction:	N/A	N/A	TEP #:	25628.105719	
				Analysis:	CJB	1/26/2017
Drilled Caisson Tool - Pier Check	Foundation Structural:	26.6%	53.1%	Check:	RRS	1/26/2017

Code Revisions: TIA-222-G ACI 318-11

Tower Type: Self Support

	LC1	LC2	
Moment:	0.00	0.00	kip-ft
Axial (download):	366.55	0.00	kip
Shear:	35.63	31.12	kip
Axial (uplift):	0.00	316.04	kip

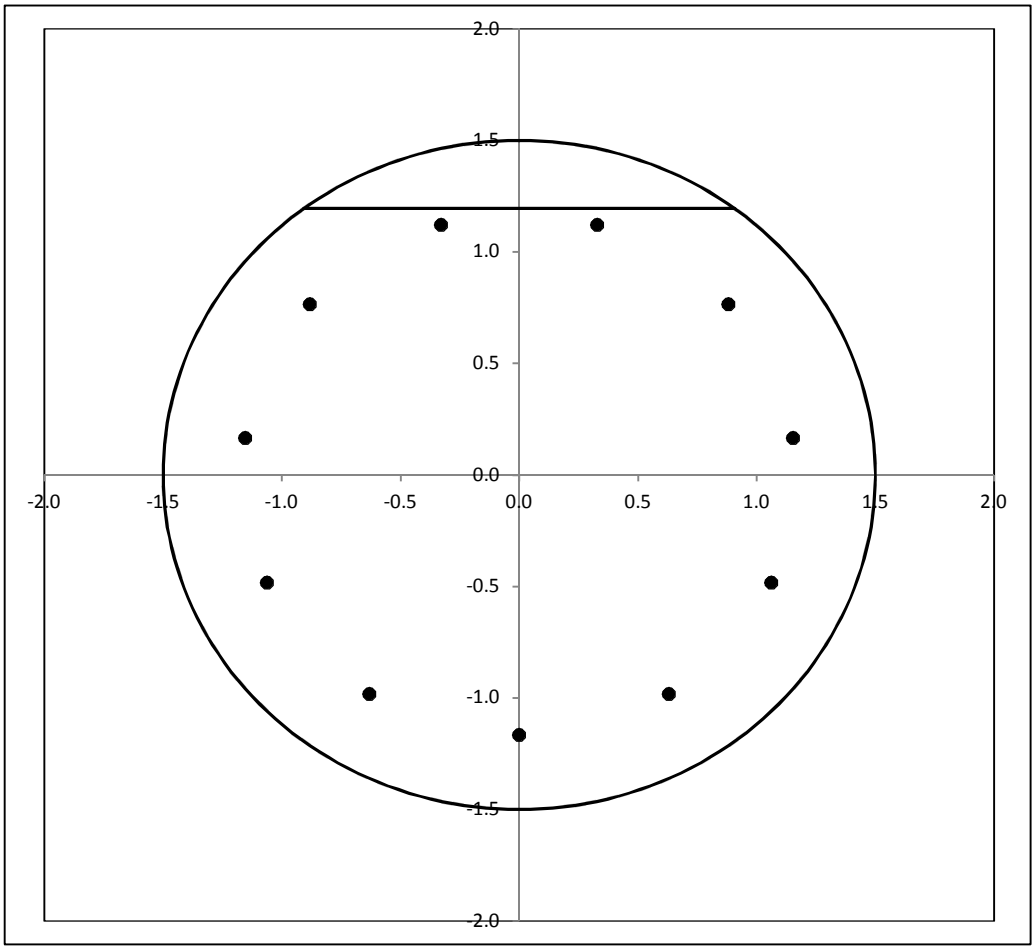
Shaft Information

Diameter:	3.00	ft
Projection:	0.25	ft
Caisson Length:	5.67	ft
f'c:	3.000	ksi
Max εc:	0.003	in/in

Cage 1 Reinforcement

Tie Bar Size:	4	*(fy = 60.0 ksi)*
Clear Cover to Tie:	3.00	*in (Cage Ø = 28.00in)*
Tie Bar Spacing:	16.00	in
Vertical Bar Size:	8	
Vertical Bar Quantity:	11	*(ρ =0.854%)*
fy:	60.0	ksi
E:	29,000	ksi

Reinforcement Capacity



		LC1	LC2	
	Vu =	35.6	35.6	kip
	Vc =	131.6	42.3	kip
fy,tie = 60.0	Vs =	47.1	47.1	kip
	ϕVn =	134.0	67.1	kip
	Capacity =	26.6%	53.1%	
		PASS	PASS	

	LC1	LC2	
Mu =	0.0	0.0	kip-ft
ϕMn =	800.8	193.7	kip-ft
Capacity =	0.0%	0.0%	
	PASS	PASS	