

**Structural Analysis for  
SBA Network Services, Inc.**

**345.2' Guyed Tower (346.4' AGL)**

**SBA Site Name: West Hartford  
SBA Site ID: CT15879-A-05  
AT&T Site ID: CTL01154  
Site Address: 3114 Albany Avenue, West Hartford, CT 06117**

FDH Velocitel Project Number 16PVUB1400

**Analysis Results**

Tower Components	67.9%	Sufficient
Foundation	73.7%	Sufficient

Prepared By:



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Project Engineer I

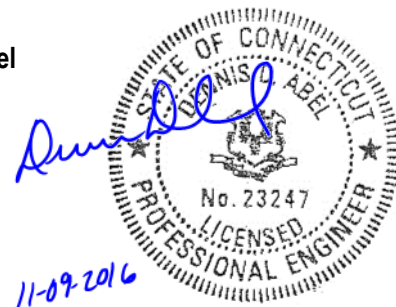
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November 09, 2016

*Prepared pursuant to the ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas and the 2016 Connecticut State Building Code*

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## EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the existing Guyed Tower located in West Hartford, CT to determine whether the tower is structurally adequate to support the antenna configuration in place per **Table 1** pursuant to the *ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas and the 2016 Connecticut State Building Code*. Information pertaining to the antenna loading, current tower geometry, member sizes, and below grade parameters was obtained from:

Source	Document Type	Reference	Date
Tower Engineering Professionals	Tower Mapping	Project No. 112343	July 12, 2011
FDH, Inc.	Tower Mapping	Job No. 14629H1500	May 09, 2014
FDH Engineering, Inc.	Foundation Mapping	Project No. 1462OE1500	May 08, 2014
Clarence Welti Assoc., Inc.	Geotechnical Report	Site Location: West Hartford, CT	May 22, 2000
FDH, Inc.	TIA Inspection	Job No. 1308391800	December 04, 2013
SBA Network Services, Inc.	-	-	-

The *ultimate design wind speed* per the *2016 Connecticut State Building Code* is 125 mph without ice and 50 mph with 1" radial ice. This is converted to a basic design wind speed of 97 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*. Ice is considered to increase with height. Furthermore, this structure was analyzed as a Risk Category II structure in Exposure C using Topographic Category 1 and Spectral Response Accelerations of  $S_s = 0.181$  and  $S_1 = 0.064$

**Note:** Per *Section 2.7.3* of the *ANSI/TIA-222-G Standard*, the seismic/earthquake loading effects can be ignored if the spectral response acceleration at short periods ( $S_s$ ) is less than or equal to 1.00. The tower's location mandates a design  $S_s$  of less than 1.00, thus seismic loading was not considered as part of the analysis of this structure.

## Conclusions

With the antenna configuration in place per **Table 1** we have determined the tower stress level to be sufficient and the foundation(s) to be sufficient pursuant to the requirements stipulated by *ANSI/TIA-222-G Structural Standard for Antenna Supporting Structures and Antennas and the 2016 Connecticut State Building Code* provided the **Recommendations** listed below are satisfied. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Velocitel is accurate (i.e., the structure member information, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

## Recommendations

To ensure the requirements of the current analysis standards are met with the antenna configuration in place per **Table 1**, we have the following recommendations:

1. Feed lines to be installed as shown in **Figure 1** in the **Appendix**.
2. RRU/RRH Stipulation: The equipment may be installed in any arrangement as determined by the client.

## APPURTENANCE LISTING

The antennas and equipment, with their corresponding feed lines, considered for this analysis are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Velocitel should be contacted to perform a revised analysis.*

**Table 1 - Appurtenance Loading**

### Existing Loading:

Antenna Elevation (ft.)	Description	Feed Lines	Carrier	Mount Elevation (ft.)	Mount Type
332	(1) ERI 3 Bay FM	(1) 3"	WCCC	332	Direct
308.3	(1) Scala SCA 4DR-8S	(1) 3"	ZGS Hartford	308.3	(1) Pipe Mount
261	(1) Decibel DB420-B	(1) 7/8"	Master Combiner	251	(1) Standoff
251.8	(1) Antenna Concepts ACB16A	(1) 1-5/8" (1) 3/8"	WRDM	251.8	(1) Pipe Mount
243	(1) Antel WPA-800120 (1) 18" x 6" x 6" TMA	(2) 7/8"	Town of West Hartford	243	Direct
235	(1) Scala 6-ft x 3-ft Grid Dish	(1) 7/8"	WCCC	235	Direct
232	(1) Radiowaves SP2-4.7NS (1) 12" x 2" x 2" TMA	(2) 1/4" (1) 3/8"	Town of West Hartford	232	Direct
225.5	(2) Unknown Panel 34" x 7" x 2"	(2) 3/8"	SNEW ISP	225.5	(2) Pipe Mount
220	(1) Antel WPA-800120	(1) 1-5/8"	Town of West Hartford	220	Direct
213	(1) Decibel DB420-B	(1) 1/2"	Master Combiner	203	(1) Standoff
196	(1) T.S. 3" x 3" x 6.5' (1) Cablewave PA6-112	(1) EW71	WRDM	196	(1) Standoff
191.5 (Tip)	(1) Micronetixx LP-1900-B-12	(1) 1-5/8"	WRNT (R&C) Tyche Media	180	(1) Pipe Mount
180					
168.5 (Base)					
165	(1) Antel BCD-80010	(1) 1-5/8"	Town of West Hartford	165	(1) Standoff
164.5	(1) 6810 1 Bay FM	(1) 1/2"	91.9 FM	164.5	(1) Pipe Mount
160	(4) RFS APX16DWV_16DWVS (4) Ericsson KRY 112 71	(12) 1-5/8"	T-Mobile	160	(3) T-Frames
146.5	(1) 12" x 4.5" x 6.25" TMA (1) 2-ft MW Dish	(1) 3/8"	SNEW ISP	146.5	(1) Pipe Mount
145	(1) 12-ft x 1" Omni	(1) 1-5/8"	Ham Radio	145	(1) Standoff
---	---	(1) 1-5/8"	---	142.5	---
---	---	(1) 1-5/8"	---	140.5	---
136.5	(1) 5' x 10" Detuner	(1) 1/4"	Ham Radio	136.5	Direct
130	(2) Andrew HBX-6517DS (2) Andrew LNX-6514DS (2) Swedcom SLCP 2x6015 (2) Swedcom SACP 2x5516 (4) RFS FD9R6004/2C (2) Alcatel Lucent RRH2x40-AWS (1) RFS DB-T1-6Z-8AB-0Z	(8) 1-5/8" (1) 1-5/8" Fiber	Verizon	129.5	(3) T-Frames
120.5	(3) RFS APXV18-206517S	(6) 1-5/8"	Metro PCS	120.5	(1) Pipe Mount
112	(3) Kathrein 800 10121 (4) Andrew SBNH-1D6565C (2) KMW AM-X-CD-16-65-00T-RET (6) CCI DTMABP7819VG12A (6) Ericsson RRUS 11	(12) 1-5/8" (4) 3/4" DC (2) 3/8" Fiber	AT&T	111.5	(3) T-Frames
48	(1) GPS	(1) 3/8"	Metro PCS	48	Direct
21	(1) 14-Element 4.5 ft Yagi	(1) 1/2"	Ham Radio	21	(1) Standoff

**Proposed Carrier Final Loading:**

Antenna Elevation (ft.)	Description	Feed Lines	Carrier	Mount Elevation (ft.)	Mount Type
112	(6) Kathrein 800 10121 (2) CCI HPA-65R-BUU-H8 (1) CCI HPA-65R-BUU-H6 (3) Ericsson RRUS-11 (3) Ericsson RRUS-12 (3) Ericsson RRUS A2 (6) CCI DTMABP7819VG12A (12) Kathrein 860 10025 (1) Raycap DC6-48-60-18-8F	(12) 1-5/8" (4) 3/4" DC (2) 3/8" Fiber	AT&T	111.5	(3) T-Frames

## RESULTS

The following material grades for individual members were used for analysis:

**Table 2 - Material Grade**

Member Type	Material Grade
Legs	A572-50 (Assumed)
Bracing	A572-50 & A36 (Assumed)
Bolts	A325 (Assumed)

**Table 3** and **Table 4** display the summary of capacities for the analyzed structure and its additional components. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. **Table 5** displays the maximum dish rotations at service winds speeds.

If the assumptions outlined in this report differ from actual field conditions, FDH Velocitel should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information.

**Table 3 - Structure Member Capacities**

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
L1	346.351 - 329.351	Pole	P10x.365 (10.75 OD)	12.1	Pass
L2	329.351 - 311.351	Pole	P10x.365 (10.75 OD)	46.6	Pass
T1	311.351 - 310.351	Leg	2 3/4	12.0	Pass
T2	310.351 - 299.182	Leg	2 3/4	9.3	Pass
T3	299.182 - 279.182	Leg	2 3/4	10.7	Pass
T4	279.182 - 259.182	Leg	2 3/4	11.3	Pass
T5	259.182 - 239.182	Leg	2 3/4	15.0 15.2 (b)	Pass
T6	239.182 - 219.182	Leg	2 3/4	20.7	Pass
T7	219.182 - 199.182	Leg	2 3/4	23.1	Pass
T8	199.182 - 179.182	Leg	2 3/4	26.1	Pass
T9	179.182 - 159.182	Leg	2 3/4	28.6	Pass
T10	159.182 - 139.182	Leg	3	28.9	Pass
T11	139.182 - 119.182	Leg	3	33.3 39.6 (b)	Pass
T12	119.182 - 99.1822	Leg	3	35.3	Pass
T13	99.1822 - 79.1822	Leg	3	37.9 45.3 (b)	Pass
T14	79.1822 - 59.1822	Leg	3	41.7	Pass
T15	59.1822 - 39.1822	Leg	3	43.1 50.8 (b)	Pass
T16	39.1822 - 19.1822	Leg	3	43.0	Pass
T17	19.1822 - 14.4112	Leg	3	41.4 48.7 (b)	Pass
T18	14.4112 - 11.8302	Leg	3	41.5	Pass
T19	11.8302 - 9.49947	Leg	3	37.9 48.2 (b)	Pass
T20	9.49947 - 7.16874	Leg	3	36.3 46.3 (b)	Pass
T21	7.16874 - 1.2	Leg	3	44.4	Pass
T2	310.351 - 299.182	Diagonal	7/8	28.9	Pass
T3	299.182 - 279.182	Diagonal	7/8	19.6	Pass
T4	279.182 - 259.182	Diagonal	7/8	18.5	Pass

**Structural Analysis Report**

SBA Network Services, Inc.

SBA Site ID: CT15879-A-05

November 09, 2016

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
T5	259.182 - 239.182	Diagonal	7/8	41.2	Pass
T6	239.182 - 219.182	Diagonal	7/8	46.2	Pass
T7	219.182 - 199.182	Diagonal	7/8	44.4	Pass
T8	199.182 - 179.182	Diagonal	7/8	34.0	Pass
T9	179.182 - 159.182	Diagonal	7/8	40.6	Pass
T10	159.182 - 139.182	Diagonal	1	42.0	Pass
T11	139.182 - 119.182	Diagonal	7/8	67.9	Pass
T12	119.182 - 99.1822	Diagonal	7/8	50.2	Pass
T13	99.1822 - 79.1822	Diagonal	7/8	53.4	Pass
T14	79.1822 - 59.1822	Diagonal	7/8	50.6	Pass
T15	59.1822 - 39.1822	Diagonal	7/8	30.4	Pass
T16	39.1822 - 19.1822	Diagonal	7/8	46.0	Pass
T17	19.1822 - 14.4112	Diagonal	1	31.0	Pass
T18	14.4112 - 11.8302	Diagonal	1	30.3	Pass
T19	11.8302 - 9.49947	Diagonal	1 1/4	13.8	Pass
T20	9.49947 - 7.16874	Diagonal	1 1/4	15.7	Pass
T21	7.16874 - 1.2	Diagonal	1 1/4	58.8	Pass
T1	311.351 - 310.351	Horizontal	6 x 1	3.0	Pass
T19	11.8302 - 9.49947	Horizontal	6 x 3/4	9.5	Pass
T20	9.49947 - 7.16874	Horizontal	6 x 3/4	16.6	Pass
T21	7.16874 - 1.2	Horizontal	6 x 3/4	8.4	Pass
T2	310.351 - 299.182	Top Girt	1 1/4	2.4	Pass
T3	299.182 - 279.182	Top Girt	1	2.4	Pass
T4	279.182 - 259.182	Top Girt	1	1.7	Pass
T5	259.182 - 239.182	Top Girt	1	1.8	Pass
T6	239.182 - 219.182	Top Girt	1	7.6	Pass
T7	219.182 - 199.182	Top Girt	1	12.8	Pass
T8	199.182 - 179.182	Top Girt	1	8.0	Pass
T9	179.182 - 159.182	Top Girt	1	4.3	Pass
T10	159.182 - 139.182	Top Girt	1 1/4	5.9	Pass
T11	139.182 - 119.182	Top Girt	1	19.0	Pass
T12	119.182 - 99.1822	Top Girt	1	2.3	Pass
T13	99.1822 - 79.1822	Top Girt	1	12.1	Pass
T14	79.1822 - 59.1822	Top Girt	1	8.7	Pass
T15	59.1822 - 39.1822	Top Girt	1	1.3	Pass
T16	39.1822 - 19.1822	Top Girt	1	6.2	Pass
T17	19.1822 - 14.4112	Top Girt	1 1/4	3.1	Pass
T18	14.4112 - 11.8302	Top Girt	7/8	6.3	Pass
T2	310.351 - 299.182	Bottom Girt	1 1/4	11.4	Pass
T3	299.182 - 279.182	Bottom Girt	1	1.6	Pass
T4	279.182 - 259.182	Bottom Girt	1	2.5	Pass
T5	259.182 - 239.182	Bottom Girt	1	10.5	Pass
T6	239.182 - 219.182	Bottom Girt	1	10.4	Pass
T7	219.182 - 199.182	Bottom Girt	1	6.2	Pass
T8	199.182 - 179.182	Bottom Girt	1	2.0	Pass
T9	179.182 - 159.182	Bottom Girt	1	6.8	Pass
T10	159.182 - 139.182	Bottom Girt	1 1/4	8.6	Pass
T11	139.182 - 119.182	Bottom Girt	1	6.2	Pass
T12	119.182 - 99.1822	Bottom Girt	1	8.0	Pass
T13	99.1822 - 79.1822	Bottom Girt	1	13.3	Pass
T14	79.1822 - 59.1822	Bottom Girt	1	4.8	Pass
T15	59.1822 - 39.1822	Bottom Girt	1	2.8	Pass
T16	39.1822 - 19.1822	Bottom Girt	1	5.8	Pass
T21	7.16874 - 1.2	Bottom Girt	6 x 3/4	7.4	Pass
T3	299.182 - 279.182	Mid Girt	1	0.5	Pass
T4	279.182 - 259.182	Mid Girt	1	0.6	Pass
T5	259.182 - 239.182	Mid Girt	1	0.6	Pass
T6	239.182 - 219.182	Mid Girt	1	19.8	Pass

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
T7	219.182 - 199.182	Mid Girt	1	1.1	Pass
T8	199.182 - 179.182	Mid Girt	1	1.3	Pass
T9	179.182 - 159.182	Mid Girt	1	1.3	Pass
T10	159.182 - 139.182	Mid Girt	1 1/4	16.3	Pass
T11	139.182 - 119.182	Mid Girt	1	3.7	Pass
T12	119.182 - 99.1822	Mid Girt	1	2.0	Pass
T13	99.1822 - 79.1822	Mid Girt	1	22.7	Pass
T14	79.1822 - 59.1822	Mid Girt	1	2.4	Pass
T15	59.1822 - 39.1822	Mid Girt	1	2.5	Pass
T16	39.1822 - 19.1822	Mid Girt	1	2.5	Pass
T17	19.1822 - 14.4112	Mid Girt	7/8	5.6	Pass
T19	11.8302 - 9.49947	Redund Horz 1 Bracing	7/8	10.5	Pass
T20	9.49947 - 7.16874	Redund Horz 1 Bracing	7/8	12.1	Pass
T20	9.49947 - 7.16874	Redund Diag 1 Bracing	7/8	15.0	Pass
T3	299.182 - 279.182	Guy A@299.182	13/16	46.2	Pass
T6	239.182 - 219.182	Guy A@229.182	7/8	44.1	Pass
T10	159.182 - 139.182	Guy A@149.182	13/16	52.6	Pass
T13	99.1822 - 79.1822	Guy A@89.1822	3/4	54.8	Pass
T3	299.182 - 279.182	Guy B@299.182	3/4	58.6	Pass
T6	239.182 - 219.182	Guy B@229.182	13/16	53.3	Pass
T10	159.182 - 139.182	Guy B@149.182	7/8	51.3	Pass
T13	99.1822 - 79.1822	Guy B@89.1822	13/16	50.4	Pass
T3	299.182 - 279.182	Guy C@299.182	3/4	54.4	Pass
T6	239.182 - 219.182	Guy C@229.182	13/16	48.9	Pass
T10	159.182 - 139.182	Guy C@149.182	7/8	48.2	Pass
T13	99.1822 - 79.1822	Guy C@89.1822	13/16	48.0	Pass

**Table 4 – Additional Structure Component Capacities**

Elevation (ft.)	Component	% Capacity	Pass / Fail	Notes
0	Base Foundation (Soil Interaction)	21.5	Pass	-
0	Base Foundation (Structural)	73.7	Pass	-
0	Guy Foundation (Soil Interaction)	31.7	Pass	-
0	Guy Foundation (Structural)	38.0	Pass	-

**Table 5 - Maximum Dish Rotations at Service Wind Speeds**

Centerline Elevation (ft.)	Dish	Tilt (deg)*	Twist (deg)*
235	(1) Scala 6-ft x 3-ft Grid Dish	0.0481	0.5018
232	(1) Radiowaves SP2-4.7NS	0.0490	0.4970
196	(1) Cablewave PA6-112	0.0512	0.4388
146.5	(1) 2-ft MW Dish	0.0288	0.3341

\*Allowable tilt and twist to be reviewed by the carrier.



## **GENERAL COMMENTS**

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Velocitel should be notified immediately to perform a revised analysis.

## **LIMITATIONS**

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Velocitel.

## **APPENDIX**

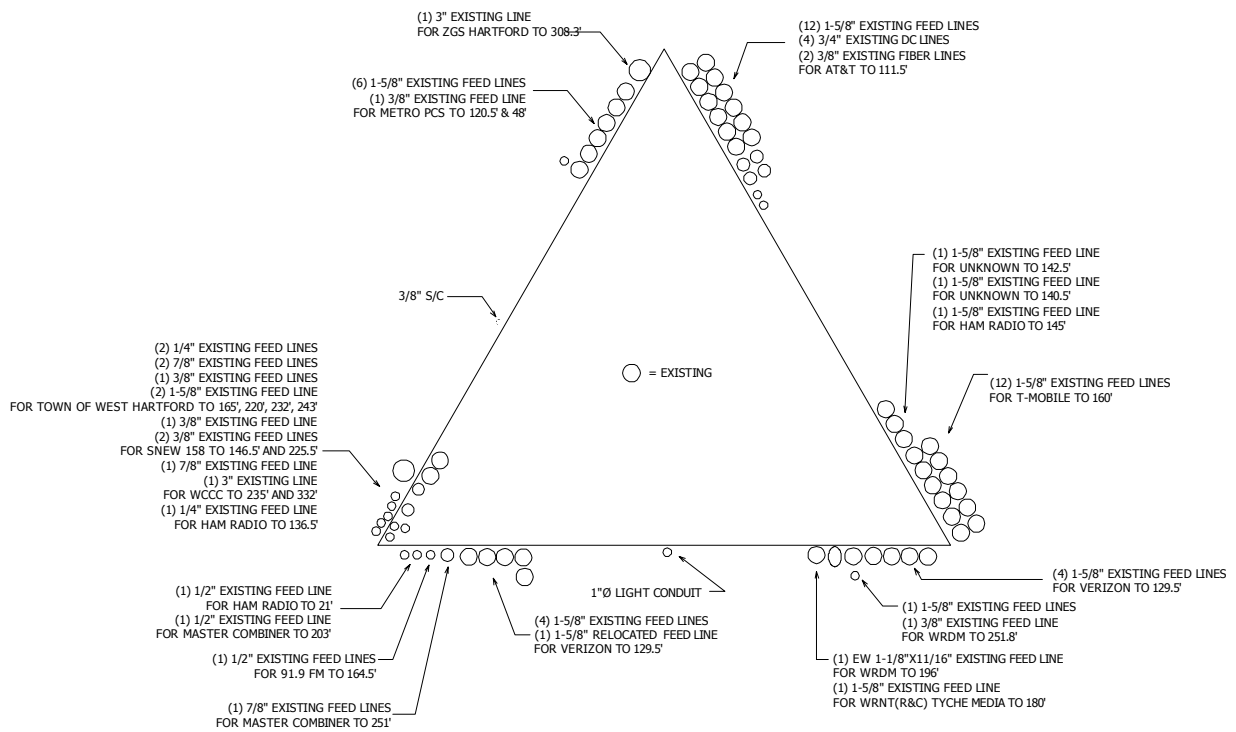
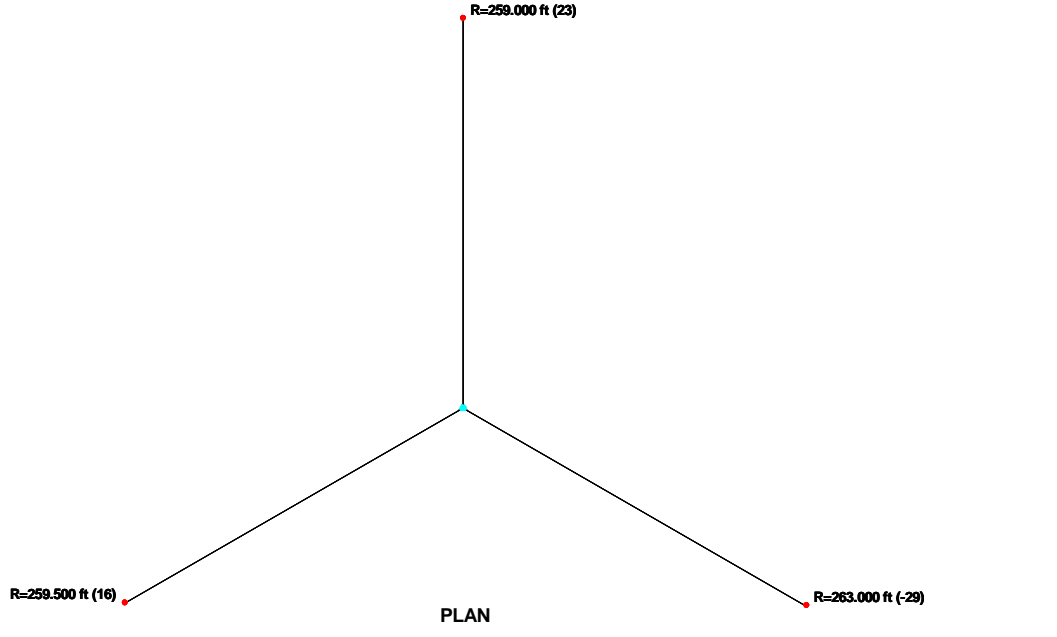
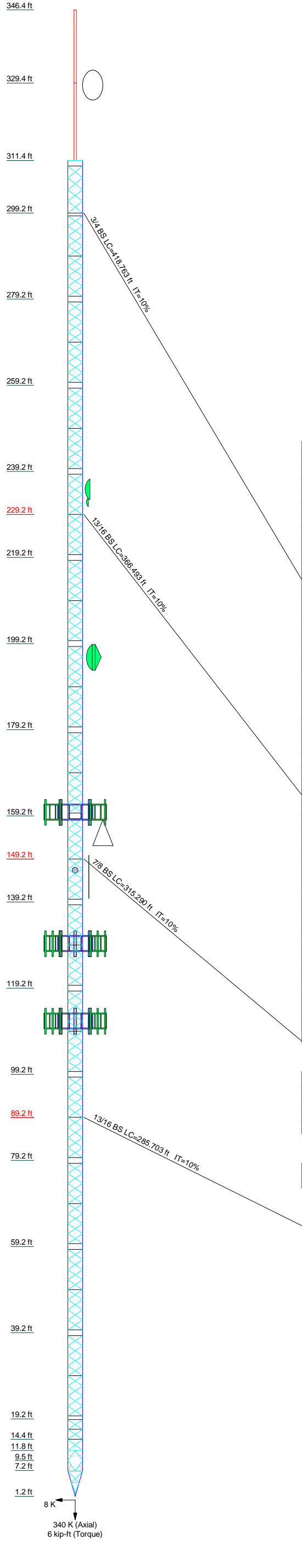


Figure 1 - Feed Line Layout

Section	L1	L2	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20
Legs																						
Leg Grade		P10x365 (10.75 OD)																				
Diagonals		A63-B-35																				
Diagonal Grade		N.A.																				
Top Girts		N.A.																				
Mid Girts		N.A.																				
Bottom Girts		N.A.																				
Horizontals		N.A.																				
Red. Horizontals		N.A.																				
Red. Diagonals		N.A.																				
Face Width (ft)																						
# Panels @ (ft)																						
Weight (K)																						



**DESIGNED APPURTENANCE LOADING**

TYPE	ELEVATION	TYPE	ELEVATION
30" x 18" Dia	346.3	(3) T-Frames	129.5
ERI 3 Bay FM	332	SLCP 2x6015 w/ Mount Pipe	129.5
2.4" Dia x 18" Pipe	332	SLCP 2x6015 w/ Mount Pipe	129.5
L2.5x2.5x0.25, 10-ft Length	309.5	SACP 2x5516 w/ Mount Pipe	129.5
Scala SCA 4DR-8S	308.3	SACP 2x5516 w/ Mount Pipe	129.5
2.9" x 22-ft Mt. Pipe	297	(2) Andrew HBX-6517DS w/ Mount Pipe	129.5
2.4" x 25' Mount Pipe	251.8	(2) Andrew LNX-6514DS w/ Mount Pipe	129.5
Antenna Concepts ACB16A w/ Mount	251.8	FD9R6004/2C Diplexer	129.5
(1) Side Arm Mount	251	FD9R6004/2C Diplexer	129.5
DB420-B	251	(2) FD9R6004/2C Diplexer	129.5
TMA 18" x 6" x 6"	243	RRH2x40-AWS	129.5
Antel WPA-800120	243	RRH2x40-AWS	129.5
6-ft x 3-ft Grid	235	DB-T1-6Z-8AB-OZ	129.5
TMA 12" x 12" x 2"	232	APXV18-206517S w/Mount Pipe	120.5
SP2-4.7NS	232	APXV18-206517S w/Mount Pipe	120.5
2'10" x 7" x 2" Panel w/ 48" Mount Pipe	225.5	APXV18-206517S w/Mount Pipe	120.5
2'10" x 7" x 2" Panel w/ 48" Mount Pipe	225.5	(2) 800 10121 w/ Mount Pipe	111.5
(2) 1" x 8" Pipe	225.5	(2) DTMABP7819VG12A	111.5
(2) 1" x 8" Pipe	225.5	2.4" Dia x 5-ft Pipe	111.5
Antel WPA-800120	220	(3) T-Frames	111.5
(1) Side Arm Mount	203	(2) 800 10121 w/ Mount Pipe	111.5
DB420-B	203	(2) 800 10121 w/ Mount Pipe	111.5
4.5" Dia x 6" Dish Mount	196	2.4" Dia x 5-ft Pipe	111.5
T.S. 3" x 3" x 6.5"	196	2.4" Dia x 5-ft Pipe	111.5
2.4" Dia x 6.5' Mount Pipe	196	RRUS-11	111.5
Cablewave PA6-112	196	RRUS-11	111.5
2.4" x 25' Mount Pipe	180	(4) 860 10025	111.5
Micronetixx LP-1900-B-12 Antennas	180	DC6-48-60-18-8F	111.5
36" Standoff	165	(4) 860 10025	111.5
BCD-80010	165	(4) 860 10025	111.5
2.4" Dia x 10-ft Mount Pipe	164.5	RRUS-12	111.5
6810 1 Bay FM	164.5	RRUS A2	111.5
(3) T-Frames	160	RRUS A2	111.5
APX16DWV_16DWVS w/ Mount Pipe	160	RRUS-12	111.5
APX16DWV_16DWVS w/ Mount Pipe	160	RRUS-12	111.5
(2) APX16DWV_16DWVS w/ Mount Pipe	160	RRUS-11	111.5
KRY 112 71	160	HPA-65R-BUU-H6 w/ Mount Pipe	111.5
KRY 112 71	160	HPA-65R-BUU-H8 w/ Mount Pipe	111.5
(2) KRY 112 71	160	(2) DTMABP7819VG12A	111.5
(2) 2.4" x 7-ft Pipe	160	RRUS A2	111.5
(2) 2.4" x 7-ft Pipe	160	HPA-65R-BUU-H8 w/ Mount Pipe	111.5
2.4" x 7-ft Pipe	160	(2) DTMABP7819VG12A	111.5
2.4" Dia x 4-ft Mount Pipe	146.5	1" dia x 16" Pipe	48
12" x 4.5" x 6.25" TMA	146.5	GPS	48
2-ft Dish w/o Radome	146.5	1-ft Side Arm	21
30" Sidearm Mount	145	14-Element 4.5 ft Yagi	21
12-ft x 1" Omni	145	Detuning Box 29" x 24" x 12"	10.5
Control Box 12" x 13.5" x 6.5"	141.5	Control Box 12" x 13.5" x 6.5"	5.7
Detuner	136.5	36"x36"x12" TMA	1.2

**SYMBOL LIST**

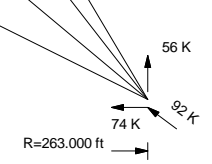
MARK	SIZE	MARK	SIZE
A	SR 1 1/4	E	2 @ 2.30217
B	SR 7/8	F	1 @ 2.581
C	6 x 1	G	2 @ 2.33073
D	1 @ 1	H	2 @ 2.60416

**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

**TOWER DESIGN NOTES**

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 67.9%



ALL REACTIONS ARE FACTORED

<p>ENGINEERING INNOVATION</p> <p>Tower Analysis</p>	<p><b>FDH Velocitel</b></p> <p>6521 Meridien Drive, Suite 107</p> <p>Raleigh, North Carolina 27616</p> <p>Phone: 9197551012</p> <p>FAX: 9197551031</p>	<p>Job: <b>West Hartford, CT15879-A-05</b></p>	<p>Project: <b>16PVUB1400</b></p>
		<p>Client: <b>SBA Network Services, Inc.</b></p>	<p>Drawn by: <b>PHicks</b></p>
		<p>Code: <b>TIA-222-G</b></p>	<p>Date: <b>11/09/16</b></p>
		<p>Path:</p>	<p>App'd: _____</p> <p>Scale: <b>NTS</b></p> <p>Dwg No. <b>E-1</b></p>

<b>tnxTower</b>  <b>FDH Velocitel</b> 6521 Meridien Drive, Suite 107 Raleigh, North Carolina 27616 Phone: 9197551012 FAX: 9197551031	<b>Job</b> West Hartford, CT15879-A-05	<b>Page</b> 1 of 57
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## Tower Input Data

The main tower is a 3x guyed tower with an overall height of 346.351 ft above the ground line.

The base of the tower is set at an elevation of 1.200 ft above the ground line.

The face width of the tower is 5.000 ft at the top and tapered at the base.

An index plate is provided at the 3x guyed -tower connection.

There is a pole section.

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

The following design criteria apply:

Tower is located in Hartford County, Connecticut.

ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).

Basic wind speed of 97 mph.

Structure Class II.

Exposure Category C.

Topographic Category 1.

Crest Height 0.000 ft.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

Safety factor used in guy design is 1.

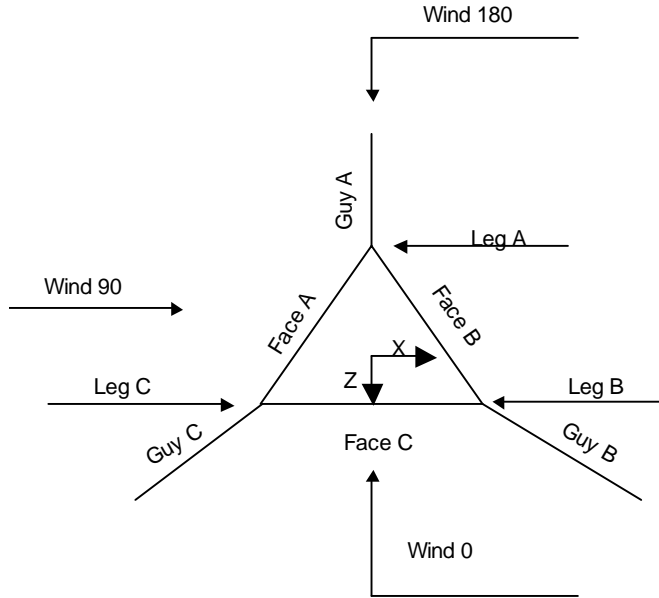
Stress ratio used in tower member design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>Consider Moments - Legs</li> <li>Consider Moments - Horizontals</li> <li>Consider Moments - Diagonals</li> <li>Use Moment Magnification</li> <li>√ Use Code Stress Ratios</li> <li>√ Use Code Safety Factors - Guys</li> <li>Escalate Ice</li> <li>Always Use Max Kz</li> <li>Use Special Wind Profile</li> <li>√ Include Bolts In Member Capacity</li> <li>Leg Bolts Are At Top Of Section</li> <li>√ Secondary Horizontal Braces Leg</li> <li>Use Diamond Inner Bracing (4 Sided)</li> <li>SR Members Have Cut Ends</li> <li>SR Members Are Concentric</li> </ul> | <ul style="list-style-type: none"> <li>Distribute Leg Loads As Uniform</li> <li>Assume Legs Pinned</li> <li>√ Assume Rigid Index Plate</li> <li>√ Use Clear Spans For Wind Area</li> <li>√ Use Clear Spans For KL/r</li> <li>√ Retension Guys To Initial Tension</li> <li>√ Bypass Mast Stability Checks</li> <li>√ Use Azimuth Dish Coefficients</li> <li>√ Project Wind Area of Appurt.</li> <li>√ Autocalc Torque Arm Areas</li> <li>Add IBC .6D+W Combination</li> <li>√ Sort Capacity Reports By Component</li> <li>Triangulate Diamond Inner Bracing</li> <li>Treat Feed Line Bundles As Cylinder</li> </ul> | <ul style="list-style-type: none"> <li>Use ASCE 10 X-Brace Ly Rules</li> <li>√ Calculate Redundant Bracing Forces</li> <li>Ignore Redundant Members in FEA</li> <li>√ SR Leg Bolts Resist Compression</li> <li>All Leg Panels Have Same Allowable</li> <li>Offset Girt At Foundation</li> <li>√ Consider Feed Line Torque</li> <li>√ Include Angle Block Shear Check</li> <li>Use TIA-222-G Bracing Resist. Exemption</li> <li>Use TIA-222-G Tension Splice Exemption</li> <li style="text-align: center;">Poles</li> <li>Include Shear-Torsion Interaction</li> <li>Always Use Sub-Critical Flow</li> <li>Use Top Mounted Sockets</li> </ul> |
|--|--|---|

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**Corner & Starmount Guyed Tower**

**Pole Section Geometry**

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	346.351-329.351	17.000	P10x.365 (10.75 OD)	A53-B-35 (35 ksi)	
L2	329.351-311.351	18.000	P10x.365 (10.75 OD)	A53-B-35 (35 ksi)	

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 346.351-329.351				1	1	1			
L2 329.351-311.351				1	1	1			

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### Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	311.351-310.351			5.000	1	1.000
T2	310.351-299.182			5.000	1	11.169
T3	299.182-279.182			5.000	1	20.000
T4	279.182-259.182			5.000	1	20.000
T5	259.182-239.182			5.000	1	20.000
T6	239.182-219.182			5.000	1	20.000
T7	219.182-199.182			5.000	1	20.000
T8	199.182-179.182			5.000	1	20.000
T9	179.182-159.182			5.000	1	20.000
T10	159.182-139.182			5.000	1	20.000
T11	139.182-119.182			5.000	1	20.000
T12	119.182-99.182			5.000	1	20.000
T13	99.182-79.182			5.000	1	20.000
T14	79.182-59.182			5.000	1	20.000
T15	59.182-39.182			5.000	1	20.000
T16	39.182-19.182			5.000	1	20.000
T17	19.182-14.411			5.000	1	4.771
T18	14.411-11.830			5.000	1	2.581
T19	11.830-9.499			5.000	1	2.331
T20	9.499-7.169			5.000	1	2.331
T21	7.169-1.200			5.000	1	5.969

### Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	311.351-310.351	1.000	X Brace	No	Yes	0.0000	0.0000
T2	310.351-299.182	2.719	X Brace	No	No	3.5000	0.0000
T3	299.182-279.182	2.333	X Brace	No	No	8.0000	8.0000
T4	279.182-259.182	2.333	X Brace	No	No	8.0000	8.0000
T5	259.182-239.182	2.333	X Brace	No	No	8.0000	8.0000
T6	239.182-219.182	2.333	X Brace	No	No	8.0000	8.0000
T7	219.182-199.182	2.333	X Brace	No	No	8.0000	8.0000
T8	199.182-179.182	2.333	X Brace	No	No	8.0000	8.0000
T9	179.182-159.182	2.333	X Brace	No	No	8.0000	8.0000
T10	159.182-139.182	2.333	X Brace	No	No	8.0000	8.0000
T11	139.182-119.182	2.333	X Brace	No	No	8.0000	8.0000
T12	119.182-99.182	2.333	X Brace	No	No	8.0000	8.0000
T13	99.182-79.182	2.333	X Brace	No	No	8.0000	8.0000
T14	79.182-59.182	2.333	X Brace	No	No	8.0000	8.0000
T15	59.182-39.182	2.333	X Brace	No	No	8.0000	8.0000
T16	39.182-19.182	2.333	X Brace	No	No	8.0000	8.0000
T17	19.182-14.411	2.302	X Brace	No	No	2.0000	0.0000
T18	14.411-11.830	2.581	X Brace	No	No	0.0000	0.0000
T19	11.830-9.499	2.331	K1 Down	No	Yes	0.0000	0.0000
T20	9.499-7.169	2.331	K1 Up	No	Yes	0.0000	0.0000
T21	7.169-1.200	2.604	X Brace	No	Yes	3.0000	6.1250

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### Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1	Solid Round	2 3/4	A572-50	Solid Round		A572-50
311.351-310.351			(50 ksi)			(50 ksi)
T2	Solid Round	2 3/4	A572-50	Solid Round	7/8	A572-50
310.351-299.182			(50 ksi)			(50 ksi)
T3	Solid Round	2 3/4	A572-50	Solid Round	7/8	A572-50
299.182-279.182			(50 ksi)			(50 ksi)
T4	Solid Round	2 3/4	A572-50	Solid Round	7/8	A572-50
279.182-259.182			(50 ksi)			(50 ksi)
T5	Solid Round	2 3/4	A572-50	Solid Round	7/8	A572-50
259.182-239.182			(50 ksi)			(50 ksi)
T6	Solid Round	2 3/4	A572-50	Solid Round	7/8	A572-50
239.182-219.182			(50 ksi)			(50 ksi)
T7	Solid Round	2 3/4	A572-50	Solid Round	7/8	A572-50
219.182-199.182			(50 ksi)			(50 ksi)
T8	Solid Round	2 3/4	A572-50	Solid Round	7/8	A572-50
199.182-179.182			(50 ksi)			(50 ksi)
T9	Solid Round	2 3/4	A572-50	Solid Round	7/8	A572-50
179.182-159.182			(50 ksi)			(50 ksi)
T10	Solid Round	3	A572-50	Solid Round	1	A572-50
159.182-139.182			(50 ksi)			(50 ksi)
T11	Solid Round	3	A572-50	Solid Round	7/8	A572-50
139.182-119.182			(50 ksi)			(50 ksi)
T12	Solid Round	3	A572-50	Solid Round	7/8	A572-50
119.182-99.182			(50 ksi)			(50 ksi)
T13	Solid Round	3	A572-50	Solid Round	7/8	A572-50
99.182-79.182			(50 ksi)			(50 ksi)
T14	Solid Round	3	A572-50	Solid Round	7/8	A572-50
79.182-59.182			(50 ksi)			(50 ksi)
T15	Solid Round	3	A572-50	Solid Round	7/8	A572-50
59.182-39.182			(50 ksi)			(50 ksi)
T16	Solid Round	3	A572-50	Solid Round	7/8	A572-50
39.182-19.182			(50 ksi)			(50 ksi)
T17	Solid Round	3	A572-50	Solid Round	1	A572-50
19.182-14.411			(50 ksi)			(50 ksi)
T18	Solid Round	3	A572-50	Solid Round	1	A572-50
14.411-11.830			(50 ksi)			(50 ksi)
T19 11.830-9.499	Solid Round	3	A572-50	Solid Round	1 1/4	A572-50
			(50 ksi)			(50 ksi)
T20 9.499-7.169	Solid Round	3	A572-50	Solid Round	1 1/4	A572-50
			(50 ksi)			(50 ksi)
T21 7.169-1.200	Solid Round	3	A572-50	Solid Round	1 1/4	A572-50
			(50 ksi)			(50 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
T2	Solid Round	1 1/4	A570-50	Solid Round	1 1/4	A570-50
310.351-299.182			(50 ksi)			(50 ksi)
T3	Solid Round	1	A570-50	Solid Round	1	A570-50
299.182-279.182			(50 ksi)			(50 ksi)
T4	Solid Round	1	A570-50	Solid Round	1	A570-50



<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>FDH Velocitel</b> 6521 Meridien Drive, Suite 107 Raleigh, North Carolina 27616 Phone: 9197551012 FAX: 9197551031</p>	<b>Job</b>	West Hartford, CT15879-A-05	<b>Page</b>	5 of 57
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Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
279.182-259.182			(50 ksi)			(50 ksi)
T5	Solid Round	1	A570-50	Solid Round	1	A570-50
259.182-239.182			(50 ksi)			(50 ksi)
T6	Solid Round	1	A570-50	Solid Round	1	A570-50
239.182-219.182			(50 ksi)			(50 ksi)
T7	Solid Round	1	A570-50	Solid Round	1	A570-50
219.182-199.182			(50 ksi)			(50 ksi)
T8	Solid Round	1	A570-50	Solid Round	1	A570-50
199.182-179.182			(50 ksi)			(50 ksi)
T9	Solid Round	1	A570-50	Solid Round	1	A570-50
179.182-159.182			(50 ksi)			(50 ksi)
T10	Solid Round	1 1/4	A570-50	Solid Round	1 1/4	A570-50
159.182-139.182			(50 ksi)			(50 ksi)
T11	Solid Round	1	A570-50	Solid Round	1	A570-50
139.182-119.182			(50 ksi)			(50 ksi)
T12	Solid Round	1	A570-50	Solid Round	1	A570-50
119.182-99.182			(50 ksi)			(50 ksi)
T13	Solid Round	1	A570-50	Solid Round	1	A570-50
99.182-79.182			(50 ksi)			(50 ksi)
T14	Solid Round	1	A570-50	Solid Round	1	A570-50
79.182-59.182			(50 ksi)			(50 ksi)
T15	Solid Round	1	A570-50	Solid Round	1	A570-50
59.182-39.182			(50 ksi)			(50 ksi)
T16	Solid Round	1	A570-50	Solid Round	1	A570-50
39.182-19.182			(50 ksi)			(50 ksi)
T17	Solid Round	1 1/4	A570-50	Solid Round		A570-50
19.182-14.411			(50 ksi)			(50 ksi)
T18	Solid Round	7/8	A570-50	Solid Round		A570-50
14.411-11.830			(50 ksi)			(50 ksi)
T21 7.169-1.200	Solid Round		A570-50	Flat Bar	6 x 3/4	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	None	Flat Bar		A570-50 (50 ksi)	Flat Bar	6 x 1	A36 (36 ksi)
311.351-310.351				(50 ksi)			(50 ksi)
T3	1	Solid Round	1	A570-50	Solid Round		A572-50
299.182-279.182				(50 ksi)			(50 ksi)
T4	1	Solid Round	1	A570-50	Solid Round		A572-50
279.182-259.182				(50 ksi)			(50 ksi)
T5	1	Solid Round	1	A570-50	Solid Round		A572-50
259.182-239.182				(50 ksi)			(50 ksi)
T6	1	Solid Round	1	A570-50	Solid Round		A572-50
239.182-219.182				(50 ksi)			(50 ksi)
T7	1	Solid Round	1	A570-50	Solid Round		A572-50
219.182-199.182				(50 ksi)			(50 ksi)
T8	1	Solid Round	1	A570-50	Solid Round		A572-50
199.182-179.182				(50 ksi)			(50 ksi)
T9	1	Solid Round	1	A570-50	Solid Round		A572-50
179.182-159.182				(50 ksi)			(50 ksi)
T10	1	Solid Round	1 1/4	A570-50	Solid Round		A572-50
159.182-139.182				(50 ksi)			(50 ksi)

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Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T11 139.182-119.182	1	Solid Round	1	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T12 119.182-99.182	1	Solid Round	1	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T13 99.182-79.182	1	Solid Round	1	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T14 79.182-59.182	1	Solid Round	1	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T15 59.182-39.182	1	Solid Round	1	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T16 39.182-19.182	1	Solid Round	1	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T17 19.182-14.411	1	Solid Round	7/8	A570-50 (50 ksi)	Solid Round		A572-50 (50 ksi)
T19 11.830-9.499	None	Flat Bar		A570-50 (50 ksi)	Flat Bar	6 x 3/4	A36 (36 ksi)
T20 9.499-7.169	None	Flat Bar		A570-50 (50 ksi)	Flat Bar	6 x 3/4	A36 (36 ksi)
T21 7.169-1.200	None	Flat Bar		A570-50 (50 ksi)	Flat Bar	6 x 3/4	A36 (36 ksi)

### Tower Section Geometry (cont'd)

Tower Elevation ft	Redundant Bracing Grade	Redundant Type	Redundant Size	K Factor
T19 11.830-9.499	A572-50 (50 ksi)	Horizontal (1)	Solid Round 7/8	1
T20 9.499-7.169	A572-50 (50 ksi)	Horizontal (1) Diagonal (1)	Solid Round 7/8 Solid Round 7/8	1 1

### Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft <sup>2</sup>	Gusset Thickness in	Gusset Grade	Adjust. Factor A <sub>f</sub>	Adjust. Factor A <sub>r</sub>	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 311.351-310.3	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 310.351-299.1	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 299.182-279.1	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 279.182-259.1	0.000	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 259.182-259.1	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000

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Tower Elevation	Gusset Area (per face)	Gusset Thickness	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
ft	ft <sup>2</sup>	in							
259.182-239.182			(36 ksi)						
T6	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
239.182-219.182			(36 ksi)						
T7	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
219.182-199.182			(36 ksi)						
T8	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
199.182-179.182			(36 ksi)						
T9	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
179.182-159.182			(36 ksi)						
T10	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
159.182-139.182			(36 ksi)						
T11	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
139.182-119.182			(36 ksi)						
T12	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
119.182-99.182			(36 ksi)						
T13	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
99.182-79.182			(36 ksi)						
T14	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
79.182-59.182			(36 ksi)						
T15	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
59.182-39.182			(36 ksi)						
T16	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
39.182-19.182			(36 ksi)						
T17	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
19.182-14.411			(36 ksi)						
T18	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
14.411-11.830			(36 ksi)						
T19	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
11.830-9.499			(36 ksi)						
T20	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
9.499-7.169			(36 ksi)						
T21	0.000	0.0000	A36	1	1	1	36.0000	36.0000	36.0000
7.169-1.200			(36 ksi)						

### Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors <sup>1</sup>							
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X	X	X	X	X	X	X
ft				Y	Y	Y	Y	Y	Y	Y
T1	No	Yes	1	1	1	1	1	1	1	1
311.351-310.351				1	1	1	1	1	1	1
T2	No	Yes	1	1	1	1	1	1	1	1
310.351-299.1				1	1	1	1	1	1	1

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Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors <sup>1</sup>							
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
ft				X Y	X Y	X Y	X Y	X Y	X Y	X Y
82										
T3	No	Yes	1	1	1	1	1	1	1	1
299.182-279.1				1	1	1	1	1	1	1
82										
T4	No	Yes	1	1	1	1	1	1	1	1
279.182-259.1				1	1	1	1	1	1	1
82										
T5	No	Yes	1	1	1	1	1	1	1	1
259.182-239.1				1	1	1	1	1	1	1
82										
T6	No	Yes	1	1	1	1	1	1	1	1
239.182-219.1				1	1	1	1	1	1	1
82										
T7	No	Yes	1	1	1	1	1	1	1	1
219.182-199.1				1	1	1	1	1	1	1
82										
T8	No	Yes	1	1	1	1	1	1	1	1
199.182-179.1				1	1	1	1	1	1	1
82										
T9	No	Yes	1	1	1	1	1	1	1	1
179.182-159.1				1	1	1	1	1	1	1
82										
T10	No	Yes	1	1	1	1	1	1	1	1
159.182-139.1				1	1	1	1	1	1	1
82										
T11	No	Yes	1	1	1	1	1	1	1	1
139.182-119.1				1	1	1	1	1	1	1
82										
T12	No	Yes	1	1	1	1	1	1	1	1
119.182-99.18				1	1	1	1	1	1	1
2										
T13	No	Yes	1	1	1	1	1	1	1	1
99.182-79.182				1	1	1	1	1	1	1
82										
T14	No	Yes	1	1	1	1	1	1	1	1
79.182-59.182				1	1	1	1	1	1	1
82										
T15	No	Yes	1	1	1	1	1	1	1	1
59.182-39.182				1	1	1	1	1	1	1
82										
T16	No	Yes	1	1	1	1	1	1	1	1
39.182-19.182				1	1	1	1	1	1	1
82										
T17	No	Yes	1	1	1	1	1	1	1	1
19.182-14.411				1	1	1	1	1	1	1
82										
T18	No	Yes	1	1	1	1	1	1	1	1
14.411-11.830				1	1	1	1	1	1	1
82										
T19	No	Yes	1	1	1	1	1	1	1	1
11.830-9.499				1	1	1	1	1	1	1
82										
T20	No	Yes	1	1	1	1	1	1	1	1
9.499-7.169				1	1	1	1	1	1	1
82										
T21	No	Yes	1	1	1	1	1	1	1	1
7.169-1.200				1	1	1	1	1	1	1

<sup>1</sup>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)**





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### Guy Data

Guy Elevation	Guy Grade	Guy Size	Initial Tension	%	Guy Modulus	Guy Weight	$L_u$	Anchor Radius	Anchor Azimuth Adj.	Anchor Elevation	End Fitting Efficiency
ft			K		ksi	plf	ft	ft	°	ft	%
299.182	BS	A 13/16	8.00	10%	24000	1.390	376.362	259.000	0.0000	23.000	100%
		B 3/4	6.80	10%	24000	1.180	418.436	263.000	0.0000	-29.000	100%
		C 3/4	6.80	10%	24000	1.180	381.857	259.500	0.0000	16.000	100%
229.182	BS	A 7/8	9.20	10%	24000	1.610	328.541	259.000	0.0000	23.000	100%
		B 13/16	8.00	10%	24000	1.390	366.207	263.000	0.0000	-29.000	100%
		C 13/16	8.00	10%	24000	1.390	333.353	259.500	0.0000	16.000	100%
149.182	BS	A 13/16	8.00	10%	24000	1.390	285.290	259.000	0.0000	23.000	100%
		B 7/8	9.20	10%	24000	1.610	315.049	263.000	0.0000	-29.000	100%
		C 7/8	9.20	10%	24000	1.610	288.895	259.500	0.0000	16.000	100%
89.1822	BS	A 3/4	6.80	10%	24000	1.180	264.325	259.000	0.0000	23.000	100%
		B 13/16	8.00	10%	24000	1.390	285.484	263.000	0.0000	-29.000	100%
		C 13/16	8.00	10%	24000	1.390	266.640	259.500	0.0000	16.000	100%

### Guy Data (cont'd)

Guy Elevation	Mount Type	Torque-Arm Spread	Torque-Arm Leg Angle	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
ft		ft	°				
299.182	Corner						
229.182	Corner						
149.182	Corner						
89.1822	Corner						

### Guy Data (cont'd)

Guy Elevation	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
ft								
299.182	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
229.182	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
149.182	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	
89.182	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Solid Round	

### Guy Data (cont'd)

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Guy Elevation	Cable Weight A	Cable Weight B	Cable Weight C	Cable Weight D	Tower Intercept A	Tower Intercept B	Tower Intercept C	Tower Intercept D
ft	K	K	K	K	ft	ft	ft	ft
299.182	0.52	0.49	0.45		12.030	14.786	12.361	
					6.0 sec/pulse	6.6 sec/pulse	6.1 sec/pulse	
229.182	0.53	0.51	0.46		9.287	11.407	9.488	
					5.3 sec/pulse	5.8 sec/pulse	5.3 sec/pulse	
149.182	0.40	0.51	0.47		7.001	8.560	7.226	
					4.6 sec/pulse	5.1 sec/pulse	4.6 sec/pulse	
89.1822	0.31	0.40	0.37		6.034	7.016	6.144	
					4.2 sec/pulse	4.6 sec/pulse	4.3 sec/pulse	

### Guy Data (cont'd)

Guy Elevation	Calc K	Calc K	Torque Arm		Pull Off		Diagonal	
			K <sub>x</sub>	K <sub>y</sub>	K <sub>x</sub>	K <sub>y</sub>	K <sub>x</sub>	K <sub>y</sub>
ft	Single Angles	Solid Rounds						
299.182	No	No			1	1	1	1
229.182	No	No			1	1	1	1
149.182	No	No			1	1	1	1
89.1822	No	No			1	1	1	1

### Guy Data (cont'd)

Guy Elevation	Torque-Arm				Pull Off				Diagonal			
	Bolt Size	Number	Net Width	U	Bolt Size	Number	Net Width	U	Bolt Size	Number	Net Width	U
ft	in		Deduct in		in		Deduct in		in		Deduct in	
299.182	0.6250	0	0.0000	0.75	0.6250	0	0.0000	0.75	0.6250	0	0.0000	0.75
	A325N				A325N				A325N			
229.182	0.6250	0	0.0000	0.75	0.6250	0	0.0000	0.75	0.6250	0	0.0000	0.75
	A325N				A325N				A325N			
149.182	0.6250	0	0.0000	0.75	0.6250	0	0.0000	0.75	0.6250	0	0.0000	0.75
	A325N				A325N				A325N			
89.1822	0.6250	0	0.0000	0.75	0.6250	0	0.0000	0.75	0.6250	0	0.0000	0.75
	A325N				A325N				A325N			

### Guy Pressures

Guy Elevation	Guy Location	z	q <sub>z</sub>	q <sub>z</sub>	Ice Thickness
ft		ft	psf	psf	in
299.182	A	161.091	29	8	2.3436
	B	135.091	28	7	2.3027
	C	157.591	29	8	2.3385
229.182	A	126.091	27	7	2.2869
	B	100.091	26	7	2.2347
	C	122.591	27	7	2.2805
149.182	A	86.091	25	7	2.2013



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Guy Elevation ft	Guy Location	z ft	q <sub>z</sub> psf	q <sub>z</sub> Ice psf	Ice Thickness in
89.1822	B	60.091	23	6	2.1235
	C	82.591	25	7	2.1922
	A	56.091	23	6	2.1090
	B	30.091	20	5	1.9816
	C	52.591	23	6	2.0954

### Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation ft	Guy Location	Chord Angle °	Guy Tension Top Bottom K	F <sub>x</sub> K	F <sub>y</sub> K	F <sub>z</sub> K	M <sub>x</sub> kip-ft	M <sub>y</sub> kip-ft	M <sub>z</sub> kip-ft
299.182	A	47.1592	8.38	0.00	6.27	-5.57	-18.09	0.00	0.00
			8.00						
229.182	B	51.6001	7.19	3.76	5.73	2.17	8.27	0.00	-14.32
			6.80						
	C	47.8178	7.13	-4.05	5.39	2.34	7.78	-0.00	13.47
			6.80						
	Sum:		9.53	<b>-0.29</b>	17.38	<b>-1.06</b>	<b>-2.05</b>	0.00	<b>-0.85</b>
149.182	A	38.8356	9.20	0.00	6.14	-7.29	-17.72	0.00	0.00
			8.36						
	B	44.7865	8.00	5.03	6.02	2.90	8.68	0.00	-15.04
			8.30						
	Sum:		8.30	<b>-0.40</b>	17.59	<b>-1.26</b>	<b>-1.18</b>	0.00	<b>-1.45</b>
89.1822	A	26.2286	8.18	0.00	3.77	-7.25	-10.89	0.00	0.00
			8.00						
	B	34.4118	9.49	6.67	5.53	3.85	7.99	0.00	-13.83
			9.20						
	Sum:		9.41	<b>-0.48</b>	13.83	<b>0.73</b>	<b>3.62</b>	0.00	<b>-2.53</b>
89.1822	A	14.4888	6.88	0.00	1.87	-6.62	-5.39	0.00	0.00
			6.80						
	B	24.4346	8.16	6.37	3.54	3.68	5.11	0.00	-8.85
			8.00						
	Sum:		8.10	<b>-0.33</b>	7.80	<b>0.93</b>	<b>3.18</b>	0.00	<b>-2.87</b>

### Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation ft	Guy Location	Chord Angle °	Guy Tension Top Bottom K	F <sub>x</sub> K	F <sub>y</sub> K	F <sub>z</sub> K	M <sub>x</sub> kip-ft	M <sub>y</sub> kip-ft	M <sub>z</sub> kip-ft
299.182	A	47.1592	20.14	0.00	15.67	-12.66	-45.22	0.00	0.00
			17.27						
	B	51.6001	18.41	8.99	15.20	5.19	21.95	0.00	-38.01
			15.21						

**tnxTower**

**FDH Velocitel**  
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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom	F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	M <sub>x</sub>	M <sub>y</sub>	M <sub>z</sub>
ft		°	K	K	K	K	kip-ft	kip-ft	kip-ft
229.182	C	47.8178	18.28 15.46	-9.76	14.40	5.63	20.78	-0.00	36.00
	A	38.8356	Sum: 21.26 19.11	<b>-0.77</b> 0.00	45.27 14.36	<b>-1.84</b> -15.67	<b>-2.50</b> -41.47	0.00 0.00	<b>-2.02</b> 0.00
	B	44.7865	19.46 16.95	11.14	14.59	6.43	21.06	0.00	-36.48
149.182	C	39.7182	19.39 17.26	-12.17	13.37	7.02	19.30	-0.00	33.43
	A	26.2286	Sum: 18.42 17.22	<b>-1.02</b> 0.00	42.33 9.22	<b>-2.22</b> -15.94	<b>-1.11</b> -26.63	0.00 0.00	<b>-3.05</b> 0.00
	B	34.4118	20.19 18.52	13.79	12.41	7.96	17.91	0.00	-31.02
89.1822	C	27.4293	20.25 18.95	-15.03	10.44	8.68	15.07	-0.00	26.10
	A	14.4888	Sum: 15.82 15.26	<b>-1.24</b> 0.00	32.07 5.01	<b>0.70</b> -15.01	<b>6.35</b> -14.47	0.00 0.00	<b>-4.92</b> 0.00
	B	24.4346	17.22 16.26	13.17	8.08	7.60	11.67	0.00	-20.21
	C	15.9173	17.54 16.89	-14.30	5.90	8.26	8.51	-0.00	14.74
	Sum:			<b>-1.14</b>	18.99	<b>0.86</b>	<b>5.70</b>	0.00	<b>-5.47</b>

**Guy-Mast Forces (Excluding Wind) - Service**

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom	F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	M <sub>x</sub>	M <sub>y</sub>	M <sub>z</sub>
ft		°	K	K	K	K	kip-ft	kip-ft	kip-ft
299.182	A	47.1592	8.38 8.00	0.00	6.27	-5.57	-18.09	0.00	0.00
	B	51.6001	7.19 6.80	3.76	5.73	2.17	8.27	0.00	-14.32
	C	47.8178	7.13 6.80	-4.05	5.39	2.34	7.78	-0.00	13.47
229.182	A	38.8356	Sum: 9.53 9.20	<b>-0.29</b> 0.00	17.38 6.14	<b>-1.06</b> -7.29	<b>-2.05</b> -17.72	0.00 0.00	<b>-0.85</b> 0.00
	B	44.7865	8.36 8.00	5.03	6.02	2.90	8.68	0.00	-15.04
	C	39.7182	8.30 8.00	-5.43	5.44	3.13	7.85	-0.00	13.59
149.182	A	26.2286	Sum: 8.18 8.00	<b>-0.40</b> 0.00	17.59 3.77	<b>-1.26</b> -7.25	<b>-1.18</b> -10.89	0.00 0.00	<b>-1.45</b> 0.00
	B	34.4118	9.49 9.20	6.67	5.53	3.85	7.99	0.00	-13.83
	C	27.4293	9.41 9.20	-7.15	4.52	4.13	6.52	-0.00	11.30
89.1822	A	14.4888	Sum: 6.88	<b>-0.48</b> 0.00	13.83 1.87	<b>0.73</b> -6.62	<b>3.62</b> -5.39	0.00 0.00	<b>-2.53</b> 0.00

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	M <sub>x</sub>	M <sub>y</sub>	M <sub>z</sub>
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
	B	24.4346	6.80 8.16 8.00	6.37	3.54	3.68	5.11	0.00	-8.85
	C	15.9173	8.10 8.00	-6.70	2.39	3.87	3.45	-0.00	5.98
			Sum:	<b>-0.33</b>	7.80	<b>0.93</b>	<b>3.18</b>	0.00	<b>-2.87</b>

### Guy-Tensioning Information

		Temperature At Time Of Tensioning															
		0 F		20 F		40 F		60 F		80 F		100 F		120 F			
Guy Elevation	H	V	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	
299.182	A	256.11	276.18	9.503	10.16	8.992	10.73	8.490	11.35	8.000	12.03	7.523	12.78	7.062	13.59	6.619	14.48
	B	260.11	328.18	7.862	12.83	7.502	13.43	7.147	14.08	6.800	14.79	6.461	15.54	6.131	16.36	5.811	17.23
	C	256.61	283.18	8.050	10.48	7.625	11.05	7.208	11.68	6.800	12.36	6.403	13.11	6.019	13.93	5.650	14.81
229.182	A	256.11	206.18	11.494	7.46	10.710	8.00	9.944	8.60	9.200	9.29	8.484	10.06	7.801	10.92	7.138	11.91
	B	260.11	258.18	9.636	9.50	9.078	10.08	8.532	10.71	8.000	11.41	7.484	12.18	6.987	13.02	6.513	13.95
	C	256.61	213.18	9.933	7.67	9.272	8.20	8.627	8.81	8.000	9.49	7.395	10.25	6.817	11.10	6.256	12.08
149.182	A	256.11	126.18	10.654	5.27	9.743	5.76	8.855	6.33	8.000	7.00	7.186	7.79	6.426	8.70	5.731	9.74
	B	260.11	178.18	11.772	6.71	10.891	7.25	10.031	7.86	9.200	8.56	8.404	9.36	7.652	10.26	6.952	11.28
	C	256.61	133.18	12.201	5.46	11.170	5.96	10.167	6.54	9.200	7.23	8.280	8.02	7.421	8.94	6.634	9.98
89.1822	A	256.11	66.18	9.452	4.35	8.539	4.81	7.652	5.36	6.800	6.03	5.998	6.84	5.261	7.79	4.605	8.89
	B	260.11	118.18	10.727	5.24	9.789	5.74	8.877	6.33	8.000	7.02	7.168	7.82	6.393	8.76	5.689	9.83
	C	256.61	73.18	11.063	4.45	10.009	4.92	8.984	5.47	8.000	6.14	7.072	6.95	6.218	7.89	5.455	8.99

### 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
1-5/8" ***	B	No	Ar (CaAa)	111.500 - 14.200	0.0000	-0.38	12	6	0.5000	1.9800		0.82
1-5/8"	B	No	Ar (CaAa)	145.000 - 14.200	0.0000	0.32	15	9	0.5000	1.9800		0.82
1-5/8" ***	B	No	Ar (CaAa)	160.000 - 145.000	0.0000	0.32	12	6	0.5000	1.9800		0.82
1-5/8"	C	No	Ar (CaAa)	128.049 - 14.200	0.0000	-0.4	4	4	0.5000	1.9800		0.82
3/8"	C	No	Ar (CaAa)	251.799 - 14.200	1.7000	-0.4	1	1	0.3750	0.3750		0.18
EW71	C	No	Ar (CaAa)	196.049 - 14.200	0.0000	-0.3	1	1	0.5000	1.1313		0.45
1-5/8"	C	No	Ar (CaAa)	180.049 - 14.200	0.0000	-0.25	1	1	0.5000	1.9800		0.82
1"	C	No	Ar (CaAa)	311.340 - 12.200	0.0000	0	1	1	0.5000	1.0000		1.13
1-5/8"	C	No	Ar (CaAa)	128.049 - 14.200	0.0000	0.25	5	4	0.5000	1.9800		0.82
7/8"	C	No	Ar (CaAa)	261.049 - 14.200	0.0000	0.35	1	1	0.5000	1.1100		0.54
1/2"	C	No	Ar (CaAa)	21.049 - 14.200	0.0000	0.45	3	3	0.5000	0.5800		0.15
									5.0000			
1/2"	C	No	Ar (CaAa)	164.549 - 21.049	0.0000	0.45	2	2	0.5000	0.5800		0.15
1/2" ***	C	No	Ar (CaAa)	213.049 - 165.700	0.0000	0.45	1	1	0.5000	0.5800		0.15
1/4"	A	No	Ar (CaAa)	136.549 - 14.200	0.0000	-0.47	1	1	0.2500	0.2500		0.25
7/8"	A	No	Ar (CaAa)	235.049 - 14.200	1.0000	-0.45	1	1	0.5000	1.1100		0.54
3/8"	A	No	Ar (CaAa)	146.549 - 14.200	0.0000	-0.42	3	3	0.3750	0.3750		0.18
3/8"	A	No	Ar (CaAa)	220.049 - 146.549	0.0000	-0.42	2	2	0.3750	0.3750		0.18

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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
3" ***	A	No	Ar (CaAa)	311.340 - 14.200	0.0000	-0.35	1	1	0.5000	3.0100		1.78
1-5/8"	A	No	Ar (CaAa)	120.549 - 14.200	0.0000	0.3	6	6	0.5000	1.9800		0.82
3/8"	A	No	Ar (CaAa)	48.049 - 14.200	2.0000	0.2	1	1	0.3750	0.3750		0.18
3" ***	A	No	Ar (CaAa)	308.049 - 14.200	0.0000	0.45	1	1	0.5000	3.0100		1.78
7/8"	A	No	Ar (CaAa)	243.049 - 14.200	-1.5000	-0.35	2	2	0.5000	1.1100		0.54
1/4"	A	No	Ar (CaAa)	233.049 - 14.200	-1.5000	-0.4	2	2	0.2500	0.2500		0.25
3/8"	A	No	Ar (CaAa)	232.049 - 14.200	-1.5000	-0.45	1	1	0.3750	0.3750		0.18
1-5/8" ***	A	No	Ar (CaAa)	165.049 - 14.200	-1.5000	-0.3	2	2	0.5000	1.9800		0.82
Safety Line 3/8 ***	A	No	Ar (CaAa)	311.340 - 1.200	0.0000	0	1	1	0.3750	0.3750		0.22
3/4"	B	No	Ar (CaAa)	111.500 - 14.200	0.0000	-0.23	4	2	0.5000	0.9950		0.47
3/8" ***	B	No	Ar (CaAa)	111.500 - 14.200	0.0000	-0.19	2	2	0.3750	0.3750		0.18

### Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C <sub>A</sub> A <sub>A</sub> ft <sup>2</sup> /ft	Weight plf
*** 3"	A	No	Inside Pole	346.351 - 311.360	1	No Ice 1/2" Ice 1" Ice	1.78 1.78 1.78
***							
***							

### Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> In Face ft <sup>2</sup>	C <sub>A</sub> A <sub>A</sub> Out Face ft <sup>2</sup>	Weight K
L1	346.351-329.351	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	329.351-311.351	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T1	311.351-310.351	A	0.000	0.000	0.335	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.099	0.000	0.00
T2	310.351-299.182	A	0.000	0.000	6.450	0.000	0.04
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	1.117	0.000	0.01
T3	299.182-279.182	A	0.000	0.000	12.790	0.000	0.08
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.000	0.000	0.02
T4	279.182-259.182	A	0.000	0.000	12.790	0.000	0.08
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.207	0.000	0.02
T5	259.182-239.182	A	0.000	0.000	13.648	0.000	0.08

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Tower Section	Tower Elevation ft	Face	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
T6	239.182-219.182	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	4.693	0.000	0.04
		A	0.000	0.000	20.232	0.000	0.12
T7	219.182-199.182	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	4.970	0.000	0.04
		A	0.000	0.000	22.700	0.000	0.13
T8	199.182-179.182	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	5.774	0.000	0.04
		A	0.000	0.000	22.700	0.000	0.13
T9	179.182-159.182	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	8.210	0.000	0.05
		A	0.000	0.000	25.023	0.000	0.14
T10	159.182-139.182	B	0.000	0.000	1.943	0.000	0.01
		C	0.000	0.000	12.597	0.000	0.07
		A	0.000	0.000	30.896	0.000	0.16
T11	139.182-119.182	B	0.000	0.000	50.976	0.000	0.21
		C	0.000	0.000	13.513	0.000	0.07
		A	0.000	0.000	33.428	0.000	0.18
T12	119.182-99.182	B	0.000	0.000	59.400	0.000	0.25
		C	0.000	0.000	29.313	0.000	0.13
		A	0.000	0.000	55.630	0.000	0.27
T13	99.182-79.182	B	0.000	0.000	94.493	0.000	0.39
		C	0.000	0.000	49.153	0.000	0.22
		A	0.000	0.000	55.630	0.000	0.27
T14	79.182-59.182	B	0.000	0.000	116.380	0.000	0.49
		C	0.000	0.000	49.153	0.000	0.22
		A	0.000	0.000	55.630	0.000	0.27
T15	59.182-39.182	B	0.000	0.000	116.380	0.000	0.49
		C	0.000	0.000	49.153	0.000	0.22
		A	0.000	0.000	55.962	0.000	0.27
T16	39.182-19.182	B	0.000	0.000	116.380	0.000	0.49
		C	0.000	0.000	49.261	0.000	0.22
		A	0.000	0.000	56.380	0.000	0.27
T17	19.182-14.411	B	0.000	0.000	116.380	0.000	0.49
		C	0.000	0.000	49.261	0.000	0.22
		A	0.000	0.000	13.449	0.000	0.06
T18	14.411-11.830	B	0.000	0.000	27.762	0.000	0.12
		C	0.000	0.000	12.002	0.000	0.05
		A	0.000	0.000	0.684	0.000	0.00
T19	11.830-9.499	B	0.000	0.000	1.229	0.000	0.01
		C	0.000	0.000	0.731	0.000	0.00
		A	0.000	0.000	0.087	0.000	0.00
T20	9.499-7.169	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.087	0.000	0.00
T21	7.169-1.200	B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
		A	0.000	0.000	0.224	0.000	0.00

**Feed Line/Linear Appurtenances Section Areas - With Ice**

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L1	346.351-329.351	A	2.524	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	0.000	0.00

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
L2	329.351-311.351	C		0.000	0.000	0.000	0.000	0.00
		A	2.510	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T1	311.351-310.351	A	2.503	0.000	0.000	1.325	0.000	0.03
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.594	0.000	0.01
T2	310.351-299.182	A	2.498	0.000	0.000	22.039	0.000	0.47
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	6.697	0.000	0.13
T3	299.182-279.182	A	2.485	0.000	0.000	42.608	0.000	0.92
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	11.939	0.000	0.23
T4	279.182-259.182	A	2.467	0.000	0.000	42.395	0.000	0.91
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	12.997	0.000	0.25
T5	259.182-239.182	A	2.448	0.000	0.000	46.855	0.000	0.96
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	30.455	0.000	0.56
T6	239.182-219.182	A	2.428	0.000	0.000	96.226	0.000	1.61
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	34.103	0.000	0.62
T7	219.182-199.182	A	2.406	0.000	0.000	126.329	0.000	1.94
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	41.314	0.000	0.73
T8	199.182-179.182	A	2.382	0.000	0.000	125.340	0.000	1.91
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	54.762	0.000	0.96
T9	179.182-159.182	A	2.355	0.000	0.000	132.575	0.000	1.99
		B		0.000	0.000	2.165	0.000	0.05
		C		0.000	0.000	70.982	0.000	1.24
T10	159.182-139.182	A	2.326	0.000	0.000	151.747	0.000	2.24
		B		0.000	0.000	57.765	0.000	1.28
		C		0.000	0.000	78.200	0.000	1.25
T11	139.182-119.182	A	2.292	0.000	0.000	162.891	0.000	2.40
		B		0.000	0.000	69.778	0.000	1.51
		C		0.000	0.000	112.922	0.000	1.81
T12	119.182-99.182	A	2.254	0.000	0.000	208.674	0.000	3.14
		B		0.000	0.000	128.448	0.000	2.53
		C		0.000	0.000	156.097	0.000	2.50
T13	99.182-79.182	A	2.209	0.000	0.000	206.037	0.000	3.06
		B		0.000	0.000	163.965	0.000	3.12
		C		0.000	0.000	154.264	0.000	2.44
T14	79.182-59.182	A	2.154	0.000	0.000	202.802	0.000	2.96
		B		0.000	0.000	162.464	0.000	3.05
		C		0.000	0.000	152.016	0.000	2.36
T15	59.182-39.182	A	2.081	0.000	0.000	202.608	0.000	2.89
		B		0.000	0.000	160.506	0.000	2.97
		C		0.000	0.000	149.086	0.000	2.26
T16	39.182-19.182	A	1.976	0.000	0.000	201.060	0.000	2.77
		B		0.000	0.000	157.641	0.000	2.85
		C		0.000	0.000	144.997	0.000	2.13
T17	19.182-14.411	A	1.869	0.000	0.000	46.385	0.000	0.62
		B		0.000	0.000	36.920	0.000	0.65
		C		0.000	0.000	34.035	0.000	0.48
T18	14.411-11.830	A	1.824	0.000	0.000	2.977	0.000	0.04
		B		0.000	0.000	1.621	0.000	0.03
		C		0.000	0.000	2.417	0.000	0.04
T19	11.830-9.499	A	1.786	0.000	0.000	0.920	0.000	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A <sub>R</sub> ft <sup>2</sup>	A <sub>F</sub> ft <sup>2</sup>	C <sub>AA</sub> In Face ft <sup>2</sup>	C <sub>AA</sub> Out Face ft <sup>2</sup>	Weight K
T20	9.499-7.169	A	1.743	0.000	0.000	0.900	0.000	0.01
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T21	7.169-1.200	A	1.627	0.000	0.000	2.166	0.000	0.03
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

### Feed Line Center of Pressure

Section	Elevation ft	CP <sub>X</sub> in	CP <sub>Z</sub> in	CP <sub>X</sub> Ice in	CP <sub>Z</sub> Ice in
L1	346.351-329.351	0.0000	0.0000	0.0000	0.0000
L2	329.351-311.351	0.0000	0.0000	0.0000	0.0000
T1	311.351-310.351	-0.4179	0.1981	0.0000	0.0000
T2	310.351-299.182	-1.3557	-0.5451	-0.7654	-0.1911
T3	299.182-279.182	-1.3384	-0.8155	-0.7380	-0.3072
T4	279.182-259.182	-1.3611	-0.7848	-0.7674	-0.2846
T5	259.182-239.182	-1.5733	-0.3702	-0.7971	0.0957
T6	239.182-219.182	-2.2295	0.1489	-1.1009	0.4054
T7	219.182-199.182	-2.5408	0.3806	-1.3502	0.5721
T8	199.182-179.182	-2.2883	0.5738	-1.2202	0.7466
T9	179.182-159.182	-1.7835	0.9521	-0.9190	0.8788
T10	159.182-139.182	1.1228	1.3023	-0.1480	0.8290
T11	139.182-119.182	1.5020	1.6730	-0.0621	1.0196
T12	119.182-99.182	1.0816	-0.0253	-0.0431	0.3771
T13	99.182-79.182	1.1194	-0.5611	0.0040	0.1835
T14	79.182-59.182	1.1194	-0.5611	0.0130	0.1773
T15	59.182-39.182	1.1138	-0.5677	0.0061	0.1327
T16	39.182-19.182	1.1031	-0.5735	-0.0012	0.0776
T17	19.182-14.411	1.0468	-0.5402	-0.0099	0.0753
T18	14.411-11.830	0.3980	-0.1127	-0.1536	0.1058
T19	11.830-9.499	-0.0595	-0.0344	-0.1121	-0.0647
T20	9.499-7.169	-0.0567	-0.0327	-0.0687	-0.0397
T21	7.169-1.200	-0.0338	-0.0195	-0.0131	-0.0076

### Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
T1	11		1" 310.35 - 311.34	0.4562	0.0000
T1	22		3" 310.35 - 311.34	0.4562	0.0000
T1	34	Safety Line 3/8	310.35 - 311.34	0.4562	0.0000
T2	11		1" 299.18 - 310.35	0.6000	0.3555
T2	22		3" 299.18 - 310.35	0.6000	0.3555
T2	26		3" 299.18 - 310.35	0.6000	0.3555

# tnxTower

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<b>Project</b>	16PVUB1400	<b>Date</b>	14:48:13 11/09/16
<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T2	34	Safety Line 3/8	308.05 299.18 - 310.35	0.6000	0.3555
T3	11	1"	279.18 - 299.18	0.6000	0.3454
T3	22	3"	279.18 - 299.18	0.6000	0.3454
T3	26	3"	279.18 - 299.18	0.6000	0.3454
T3	34	Safety Line 3/8	279.18 - 299.18	0.6000	0.3454
T4	11	1"	259.18 - 279.18	0.6000	0.3487
T4	13	7/8"	259.18 - 261.05	0.6000	0.3487
T4	22	3"	259.18 - 279.18	0.6000	0.3487
T4	26	3"	259.18 - 279.18	0.6000	0.3487
T4	34	Safety Line 3/8	259.18 - 279.18	0.6000	0.3487
T5	8	3/8"	239.18 - 251.80	0.6000	0.3522
T5	11	1"	239.18 - 259.18	0.6000	0.3522
T5	13	7/8"	239.18 - 259.18	0.6000	0.3522
T5	22	3"	239.18 - 259.18	0.6000	0.3522
T5	26	3"	239.18 - 259.18	0.6000	0.3522
T5	28	7/8"	239.18 - 243.05	0.6000	0.3522
T5	34	Safety Line 3/8	239.18 - 259.18	0.6000	0.3522
T6	8	3/8"	219.18 - 239.18	0.6000	0.3560
T6	11	1"	219.18 - 239.18	0.6000	0.3560
T6	13	7/8"	219.18 - 239.18	0.6000	0.3560
T6	19	7/8"	219.18 - 235.05	0.6000	0.3560
T6	21	3/8"	219.18 - 220.05	0.6000	0.3560
T6	22	3"	219.18 - 239.18	0.6000	0.3560
T6	26	3"	219.18 - 239.18	0.6000	0.3560
T6	28	7/8"	219.18 - 239.18	0.6000	0.3560
T6	29	1/4"	219.18 - 233.05	0.6000	0.3560
T6	30	3/8"	219.18 - 232.05	0.6000	0.3560
T6	34	Safety Line 3/8	219.18 - 239.18	0.6000	0.3560
T7	8	3/8"	199.18 - 219.18	0.6000	0.3601
T7	11	1"	199.18 - 219.18	0.6000	0.3601
T7	13	7/8"	199.18 -	0.6000	0.3601



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<b>Project</b>	16PVUB1400	<b>Date</b>	14:48:13 11/09/16
<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
T7	16		219.18 199.18 - 213.05	0.6000	0.3601
T7	19		199.18 - 219.18	0.6000	0.3601
T7	21		199.18 - 219.18	0.6000	0.3601
T7	22		199.18 - 219.18	0.6000	0.3601
T7	26		199.18 - 219.18	0.6000	0.3601
T7	28		199.18 - 219.18	0.6000	0.3601
T7	29		199.18 - 219.18	0.6000	0.3601
T7	30		199.18 - 219.18	0.6000	0.3601
T7	34	Safety Line 3/8	199.18 - 219.18	0.6000	0.3601
T8	8		179.18 - 199.18	0.6000	0.3646
T8	9	EW71	179.18 - 196.05	0.6000	0.3646
T8	10		179.18 - 180.05	0.6000	0.3646
T8	11		179.18 - 199.18	0.6000	0.3646
T8	13		179.18 - 199.18	0.6000	0.3646
T8	16		179.18 - 199.18	0.6000	0.3646
T8	19		179.18 - 199.18	0.6000	0.3646
T8	21		179.18 - 199.18	0.6000	0.3646
T8	22		179.18 - 199.18	0.6000	0.3646
T8	26		179.18 - 199.18	0.6000	0.3646
T8	28		179.18 - 199.18	0.6000	0.3646
T8	29		179.18 - 199.18	0.6000	0.3646
T8	30		179.18 - 199.18	0.6000	0.3646
T8	34	Safety Line 3/8	179.18 - 199.18	0.6000	0.3646
T9	4		159.18 - 160.00	0.6000	0.3695
T9	8		159.18 - 179.18	0.6000	0.3695
T9	9	EW71	159.18 - 179.18	0.6000	0.3695
T9	10		159.18 - 179.18	0.6000	0.3695
T9	11		159.18 - 179.18	0.6000	0.3695
T9	13		159.18 - 179.18	0.6000	0.3695
T9	15		159.18 - 164.55	0.6000	0.3695
T9	16		165.70 -	0.6000	0.3695

**tnxTower**

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<b>Project</b>	16PVUB1400	<b>Date</b>	14:48:13 11/09/16
<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
			179.18		
T9	19	7/8"	159.18 - 179.18	0.6000	0.3695
T9	21	3/8"	159.18 - 179.18	0.6000	0.3695
T9	22	3"	159.18 - 179.18	0.6000	0.3695
T9	26	3"	159.18 - 179.18	0.6000	0.3695
T9	28	7/8"	159.18 - 179.18	0.6000	0.3695
T9	29	1/4"	159.18 - 179.18	0.6000	0.3695
T9	30	3/8"	159.18 - 179.18	0.6000	0.3695
T9	31	1-5/8"	159.18 - 165.05	0.6000	0.3695
T9	34	Safety Line 3/8"	159.18 - 179.18	0.6000	0.3695
T10	3	1-5/8"	139.18 - 145.00	0.6000	0.3613
T10	4	1-5/8"	145.00 - 159.18	0.6000	0.3613
T10	8	3/8"	139.18 - 159.18	0.6000	0.3613
T10	9	EW71	139.18 - 159.18	0.6000	0.3613
T10	10	1-5/8"	139.18 - 159.18	0.6000	0.3613
T10	11	1"	139.18 - 159.18	0.6000	0.3613
T10	13	7/8"	139.18 - 159.18	0.6000	0.3613
T10	15	1/2"	139.18 - 159.18	0.6000	0.3613
T10	19	7/8"	139.18 - 159.18	0.6000	0.3613
T10	20	3/8"	139.18 - 146.55	0.6000	0.3613
T10	21	3/8"	146.55 - 159.18	0.6000	0.3613
T10	22	3"	139.18 - 159.18	0.6000	0.3613
T10	26	3"	139.18 - 159.18	0.6000	0.3613
T10	28	7/8"	139.18 - 159.18	0.6000	0.3613
T10	29	1/4"	139.18 - 159.18	0.6000	0.3613
T10	30	3/8"	139.18 - 159.18	0.6000	0.3613
T10	31	1-5/8"	139.18 - 159.18	0.6000	0.3613
T10	34	Safety Line 3/8"	139.18 - 159.18	0.6000	0.3613
T11	3	1-5/8"	119.18 - 139.18	0.6000	0.3779
T11	6	1-5/8"	119.18 - 128.05	0.6000	0.3779
T11	8	3/8"	119.18 - 139.18	0.6000	0.3779
T11	9	EW71	119.18 -	0.6000	0.3779

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<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K <sub>a</sub> No Ice	K <sub>a</sub> Ice
T11	10	1-5/8"	139.18 - 119.18	0.6000	0.3779
T11	11	1"	139.18 - 119.18	0.6000	0.3779
T11	12	1-5/8"	139.18 - 119.18	0.6000	0.3779
T11	13	7/8"	128.05 - 119.18	0.6000	0.3779
T11	15	1/2"	139.18 - 119.18	0.6000	0.3779
T11	18	1/4"	139.18 - 119.18	0.6000	0.3779
T11	19	7/8"	136.55 - 119.18	0.6000	0.3779
T11	20	3/8"	139.18 - 119.18	0.6000	0.3779
T11	22	3"	139.18 - 119.18	0.6000	0.3779
T11	24	1-5/8"	139.18 - 119.18	0.6000	0.3779
T11	26	3"	120.55 - 119.18	0.6000	0.3779
T11	28	7/8"	139.18 - 119.18	0.6000	0.3779
T11	29	1/4"	139.18 - 119.18	0.6000	0.3779
T11	30	3/8"	139.18 - 119.18	0.6000	0.3779
T11	31	1-5/8"	139.18 - 119.18	0.6000	0.3779
T11	34	Safety Line 3/8"	139.18 - 119.18	0.6000	0.3779
T12	1	1-5/8"	99.18 - 111.50	0.6000	0.3850
T12	3	1-5/8"	99.18 - 119.18	0.6000	0.3850
T12	6	1-5/8"	99.18 - 119.18	0.6000	0.3850
T12	8	3/8"	99.18 - 119.18	0.6000	0.3850
T12	9	EW71	99.18 - 119.18	0.6000	0.3850
T12	10	1-5/8"	99.18 - 119.18	0.6000	0.3850
T12	11	1"	99.18 - 119.18	0.6000	0.3850
T12	12	1-5/8"	99.18 - 119.18	0.6000	0.3850
T12	13	7/8"	99.18 - 119.18	0.6000	0.3850
T12	15	1/2"	99.18 - 119.18	0.6000	0.3850
T12	18	1/4"	99.18 - 119.18	0.6000	0.3850
T12	19	7/8"	99.18 - 119.18	0.6000	0.3850
T12	20	3/8"	99.18 - 119.18	0.6000	0.3850
T12	22	3"	99.18 - 119.18	0.6000	0.3850
T12	24	1-5/8"	99.18 - 119.18	0.6000	0.3850
T12	26	3"	99.18 - 119.18	0.6000	0.3850
T12	28	7/8"	99.18 - 119.18	0.6000	0.3850
T12	29	1/4"	99.18 - 119.18	0.6000	0.3850
T12	30	3/8"	99.18 - 119.18	0.6000	0.3850
T12	31	1-5/8"	99.18 - 119.18	0.6000	0.3850
T12	34	Safety Line 3/8"	99.18 - 119.18	0.6000	0.3850
T12	42	3/4"	99.18 - 111.50	0.6000	0.3850
T12	43	3/8"	99.18 - 111.50	0.6000	0.3850
T13	1	1-5/8"	79.18 - 99.18	0.6000	0.3934
T13	3	1-5/8"	79.18 - 99.18	0.6000	0.3934
T13	6	1-5/8"	79.18 - 99.18	0.6000	0.3934
T13	8	3/8"	79.18 - 99.18	0.6000	0.3934
T13	9	EW71	79.18 - 99.18	0.6000	0.3934
T13	10	1-5/8"	79.18 - 99.18	0.6000	0.3934

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<b>Project</b>	16PVUB1400	<b>Date</b>	14:48:13 11/09/16
<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T13	11	1"	79.18 - 99.18	0.6000	0.3934
T13	12	1-5/8"	79.18 - 99.18	0.6000	0.3934
T13	13	7/8"	79.18 - 99.18	0.6000	0.3934
T13	15	1/2"	79.18 - 99.18	0.6000	0.3934
T13	18	1/4"	79.18 - 99.18	0.6000	0.3934
T13	19	7/8"	79.18 - 99.18	0.6000	0.3934
T13	20	3/8"	79.18 - 99.18	0.6000	0.3934
T13	22	3"	79.18 - 99.18	0.6000	0.3934
T13	24	1-5/8"	79.18 - 99.18	0.6000	0.3934
T13	26	3"	79.18 - 99.18	0.6000	0.3934
T13	28	7/8"	79.18 - 99.18	0.6000	0.3934
T13	29	1/4"	79.18 - 99.18	0.6000	0.3934
T13	30	3/8"	79.18 - 99.18	0.6000	0.3934
T13	31	1-5/8"	79.18 - 99.18	0.6000	0.3934
T13	34	Safety Line 3/8"	79.18 - 99.18	0.6000	0.3934
T13	42	3/4"	79.18 - 99.18	0.6000	0.3934
T13	43	3/8"	79.18 - 99.18	0.6000	0.3934
T14	1	1-5/8"	59.18 - 79.18	0.6000	0.4038
T14	3	1-5/8"	59.18 - 79.18	0.6000	0.4038
T14	6	1-5/8"	59.18 - 79.18	0.6000	0.4038
T14	8	3/8"	59.18 - 79.18	0.6000	0.4038
T14	9	EW71	59.18 - 79.18	0.6000	0.4038
T14	10	1-5/8"	59.18 - 79.18	0.6000	0.4038
T14	11	1"	59.18 - 79.18	0.6000	0.4038
T14	12	1-5/8"	59.18 - 79.18	0.6000	0.4038
T14	13	7/8"	59.18 - 79.18	0.6000	0.4038
T14	15	1/2"	59.18 - 79.18	0.6000	0.4038
T14	18	1/4"	59.18 - 79.18	0.6000	0.4038
T14	19	7/8"	59.18 - 79.18	0.6000	0.4038
T14	20	3/8"	59.18 - 79.18	0.6000	0.4038
T14	22	3"	59.18 - 79.18	0.6000	0.4038
T14	24	1-5/8"	59.18 - 79.18	0.6000	0.4038
T14	26	3"	59.18 - 79.18	0.6000	0.4038
T14	28	7/8"	59.18 - 79.18	0.6000	0.4038
T14	29	1/4"	59.18 - 79.18	0.6000	0.4038
T14	30	3/8"	59.18 - 79.18	0.6000	0.4038
T14	31	1-5/8"	59.18 - 79.18	0.6000	0.4038
T14	34	Safety Line 3/8"	59.18 - 79.18	0.6000	0.4038
T14	42	3/4"	59.18 - 79.18	0.6000	0.4038
T14	43	3/8"	59.18 - 79.18	0.6000	0.4038
T15	1	1-5/8"	39.18 - 59.18	0.6000	0.4174
T15	3	1-5/8"	39.18 - 59.18	0.6000	0.4174
T15	6	1-5/8"	39.18 - 59.18	0.6000	0.4174
T15	8	3/8"	39.18 - 59.18	0.6000	0.4174
T15	9	EW71	39.18 - 59.18	0.6000	0.4174
T15	10	1-5/8"	39.18 - 59.18	0.6000	0.4174
T15	11	1"	39.18 - 59.18	0.6000	0.4174
T15	12	1-5/8"	39.18 - 59.18	0.6000	0.4174
T15	13	7/8"	39.18 - 59.18	0.6000	0.4174
T15	15	1/2"	39.18 - 59.18	0.6000	0.4174
T15	18	1/4"	39.18 - 59.18	0.6000	0.4174
T15	19	7/8"	39.18 - 59.18	0.6000	0.4174
T15	20	3/8"	39.18 - 59.18	0.6000	0.4174
T15	22	3"	39.18 - 59.18	0.6000	0.4174
T15	24	1-5/8"	39.18 - 59.18	0.6000	0.4174
T15	25	3/8"	39.18 - 48.05	0.6000	0.4174
T15	26	3"	39.18 - 59.18	0.6000	0.4174
T15	28	7/8"	39.18 - 59.18	0.6000	0.4174
T15	29	1/4"	39.18 - 59.18	0.6000	0.4174
T15	30	3/8"	39.18 - 59.18	0.6000	0.4174
T15	31	1-5/8"	39.18 - 59.18	0.6000	0.4174
T15	34	Safety Line 3/8"	39.18 - 59.18	0.6000	0.4174

# tnxTower

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<b>Project</b>	16PVUB1400	<b>Date</b>	14:48:13 11/09/16
<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T15	42	3/4"	39.18 - 59.18	0.6000	0.4174
T15	43	3/8"	39.18 - 59.18	0.6000	0.4174
T16	1	1-5/8"	19.18 - 39.18	0.6000	0.4374
T16	3	1-5/8"	19.18 - 39.18	0.6000	0.4374
T16	6	1-5/8"	19.18 - 39.18	0.6000	0.4374
T16	8	3/8"	19.18 - 39.18	0.6000	0.4374
T16	9	EW71	19.18 - 39.18	0.6000	0.4374
T16	10	1-5/8"	19.18 - 39.18	0.6000	0.4374
T16	11	1"	19.18 - 39.18	0.6000	0.4374
T16	12	1-5/8"	19.18 - 39.18	0.6000	0.4374
T16	13	7/8"	19.18 - 39.18	0.6000	0.4374
T16	14	1/2"	19.18 - 21.05	0.6000	0.4374
T16	15	1/2"	21.05 - 39.18	0.6000	0.4374
T16	18	1/4"	19.18 - 39.18	0.6000	0.4374
T16	19	7/8"	19.18 - 39.18	0.6000	0.4374
T16	20	3/8"	19.18 - 39.18	0.6000	0.4374
T16	22	3"	19.18 - 39.18	0.6000	0.4374
T16	24	1-5/8"	19.18 - 39.18	0.6000	0.4374
T16	25	3/8"	19.18 - 39.18	0.6000	0.4374
T16	26	3"	19.18 - 39.18	0.6000	0.4374
T16	28	7/8"	19.18 - 39.18	0.6000	0.4374
T16	29	1/4"	19.18 - 39.18	0.6000	0.4374
T16	30	3/8"	19.18 - 39.18	0.6000	0.4374
T16	31	1-5/8"	19.18 - 39.18	0.6000	0.4374
T16	34	Safety Line 3/8	19.18 - 39.18	0.6000	0.4374
T16	42	3/4"	19.18 - 39.18	0.6000	0.4374
T16	43	3/8"	19.18 - 39.18	0.6000	0.4374
T17	1	1-5/8"	14.41 - 19.18	0.6000	0.3435
T17	3	1-5/8"	14.41 - 19.18	0.6000	0.3435
T17	6	1-5/8"	14.41 - 19.18	0.6000	0.3435
T17	8	3/8"	14.41 - 19.18	0.6000	0.3435
T17	9	EW71	14.41 - 19.18	0.6000	0.3435
T17	10	1-5/8"	14.41 - 19.18	0.6000	0.3435
T17	11	1"	14.41 - 19.18	0.6000	0.3435
T17	12	1-5/8"	14.41 - 19.18	0.6000	0.3435
T17	13	7/8"	14.41 - 19.18	0.6000	0.3435
T17	14	1/2"	14.41 - 19.18	0.6000	0.3435
T17	18	1/4"	14.41 - 19.18	0.6000	0.3435
T17	19	7/8"	14.41 - 19.18	0.6000	0.3435
T17	20	3/8"	14.41 - 19.18	0.6000	0.3435
T17	22	3"	14.41 - 19.18	0.6000	0.3435
T17	24	1-5/8"	14.41 - 19.18	0.6000	0.3435
T17	25	3/8"	14.41 - 19.18	0.6000	0.3435
T17	26	3"	14.41 - 19.18	0.6000	0.3435
T17	28	7/8"	14.41 - 19.18	0.6000	0.3435
T17	29	1/4"	14.41 - 19.18	0.6000	0.3435
T17	30	3/8"	14.41 - 19.18	0.6000	0.3435
T17	31	1-5/8"	14.41 - 19.18	0.6000	0.3435
T17	34	Safety Line 3/8	14.41 - 19.18	0.6000	0.3435
T17	42	3/4"	14.41 - 19.18	0.6000	0.3435
T17	43	3/8"	14.41 - 19.18	0.6000	0.3435
T18	1	1-5/8"	14.20 - 14.41	0.6000	0.3868
T18	3	1-5/8"	14.20 - 14.41	0.6000	0.3868
T18	6	1-5/8"	14.20 - 14.41	0.6000	0.3868
T18	8	3/8"	14.20 - 14.41	0.6000	0.3868
T18	9	EW71	14.20 - 14.41	0.6000	0.3868
T18	10	1-5/8"	14.20 - 14.41	0.6000	0.3868
T18	11	1"	12.20 - 14.41	0.6000	0.3868
T18	12	1-5/8"	14.20 - 14.41	0.6000	0.3868
T18	13	7/8"	14.20 - 14.41	0.6000	0.3868
T18	14	1/2"	14.20 - 14.41	0.6000	0.3868
T18	18	1/4"	14.20 - 14.41	0.6000	0.3868

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
T18	19	7/8"	14.20 - 14.41	0.6000	0.3868
T18	20	3/8"	14.20 - 14.41	0.6000	0.3868
T18	22	3"	14.20 - 14.41	0.6000	0.3868
T18	24	1-5/8"	14.20 - 14.41	0.6000	0.3868
T18	25	3/8"	14.20 - 14.41	0.6000	0.3868
T18	26	3"	14.20 - 14.41	0.6000	0.3868
T18	28	7/8"	14.20 - 14.41	0.6000	0.3868
T18	29	1/4"	14.20 - 14.41	0.6000	0.3868
T18	30	3/8"	14.20 - 14.41	0.6000	0.3868
T18	31	1-5/8"	14.20 - 14.41	0.6000	0.3868
T18	34	Safety Line 3/8"	11.83 - 14.41	0.6000	0.3868
T18	42	3/4"	14.20 - 14.41	0.6000	0.3868
T18	43	3/8"	14.20 - 14.41	0.6000	0.3868
T19	34	Safety Line 3/8"	9.50 - 11.83	0.6000	0.2431
T20	34	Safety Line 3/8"	7.17 - 9.50	0.6000	0.1658
T21	34	Safety Line 3/8"	1.20 - 7.17	0.4990	0.0419

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	$C_{AA}$ Front	$C_{AA}$ Side	Weight
			ft ft ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K
1-ft Side Arm	C	From Leg	5.000 0.000 0.000	-90.0000	21.000	No Ice 0.080 1/2" Ice 0.120 1" Ice 0.160	0.350 0.530 0.710	0.01 0.01 0.02
14-Element 4.5 ft Yagi	C	From Leg	1.000 0.000 0.000	-90.0000	21.000	No Ice 1.500 1/2" Ice 2.200 1" Ice 2.900	1.500 2.200 2.900	0.04 0.04 0.05
***								
1" dia x 16" Pipe	C	From Leg	1.000 0.000 0.000	30.0000	48.000	No Ice 0.110 1/2" Ice 0.200 1" Ice 0.290	0.110 0.200 0.290	0.00 0.00 0.00
GPS	C	From Leg	1.000 0.000 0.000	0.0000	48.000	No Ice 0.620 1/2" Ice 0.730 1" Ice 0.840	0.620 0.730 0.840	0.01 0.02 0.03
***								
2.4" Dia x 5-ft Pipe	A	From Leg	4.000 0.000 0.500	0.0000	111.500	No Ice 1.200 1/2" Ice 1.500 1" Ice 1.800	1.200 1.500 1.800	0.02 0.03 0.04
2.4" Dia x 5-ft Pipe	B	From Leg	4.000 0.000 0.500	0.0000	111.500	No Ice 1.200 1/2" Ice 1.500 1" Ice 1.800	1.200 1.500 1.800	0.02 0.03 0.04
2.4" Dia x 5-ft Pipe	C	From Leg	4.000 0.000 0.500	0.0000	111.500	No Ice 1.200 1/2" Ice 1.500 1" Ice 1.800	1.200 1.500 1.800	0.02 0.03 0.04
(3) T-Frames	C	None		0.0000	111.500	No Ice 22.470 1/2" Ice 31.990 1" Ice 41.510	22.470 31.990 41.510	1.03 1.50 1.97
(2) 800 10121 w/ Mount Pipe	A	From Leg	4.000 0.000 0.500	0.0000	111.500	No Ice 5.388 1/2" Ice 5.813 1" Ice 6.234	4.600 5.351 6.046	0.07 0.11 0.17

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Lateral						°
(2) 800 10121 w/ Mount Pipe	B	From Leg	4.000	0.000	0.0000	111.500	No Ice	5.388	4.600	0.07
			0.000				1/2" Ice	5.813	5.351	0.11
			0.500				1" Ice	6.234	6.046	0.17
(2) 800 10121 w/ Mount Pipe	C	From Leg	4.000	0.000	0.0000	111.500	No Ice	5.388	4.600	0.07
			0.000				1/2" Ice	5.813	5.351	0.11
			0.500				1" Ice	6.234	6.046	0.17
(2) DTMABP7819VG12A	A	From Leg	4.000	0.000	0.0000	111.500	No Ice	0.710	0.710	0.01
			0.000				1/2" Ice	0.830	0.830	0.02
			0.500				1" Ice	0.950	0.950	0.02
(2) DTMABP7819VG12A	B	From Leg	4.000	0.000	0.0000	111.500	No Ice	0.710	0.710	0.01
			0.000				1/2" Ice	0.830	0.830	0.02
			0.500				1" Ice	0.950	0.950	0.02
(2) DTMABP7819VG12A	C	From Leg	4.000	0.000	0.0000	111.500	No Ice	0.710	0.710	0.01
			0.000				1/2" Ice	0.830	0.830	0.02
			0.500				1" Ice	0.950	0.950	0.02
HPA-65R-BUU-H8 w/ Mount Pipe	A	From Leg	4.000	0.000	0.0000	111.500	No Ice	12.976	9.179	0.09
			0.000				1/2" Ice	13.558	10.478	0.19
			0.500				1" Ice	14.147	11.491	0.29
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Leg	4.000	0.000	0.0000	111.500	No Ice	12.073	8.113	0.08
			0.000				1/2" Ice	12.668	9.304	0.17
			0.500				1" Ice	13.228	10.209	0.27
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Leg	4.000	0.000	0.0000	111.500	No Ice	12.976	9.179	0.09
			0.000				1/2" Ice	13.558	10.478	0.19
			0.500				1" Ice	14.147	11.491	0.29
RRUS-11	A	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.522	1.068	0.06
			0.000				1/2" Ice	2.719	1.211	0.07
			0.500				1" Ice	2.923	1.361	0.10
RRUS-11	B	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.522	1.068	0.06
			0.000				1/2" Ice	2.719	1.211	0.07
			0.500				1" Ice	2.923	1.361	0.10
RRUS-11	C	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.522	1.068	0.06
			0.000				1/2" Ice	2.719	1.211	0.07
			0.500				1" Ice	2.923	1.361	0.10
RRUS-12	A	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.700	1.213	0.06
			0.000				1/2" Ice	2.903	1.363	0.08
			0.500				1" Ice	3.114	1.519	0.11
RRUS-12	B	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.700	1.213	0.06
			0.000				1/2" Ice	2.903	1.363	0.08
			0.500				1" Ice	3.114	1.519	0.11
RRUS-12	C	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.700	1.213	0.06
			0.000				1/2" Ice	2.903	1.363	0.08
			0.500				1" Ice	3.114	1.519	0.11
RRUS A2	A	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.066	0.498	0.02
			0.000				1/2" Ice	2.245	0.607	0.03
			0.500				1" Ice	2.431	0.724	0.05
RRUS A2	B	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.066	0.498	0.02
			0.000				1/2" Ice	2.245	0.607	0.03
			0.500				1" Ice	2.431	0.724	0.05
RRUS A2	C	From Leg	4.000	0.000	0.0000	111.500	No Ice	2.066	0.498	0.02
			0.000				1/2" Ice	2.245	0.607	0.03
			0.500				1" Ice	2.431	0.724	0.05
(4) 860 10025	A	From Leg	4.000	0.000	0.0000	111.500	No Ice	0.142	0.121	0.00
			0.000				1/2" Ice	0.196	0.173	0.00
			0.500				1" Ice	0.259	0.231	0.01
(4) 860 10025	B	From Leg	4.000	0.000	0.0000	111.500	No Ice	0.142	0.121	0.00
			0.000				1/2" Ice	0.196	0.173	0.00
			0.500				1" Ice	0.259	0.231	0.01

**tnxTower**

**FDH Velocitel**  
 6521 Meridien Drive, Suite 107  
 Raleigh, North Carolina 27616  
 Phone: 9197551012  
 FAX: 9197551031

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<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K
(4) 860 10025	C	From Leg	4.000 0.000 0.500	0.0000	111.500	No Ice 0.142 1/2" Ice 0.196 1" Ice 0.259	0.121 0.173 0.231	0.00 0.00 0.01
DC6-48-60-18-8F	C	From Leg	4.000 0.000 0.500	0.0000	111.500	No Ice 2.200 1/2" Ice 2.398 1" Ice 2.604	3.700 3.940 4.187	0.02 0.05 0.09
***								
APXV18-206517S w/Mount Pipe	A	From Leg	0.500 0.000 0.000	0.0000	120.500	No Ice 5.404 1/2" Ice 5.960 1" Ice 6.481	4.700 5.860 6.734	0.06 0.10 0.15
APXV18-206517S w/Mount Pipe	B	From Leg	0.500 0.000 0.000	0.0000	120.500	No Ice 5.404 1/2" Ice 5.960 1" Ice 6.481	4.700 5.860 6.734	0.06 0.10 0.15
APXV18-206517S w/Mount Pipe	C	From Leg	0.500 0.000 0.000	0.0000	120.500	No Ice 5.404 1/2" Ice 5.960 1" Ice 6.481	4.700 5.860 6.734	0.06 0.10 0.15
***								
30" Sidearm Mount	B	From Leg	1.250 0.000 0.000	0.0000	145.000	No Ice 0.350 1/2" Ice 0.480 1" Ice 0.610	0.350 0.480 0.610	0.02 0.03 0.04
12-ft x 1" Omni	B	From Leg	2.500 0.000 0.000	0.0000	145.000	No Ice 1.200 1/2" Ice 2.420 1" Ice 3.640	1.200 2.420 3.640	0.01 0.03 0.04
***								
2.4" Dia x 4-ft Mount Pipe	A	From Leg	0.500 0.000 0.000	0.0000	146.500	No Ice 0.870 1/2" Ice 1.120 1" Ice 1.370	0.870 1.120 1.370	0.01 0.02 0.03
12" x 4.5" x 6.25" TMA	A	From Leg	0.250 0.000 0.000	0.0000	146.500	No Ice 0.530 1/2" Ice 0.640 1" Ice 0.750	0.730 0.850 0.970	0.01 0.02 0.03
***								
(3) T-Frames	C	None		0.0000	160.000	No Ice 22.450 1/2" Ice 33.500 1" Ice 44.550	22.450 33.500 44.550	1.02 1.47 1.93
APX16DWV_16DWVS w/ Mount Pipe	A	From Leg	2.500 0.000 0.000	0.0000	160.000	No Ice 7.312 1/2" Ice 8.013 1" Ice 8.614	4.503 5.565 6.341	0.07 0.12 0.18
APX16DWV_16DWVS w/ Mount Pipe	A	From Leg	2.500 0.000 0.000	0.0000	160.000	No Ice 7.312 1/2" Ice 8.013 1" Ice 8.614	4.503 5.565 6.341	0.07 0.12 0.18
(2) APX16DWV_16DWVS w/ Mount Pipe	C	From Leg	2.500 0.000 0.000	0.0000	160.000	No Ice 7.312 1/2" Ice 8.013 1" Ice 8.614	4.503 5.565 6.341	0.07 0.12 0.18
KRY 112 71	A	From Leg	2.250 0.000 0.000	0.0000	160.000	No Ice 1.500 1/2" Ice 1.654 1" Ice 1.815	0.500 0.605 0.716	0.02 0.03 0.04
KRY 112 71	B	From Leg	2.250 0.000 0.000	0.0000	160.000	No Ice 1.500 1/2" Ice 1.654 1" Ice 1.815	0.500 0.605 0.716	0.02 0.03 0.04
(2) KRY 112 71	C	From Leg	2.250 0.000 0.000	0.0000	160.000	No Ice 1.500 1/2" Ice 1.654 1" Ice 1.815	0.500 0.605 0.716	0.02 0.03 0.04
(2) 2.4" x 7-ft Pipe	A	From Leg	2.250 0.000 0.000	0.0000	160.000	No Ice 1.660 1/2" Ice 2.390 1" Ice 3.120	1.660 2.390 3.120	0.04 0.06 0.07
(2) 2.4" x 7-ft Pipe	B	From Leg	2.250 0.000 0.000	0.0000	160.000	No Ice 1.660 1/2" Ice 2.390	1.660 2.390	0.04 0.06





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	<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C <sub>AA</sub> Front ft <sup>2</sup>	C <sub>AA</sub> Side ft <sup>2</sup>	Weight K	
			Horz ft	Lateral ft						
			0.000				1/2" Ice	0.100	0.100	0.00
			0.000				1" Ice	0.150	0.150	0.00
(2) 1" x 8" Pipe	B	From Leg	0.330		15.0000	225.500	No Ice	0.050	0.050	0.00
			0.000				1/2" Ice	0.100	0.100	0.00
			0.000				1" Ice	0.150	0.150	0.00
***										
TMA 12" x 12" x 2"	B	From Leg	1.000		0.0000	232.000	No Ice	1.400	0.230	0.01
			0.000				1/2" Ice	1.560	0.330	0.02
			0.000				1" Ice	1.720	0.430	0.03
***										
TMA 18" x 6" x 6"	B	From Leg	1.000		0.0000	243.000	No Ice	1.050	1.050	0.00
			0.000				1/2" Ice	1.210	1.210	0.02
			0.000				1" Ice	1.370	1.370	0.03
Antel WPA-800120	B	From Leg	1.000		0.0000	243.000	No Ice	6.450	6.450	0.02
			0.000				1/2" Ice	7.020	7.020	0.06
			0.000				1" Ice	7.590	7.590	0.10
***										
2.4" x 25' Mount Pipe	C	From Leg	0.500		0.0000	251.800	No Ice	5.950	5.950	0.09
			0.000				1/2" Ice	8.480	8.480	0.14
			0.000				1" Ice	11.010	11.010	0.18
Antenna Concepts ACB16A w/ Mount	C	From Leg	2.500		0.0000	251.800	No Ice	19.290	14.110	0.20
			0.000				1/2" Ice	24.180	18.330	0.30
			0.000				1" Ice	29.070	22.550	0.40
***										
(1) Side Arm Mount	C	From Leg	1.500		0.0000	251.000	No Ice	0.940	1.410	0.03
			0.000				1/2" Ice	1.480	2.170	0.04
			0.000				1" Ice	2.020	2.930	0.06
DB420-B	C	From Leg	3.000		0.0000	251.000	No Ice	3.330	3.330	0.03
			0.000				1/2" Ice	5.994	5.994	0.04
			10.000				1" Ice	8.658	8.658	0.05
***										
L2.5x2.5x0.25, 10-ft Length	B	Stand-Off Right	2.500		0.0000	309.500	No Ice	4.170	4.170	0.04
			0.000				1/2" Ice	5.310	5.310	0.06
			0.000				1" Ice	6.450	6.450	0.09
2.9" x 22-ft Mt. Pipe	B	Stand-Off Right	7.500		0.0000	297.000	No Ice	6.380	6.380	0.13
			0.000				1/2" Ice	8.610	8.610	0.17
			0.000				1" Ice	10.840	10.840	0.22
Scala SCA 4DR-8S	B	Stand-Off Right	8.000		0.0000	308.300	No Ice	16.980	9.250	0.05
			0.000				1/2" Ice	17.720	9.860	0.15
			0.000				1" Ice	18.460	10.470	0.24
***										
Control Box 12" x 13.5" x 6.5"	C	From Face	0.250		0.0000	5.700	No Ice	1.580	0.760	0.05
			0.000				1/2" Ice	1.740	0.880	0.06
			0.000				1" Ice	1.900	1.000	0.07
Detuning Box 29" x 24" x 12"	C	From Face	0.500		0.0000	10.500	No Ice	6.770	3.380	0.05
			0.000				1/2" Ice	7.110	3.650	0.10
			0.000				1" Ice	7.450	3.920	0.14
Detuner	C	From Leg	0.000		30.0000	136.500	No Ice	1.250	3.080	0.03
			0.000				1/2" Ice	2.100	5.260	0.05
			0.000				1" Ice	2.950	7.440	0.07
Control Box 12" x 13.5" x 6.5"	B	From Leg	0.250		0.0000	141.500	No Ice	1.580	0.760	0.05
			0.000				1/2" Ice	1.740	0.880	0.06
			0.000				1" Ice	1.900	1.000	0.07
***										
**ACTIVE LEVEL**										
(3) T-Frames	C	None			0.0000	129.500	No Ice	21.880	21.880	1.07
							1/2" Ice	30.680	30.680	1.48

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>AA</sub> Front	C <sub>AA</sub> Side	Weight	
			Horz	Vert						ft
			ft	ft	°	ft	ft <sup>2</sup>	ft <sup>2</sup>	K	
SLCP 2x6015 w/ Mount Pipe	A	From Leg	2.250		40.0000	129.500	1" Ice	39.480	39.480	1.90
			0.000				No Ice	10.219	9.996	0.06
			2.000				1/2" Ice	10.817	11.245	0.15
SLCP 2x6015 w/ Mount Pipe	B	From Leg	2.250		40.0000	129.500	1" Ice	11.389	12.259	0.25
			0.000				No Ice	10.219	9.996	0.06
			2.000				1/2" Ice	10.817	11.245	0.15
SACP 2x5516 w/ Mount Pipe	A	From Leg	2.250		40.0000	129.500	1" Ice	11.389	12.259	0.25
			0.000				No Ice	5.313	5.021	0.04
			2.000				1/2" Ice	5.747	5.810	0.09
SACP 2x5516 w/ Mount Pipe	B	From Leg	2.250		40.0000	129.500	1" Ice	6.173	6.526	0.14
			0.000				No Ice	5.313	5.021	0.04
			2.000				1/2" Ice	5.747	5.810	0.09
(2) Andrew HBX-6517DS w/ Mount Pipe	C	From Leg	2.250		40.0000	129.500	1" Ice	6.173	6.526	0.14
			0.000				No Ice	5.503	5.019	0.04
			2.000				1/2" Ice	6.073	6.221	0.09
(2) Andrew LNX-6514DS w/ Mount Pipe	C	From Leg	2.250		40.0000	129.500	1" Ice	6.644	7.422	0.13
			0.000				No Ice	8.568	7.004	0.06
			2.000				1/2" Ice	9.220	8.185	0.13
FD9R6004/2C Diplexer	A	From Leg	2.250		40.0000	129.500	1" Ice	9.872	9.367	0.19
			0.000				No Ice	0.367	0.085	0.00
			2.000				1/2" Ice	0.451	0.136	0.01
FD9R6004/2C Diplexer	B	From Leg	2.250		40.0000	129.500	1" Ice	0.543	0.196	0.01
			0.000				No Ice	0.367	0.085	0.00
			2.000				1/2" Ice	0.451	0.136	0.01
(2) FD9R6004/2C Diplexer	C	From Leg	2.250		40.0000	129.500	1" Ice	0.543	0.196	0.01
			0.000				No Ice	0.367	0.085	0.00
			2.000				1/2" Ice	0.451	0.136	0.01
RRH2x40-AWS	A	From Leg	2.250		40.0000	129.500	1" Ice	0.543	0.196	0.01
			0.000				No Ice	2.161	1.420	0.04
			2.000				1/2" Ice	2.360	1.590	0.06
RRH2x40-AWS	B	From Leg	2.250		40.0000	129.500	1" Ice	2.565	1.768	0.08
			0.000				No Ice	2.161	1.420	0.04
			2.000				1/2" Ice	2.360	1.590	0.06
DB-T1-6Z-8AB-0Z	C	From Leg	2.250		40.0000	129.500	1" Ice	2.565	1.768	0.08
			0.000				No Ice	4.800	2.000	0.04
			2.000				1/2" Ice	5.070	2.193	0.08
***						1" Ice	5.348	2.393	0.12	
30" x 18" Dia	C	None			0.0000	346.300	No Ice	3.000	3.000	0.06
							1/2" Ice	3.270	3.270	0.09
							1" Ice	3.540	3.540	0.13
ERI 3 Bay FM	C	From Leg	1.500		0.0000	332.000	No Ice	9.800	9.800	0.32
			0.000				1/2" Ice	10.400	10.400	0.42
			0.000				1" Ice	11.000	11.000	0.52
2.4" Dia x 18" Pipe	C	From Leg	0.750		0.0000	332.000	No Ice	0.240	0.240	0.01
			0.000				1/2" Ice	0.360	0.360	0.01
			0.000				1" Ice	0.480	0.480	0.01
***										

**Dishes**

<p><b>tnxTower</b></p> <p><b>FDH Velocitel</b> 6521 Meridien Drive, Suite 107 Raleigh, North Carolina 27616 Phone: 9197551012 FAX: 9197551031</p>	<b>Job</b>	West Hartford, CT15879-A-05	<b>Page</b>	32 of 57
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Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft <sup>2</sup>	Weight K
2-ft Dish w/o Radome	A	Paraboloid w/o Radome	From Leg	1.500 0.000 0.000	70.0000		146.500	2.000	No Ice 3.140 1/2" Ice 3.410 1" Ice 3.680	0.04 0.06 0.08
***										
Cablewave PA6-112	B	Paraboloid w/Radome	From Leg	1.500 0.000 0.000	0.0000		196.000	6.000	No Ice 28.270 1/2" Ice 29.070 1" Ice 29.870	0.59 0.74 0.89
***										
SP2-4.7NS	B	Paraboloid w/o Radome	From Leg	1.500 0.000 0.000	60.0000		232.000	2.000	No Ice 3.140 1/2" Ice 3.410 1" Ice 3.680	0.02 0.04 0.06
***										
6-ft x 3-ft Grid	B	Grid	From Leg	1.000 0.000 0.000	30.0000		235.000	4.790	No Ice 19.630 1/2" Ice 20.290 1" Ice 20.950	0.13 0.23 0.33
***										

## Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2D+1.6W (pattern 1) 0 deg - No Ice+1.0 Guy
4	1.2D+1.6W (pattern 2) 0 deg - No Ice+1.0 Guy
5	1.2D+1.6W (pattern 3) 0 deg - No Ice+1.0 Guy
6	1.2D+1.6W (pattern 4) 0 deg - No Ice+1.0 Guy
7	1.2D+1.6W (pattern 5) 0 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
9	1.2D+1.6W (pattern 1) 30 deg - No Ice+1.0 Guy
10	1.2D+1.6W (pattern 2) 30 deg - No Ice+1.0 Guy
11	1.2D+1.6W (pattern 3) 30 deg - No Ice+1.0 Guy
12	1.2D+1.6W (pattern 4) 30 deg - No Ice+1.0 Guy
13	1.2D+1.6W (pattern 5) 30 deg - No Ice+1.0 Guy
14	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
15	1.2D+1.6W (pattern 1) 60 deg - No Ice+1.0 Guy
16	1.2D+1.6W (pattern 2) 60 deg - No Ice+1.0 Guy
17	1.2D+1.6W (pattern 3) 60 deg - No Ice+1.0 Guy
18	1.2D+1.6W (pattern 4) 60 deg - No Ice+1.0 Guy
19	1.2D+1.6W (pattern 5) 60 deg - No Ice+1.0 Guy
20	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
21	1.2D+1.6W (pattern 1) 90 deg - No Ice+1.0 Guy
22	1.2D+1.6W (pattern 2) 90 deg - No Ice+1.0 Guy
23	1.2D+1.6W (pattern 3) 90 deg - No Ice+1.0 Guy
24	1.2D+1.6W (pattern 4) 90 deg - No Ice+1.0 Guy
25	1.2D+1.6W (pattern 5) 90 deg - No Ice+1.0 Guy
26	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
27	1.2D+1.6W (pattern 1) 120 deg - No Ice+1.0 Guy
28	1.2D+1.6W (pattern 2) 120 deg - No Ice+1.0 Guy
29	1.2D+1.6W (pattern 3) 120 deg - No Ice+1.0 Guy
30	1.2D+1.6W (pattern 4) 120 deg - No Ice+1.0 Guy
31	1.2D+1.6W (pattern 5) 120 deg - No Ice+1.0 Guy
32	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
33	1.2D+1.6W (pattern 1) 150 deg - No Ice+1.0 Guy
34	1.2D+1.6W (pattern 2) 150 deg - No Ice+1.0 Guy
35	1.2D+1.6W (pattern 3) 150 deg - No Ice+1.0 Guy

<p style="text-align: center;"><b>tnxTower</b></p> <p style="text-align: center;"><b>FDH Velocitel</b> 6521 Meridien Drive, Suite 107 Raleigh, North Carolina 27616 Phone: 9197551012 FAX: 9197551031</p>	<p><b>Job</b></p> <p style="text-align: center;">West Hartford, CT15879-A-05</p>	<p><b>Page</b></p> <p style="text-align: center;">33 of 57</p>
	<p><b>Project</b></p> <p style="text-align: center;">16PVUB1400</p>	<p><b>Date</b></p> <p style="text-align: center;">14:48:13 11/09/16</p>
	<p><b>Client</b></p> <p style="text-align: center;">SBA Network Services, Inc.</p>	<p><b>Designed by</b></p> <p style="text-align: center;">PHicks</p>

<i>Comb. No.</i>	<i>Description</i>
36	1.2D+1.6W (pattern 4) 150 deg - No Ice+1.0 Guy
37	1.2D+1.6W (pattern 5) 150 deg - No Ice+1.0 Guy
38	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
39	1.2D+1.6W (pattern 1) 180 deg - No Ice+1.0 Guy
40	1.2D+1.6W (pattern 2) 180 deg - No Ice+1.0 Guy
41	1.2D+1.6W (pattern 3) 180 deg - No Ice+1.0 Guy
42	1.2D+1.6W (pattern 4) 180 deg - No Ice+1.0 Guy
43	1.2D+1.6W (pattern 5) 180 deg - No Ice+1.0 Guy
44	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
45	1.2D+1.6W (pattern 1) 210 deg - No Ice+1.0 Guy
46	1.2D+1.6W (pattern 2) 210 deg - No Ice+1.0 Guy
47	1.2D+1.6W (pattern 3) 210 deg - No Ice+1.0 Guy
48	1.2D+1.6W (pattern 4) 210 deg - No Ice+1.0 Guy
49	1.2D+1.6W (pattern 5) 210 deg - No Ice+1.0 Guy
50	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
51	1.2D+1.6W (pattern 1) 240 deg - No Ice+1.0 Guy
52	1.2D+1.6W (pattern 2) 240 deg - No Ice+1.0 Guy
53	1.2D+1.6W (pattern 3) 240 deg - No Ice+1.0 Guy
54	1.2D+1.6W (pattern 4) 240 deg - No Ice+1.0 Guy
55	1.2D+1.6W (pattern 5) 240 deg - No Ice+1.0 Guy
56	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
57	1.2D+1.6W (pattern 1) 270 deg - No Ice+1.0 Guy
58	1.2D+1.6W (pattern 2) 270 deg - No Ice+1.0 Guy
59	1.2D+1.6W (pattern 3) 270 deg - No Ice+1.0 Guy
60	1.2D+1.6W (pattern 4) 270 deg - No Ice+1.0 Guy
61	1.2D+1.6W (pattern 5) 270 deg - No Ice+1.0 Guy
62	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
63	1.2D+1.6W (pattern 1) 300 deg - No Ice+1.0 Guy
64	1.2D+1.6W (pattern 2) 300 deg - No Ice+1.0 Guy
65	1.2D+1.6W (pattern 3) 300 deg - No Ice+1.0 Guy
66	1.2D+1.6W (pattern 4) 300 deg - No Ice+1.0 Guy
67	1.2D+1.6W (pattern 5) 300 deg - No Ice+1.0 Guy
68	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
69	1.2D+1.6W (pattern 1) 330 deg - No Ice+1.0 Guy
70	1.2D+1.6W (pattern 2) 330 deg - No Ice+1.0 Guy
71	1.2D+1.6W (pattern 3) 330 deg - No Ice+1.0 Guy
72	1.2D+1.6W (pattern 4) 330 deg - No Ice+1.0 Guy
73	1.2D+1.6W (pattern 5) 330 deg - No Ice+1.0 Guy
74	1.2 Dead+1.0 Ice+1.0 Temp+Guy
75	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
76	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
77	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
78	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
79	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
80	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
81	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
82	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
83	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
84	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
85	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
86	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
87	Dead+Wind 0 deg - Service+Guy
88	Dead+Wind 30 deg - Service+Guy
89	Dead+Wind 60 deg - Service+Guy
90	Dead+Wind 90 deg - Service+Guy
91	Dead+Wind 120 deg - Service+Guy
92	Dead+Wind 150 deg - Service+Guy
93	Dead+Wind 180 deg - Service+Guy
94	Dead+Wind 210 deg - Service+Guy
95	Dead+Wind 240 deg - Service+Guy
96	Dead+Wind 270 deg - Service+Guy
97	Dead+Wind 300 deg - Service+Guy

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Comb. No.	Description
98	Dead+Wind 330 deg - Service+Guy

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	346.351 - 329.351	4.502	97	0.3003	0.5952
L2	329.351 - 311.351	3.477	97	0.2707	0.5953
T1	311.351 - 310.351	2.800	97	0.0522	0.5953
T2	310.351 - 299.182	2.788	97	0.0519	0.5957
T3	299.182 - 279.182	2.669	97	0.0478	0.5877
T4	279.182 - 259.182	2.491	97	0.0473	0.5633
T5	259.182 - 239.182	2.318	97	0.0479	0.5361
T6	239.182 - 219.182	2.145	97	0.0480	0.5083
T7	219.182 - 199.182	2.018	97	0.0534	0.4765
T8	199.182 - 179.182	1.926	97	0.0520	0.4448
T9	179.182 - 159.182	1.819	97	0.0446	0.4014
T10	159.182 - 139.182	1.701	97	0.0344	0.3533
T11	139.182 - 119.182	1.701	95	0.0249	0.3243
T12	119.182 - 99.1822	1.741	95	0.0254	0.2900
T13	99.1822 - 79.1822	1.656	95	0.0360	0.2532
T14	79.1822 - 59.1822	1.506	95	0.0437	0.2186
T15	59.1822 - 39.1822	1.291	95	0.0682	0.1864
T16	39.1822 - 19.1822	0.942	95	0.0958	0.1540
T17	19.1822 - 14.4112	0.472	93	0.1172	0.1230
T18	14.4112 - 11.8302	0.348	93	0.1205	0.1175
T19	11.8302 - 9.49947	0.280	93	0.1218	0.1151
T20	9.49947 - 7.16874	0.219	93	0.1230	0.1135
T21	7.16874 - 1.2	0.157	93	0.1236	0.1116

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
346.300	30" x 18" Dia	97	4.498	0.3004	0.5952	26308
332.000	ERI 3 Bay FM	97	3.625	0.2936	0.5955	9196
309.500	L2.5x2.5x0.25, 10-ft Length	97	2.779	0.0519	0.5958	12120
308.300	Scala SCA 4DR-8S	97	2.766	0.0518	0.5957	24258
299.182	Guy	97	2.669	0.0478	0.5877	59884
297.000	2.9" x 22-ft Mt. Pipe	97	2.648	0.0470	0.5851	60221
251.800	2.4" x 25' Mount Pipe	97	2.252	0.0479	0.5261	110979
251.000	(1) Side Arm Mount	97	2.245	0.0479	0.5250	104397
243.000	TMA 18" x 6" x 6"	97	2.176	0.0479	0.5139	65561
235.000	6-ft x 3-ft Grid	97	2.114	0.0481	0.5018	55129
232.000	SP2-4.7NS	97	2.094	0.0490	0.4970	54754
229.182	Guy	97	2.075	0.0502	0.4925	54412
225.500	2'10" x 7" x 2" Panel w/ 48" Mount Pipe	97	2.053	0.0516	0.4865	53973
220.000	Antel WPA-800120	97	2.022	0.0532	0.4777	55100
203.000	(1) Side Arm Mount	97	1.943	0.0529	0.4514	166327
196.000	Cablewave PA6-112	97	1.911	0.0512	0.4388	90552
180.000	2.4" x 25' Mount Pipe	97	1.824	0.0450	0.4034	73373
165.000	36" Standoff	97	1.732	0.0372	0.3657	105391

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Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.500	2.4" Dia x 10-ft Mount Pipe	97	1.730	0.0370	0.3646	100905
160.000	(3) T-Frames	97	1.705	0.0348	0.3549	73535
149.182	Guy	95	1.667	0.0300	0.3377	74282
146.500	2-ft Dish w/o Radome	95	1.676	0.0288	0.3341	76599
145.000	30" Sidearm Mount	95	1.681	0.0281	0.3322	77959
141.500	Control Box 12" x 13.5" x 6.5"	95	1.693	0.0262	0.3276	82817
136.500	Detuner	95	1.711	0.0232	0.3203	112597
129.500	(3) T-Frames	95	1.732	0.0220	0.3088	47097
120.500	APXV18-206517S w/Mount Pipe	95	1.742	0.0247	0.2924	27602
111.500	2.4" Dia x 5-ft Pipe	95	1.722	0.0298	0.2757	34777
89.182	Guy	95	1.587	0.0384	0.2356	89286
48.000	1" dia x 16" Pipe	95	1.113	0.0840	0.1684	33634
21.000	1-ft Side Arm	93	0.519	0.1157	0.1254	67721
10.500	Detuning Box 29" x 24" x 12"	93	0.245	0.1225	0.1142	438261
5.700	Control Box 12" x 13.5" x 6.5"	93	0.118	0.1240	0.1103	601223
1.200	36"x36"x12" TMA	0	0.000	0.1253	0.1067	601223

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	346.351 - 329.351	20.747	64	1.3105	2.1571
L2	329.351 - 311.351	16.289	64	1.1904	2.1572
T1	311.351 - 310.351	13.260	70	0.2832	2.1582
T2	310.351 - 299.182	13.206	70	0.2819	2.1596
T3	299.182 - 279.182	12.653	70	0.2621	2.1266
T4	279.182 - 259.182	11.931	69	0.2403	2.0343
T5	259.182 - 239.182	11.322	69	0.2226	1.9311
T6	239.182 - 219.182	10.753	68	0.1914	1.8253
T7	219.182 - 199.182	10.409	68	0.2132	1.7064
T8	199.182 - 179.182	10.219	68	0.2006	1.5918
T9	179.182 - 159.182	10.307	50	0.1581	1.4280
T10	159.182 - 139.182	10.495	55	0.1296	1.2443
T11	139.182 - 119.182	10.693	55	0.1077	1.1379
T12	119.182 - 99.1822	10.660	55	0.1507	1.0147
T13	99.1822 - 79.1822	9.977	55	0.2182	0.8822
T14	79.1822 - 59.1822	8.896	55	0.3037	0.7595
T15	59.1822 - 39.1822	7.429	55	0.4296	0.6476
T16	39.1822 - 19.1822	5.317	55	0.5624	0.5353
T17	19.1822 - 14.4112	2.636	55	0.6624	0.4280
T18	14.4112 - 11.8302	1.942	55	0.6774	0.4088
T19	11.8302 - 9.49947	1.563	55	0.6837	0.4004
T20	9.49947 - 7.16874	1.220	55	0.6888	0.3950
T21	7.16874 - 1.2	0.877	55	0.6917	0.3883

### Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
346.300	30" x 18" Dia	64	20.733	1.3110	2.1571	9565

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Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
332.000	ERI 3 Bay FM	64	16.936	1.2851	2.1580	3307
309.500	L2.5x2.5x0.25, 10-ft Length	70	13.162	0.2819	2.1601	2820
308.300	Scala SCA 4DR-8S	70	13.101	0.2813	2.1596	5563
299.182	Guy	70	12.653	0.2621	2.1266	16155
297.000	2.9" x 22-ft Mt. Pipe	70	12.554	0.2576	2.1162	16512
251.800	2.4" x 25' Mount Pipe	69	11.094	0.2135	1.8930	25535
251.000	(1) Side Arm Mount	69	11.070	0.2123	1.8889	24034
243.000	TMA 18" x 6" x 6"	68	10.848	0.1987	1.8466	15147
235.000	6-ft x 3-ft Grid	68	10.660	0.1965	1.8009	13789
232.000	SP2-4.7NS	68	10.601	0.2007	1.7829	14113
229.182	Guy	68	10.550	0.2045	1.7658	14233
225.500	2'10" x 7" x 2" Panel w/ 48" Mount Pipe	68	10.492	0.2090	1.7435	14392
220.000	Antel WPA-800120	68	10.418	0.2130	1.7111	15015
203.000	(1) Side Arm Mount	68	10.257	0.2057	1.6159	22342
196.000	Cablewave PA6-112	68	10.183	0.1954	1.5698	16011
180.000	2.4" x 25' Mount Pipe	50	10.296	0.1601	1.4358	13586
165.000	36" Standoff	50	10.446	0.1362	1.2915	23809
164.500	2.4" Dia x 10-ft Mount Pipe	50	10.449	0.1358	1.2871	22909
160.000	(3) T-Frames	55	10.485	0.1308	1.2503	17837
149.182	Guy	55	10.605	0.1155	1.1859	21792
146.500	2-ft Dish w/o Radome	55	10.631	0.1129	1.1731	22481
145.000	30" Sidearm Mount	55	10.645	0.1115	1.1660	22840
141.500	Control Box 12" x 13.5" x 6.5"	55	10.675	0.1089	1.1494	23674
136.500	Detuner	55	10.712	0.1074	1.1236	20184
129.500	(3) T-Frames	55	10.738	0.1160	1.0822	9663
120.500	APXV18-206517S w/Mount Pipe	55	10.680	0.1458	1.0235	5915
111.500	2.4" Dia x 5-ft Pipe	55	10.469	0.1792	0.9633	7172
89.182	Guy	55	9.476	0.2595	0.8193	14220
48.000	1" dia x 16" Pipe	55	6.330	0.5059	0.5854	7142
21.000	1-ft Side Arm	55	2.896	0.6556	0.4362	14995
10.500	Detuning Box 29" x 24" x 12"	55	1.368	0.6868	0.3973	100231
5.700	Control Box 12" x 13.5" x 6.5"	55	0.661	0.6934	0.3839	128442
1.200	36"x36"x12" TMA	0	0.000	0.6993	0.3711	128442

## Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	311.351	Leg	A325N	1.7500	2	5.27	162.36	0.032	✓	Bolt Tension
T3	299.182	Leg	A325N	0.8750	5	4.86	48.71	0.100	✓	Bolt DS
T5	259.182	Leg	A325N	0.8750	5	7.43	48.71	0.152	✓	Bolt DS
T7	219.182	Leg	A325N	0.8750	5	11.12	48.71	0.228	✓	Bolt DS
T9	179.182	Leg	A325N	0.8750	5	13.61	48.71	0.279	✓	Bolt DS
T11	139.182	Leg	A325N	0.8750	5	19.27	48.71	0.396	✓	Bolt DS
T13	99.1822	Leg	A325N	0.8750	5	22.05	48.71	0.453	✓	Bolt DS
T15	59.1822	Leg	A325N	0.8750	5	24.74	48.71	0.508	✓	Bolt DS
T17	19.1822	Leg	A325N	0.8750	5	23.74	48.71	0.487	✓	Bolt DS
T19	11.8302	Leg	A325N	0.8750	5	23.49	48.71	0.482	✓	Bolt DS



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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
T20	9.49947	Leg	A325N	0.8750	5	22.53	48.71	0.463 ✓	1	Bolt DS

### Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual $T_u$ K	Allowable $\phi T_n$ K	Required S.F.	Actual S.F.
T3	299.182 (A) (983)	13/16 BS	8.00	80.00	22.19	48.00	1.000	2.163 ✓
	299.182 (B) (982)	3/4 BS	6.80	68.00	23.92	40.80	1.000	1.706 ✓
	299.182 (C) (981)	3/4 BS	6.80	68.00	22.20	40.80	1.000	1.838 ✓
T6	229.182 (A) (986)	7/8 BS	9.20	92.00	24.33	55.20	1.000	2.269 ✓
	229.182 (B) (985)	13/16 BS	8.00	80.00	25.57	48.00	1.000	1.878 ✓
	229.182 (C) (984)	13/16 BS	8.00	80.00	23.47	48.00	1.000	2.045 ✓
T10	149.182 (A) (989)	13/16 BS	8.00	80.00	25.23	48.00	1.000	1.902 ✓
	149.182 (B) (988)	7/8 BS	9.20	92.00	28.30	55.20	1.000	1.951 ✓
	149.182 (C) (987)	7/8 BS	9.20	92.00	26.61	55.20	1.000	2.074 ✓
T13	89.182 (A) (992)	3/4 BS	6.80	68.00	22.35	40.80	1.000	1.826 ✓
	89.182 (B) (991)	13/16 BS	8.00	80.00	24.21	48.00	1.000	1.983 ✓
	89.182 (C) (990)	13/16 BS	8.00	80.00	23.03	48.00	1.000	2.085 ✓

### Compression Checks

### Pole Design Data

Section No.	Elevation ft	Size	L ft	$L_u$ ft	$Kl/r$	A $in^2$	$P_u$ K	$\phi P_n$ K	Ratio $\frac{P_u}{\phi P_n}$
L1	346.351 - 329.351 (1)	P10x.365 (10.75 OD)	17.000	0.000	0.0	11.9083	-1.30	375.11	0.003
L2	329.351 - 311.351 (2)	P10x.365 (10.75 OD)	18.000	0.000	0.0	11.9083	-2.23	375.11	0.006

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### Pole Bending Design Data

Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{ux}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	$M_{uy}$ kip-ft	$\phi M_{uy}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
L1	346.351 - 329.351 (1)	P10x.365 (10.75 OD)	12.17	103.38	0.118	0.00	103.38	0.000
L2	329.351 - 311.351 (2)	P10x.365 (10.75 OD)	47.56	103.38	0.460	0.00	103.38	0.000

### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual $V_u$ K	$\phi V_n$ K	Ratio $\frac{V_u}{\phi V_n}$	Actual $T_u$ kip-ft	$\phi T_n$ kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	346.351 - 329.351 (1)	P10x.365 (10.75 OD)	1.63	187.56	0.009	0.00	157.00	0.000
L2	329.351 - 311.351 (2)	P10x.365 (10.75 OD)	2.30	187.56	0.012	0.03	157.00	0.000

### Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	346.351 - 329.351 (1)	0.003	0.118	0.000	0.009	0.000	0.121	1.000	4.8.2 ✓
L2	329.351 - 311.351 (2)	0.006	0.460	0.000	0.012	0.000	0.466	1.000	4.8.2 ✓

### Leg Design Data (Compression)

Section No.	Elevation ft	Size	$L$ ft	$L_u$ ft	$Kl/r$	$A$ $in^2$	$P_u$ K	$\phi P_n$ K	Ratio $\frac{P_u}{\phi P_n}$
T1	311.351 - 310.351	2 3/4	1.000	1.000	17.5 K=1.00	5.9396	-6.28	261.39	0.024
T2	310.351 - 299.182	2 3/4	11.169	2.719	47.5 K=1.00	5.9396	-21.06	226.69	0.093 <sup>1</sup>
T3	299.182 - 279.182	2 3/4	20.000	2.333	40.7 K=1.00	5.9396	-25.24	236.75	0.107 <sup>1</sup>
T4	279.182 - 259.182	2 3/4	20.000	2.333	40.7 K=1.00	5.9396	-26.74	236.75	0.113 <sup>1</sup>
T5	259.182 -	2 3/4	20.000	2.333	40.7	5.9396	-35.53	236.75	0.150 <sup>1</sup>

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T6	239.182 - 239.182	2 3/4	20.000	2.333	K=1.00 40.7	5.9396	-49.00	236.75	0.207 <sup>1</sup>
T7	219.182 - 219.182	2 3/4	20.000	2.333	K=1.00 40.7	5.9396	-54.67	236.75	0.231 <sup>1</sup>
T8	199.182 - 199.182	2 3/4	20.000	2.333	K=1.00 40.7	5.9396	-61.76	236.75	0.261 <sup>1</sup>
T9	179.182 - 179.182	2 3/4	20.000	2.333	K=1.00 40.7	5.9396	-67.76	236.75	0.286 <sup>1</sup>
T10	159.182 - 159.182	3	20.000	2.333	K=1.00 37.3	7.0686	-82.96	287.27	0.289 <sup>1</sup>
T11	139.182 - 139.182	3	20.000	2.333	K=1.00 37.3	7.0686	-95.66	287.27	0.333 <sup>1</sup>
T12	119.182 - 119.182	3	20.000	2.333	K=1.00 37.3	7.0686	-101.27	287.27	0.353 <sup>1</sup>
T13	99.1822 - 99.1822	3	20.000	2.333	K=1.00 37.3	7.0686	-108.97	287.27	0.379 <sup>1</sup>
T14	79.1822 - 79.1822	3	20.000	2.333	K=1.00 37.3	7.0686	-119.70	287.27	0.417 <sup>1</sup>
T15	59.1822 - 59.1822	3	20.000	2.333	K=1.00 37.3	7.0686	-123.90	287.27	0.431 <sup>1</sup>
T16	39.1822 - 39.1822	3	20.000	2.333	K=1.00 37.3	7.0686	-123.61	287.27	0.430 <sup>1</sup>
T17	19.1822 - 19.1822	3	4.771	2.302	K=1.00 36.8	7.0686	-119.11	288.05	0.414 <sup>1</sup>
T18	14.4112 - 14.4112	3	2.581	2.581	K=1.00 41.3	7.0686	-116.64	280.80	0.415 <sup>1</sup>
T19	11.8302 - 11.8302	3	2.331	1.165	K=1.00 18.6	7.0686	-117.44	310.10	0.379 <sup>1</sup>
T20	9.49947 - 9.49947	3	2.331	1.165	K=1.00 18.6	7.0686	-112.65	310.10	0.363 <sup>1</sup>
T21	7.16874 - 7.16874	3	6.630	2.893	K=1.00 46.3	7.0686	-120.71	271.97	0.444 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Leg Bending Design Data (Compression)

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>ux</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M <sub>uy</sub> kip-ft	φM <sub>uy</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T1	311.351 - 310.351	2 3/4	1.41	13.00	0.108	0.00	13.00	0.000
T2	310.351 - 299.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T3	299.182 - 279.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T4	279.182 - 259.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T5	259.182 - 239.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T6	239.182 - 219.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T7	219.182 - 199.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T8	199.182 -	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000

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Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{rx}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	$M_{uy}$ kip-ft	$\phi M_{ry}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
T9	179.182 - 179.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T10	159.182 - 159.182	3	0.00	16.88	0.000	0.00	16.88	0.000
T11	139.182 - 139.182	3	0.00	16.88	0.000	0.00	16.88	0.000
T12	119.182 - 119.182	3	0.00	16.88	0.000	0.00	16.88	0.000
T13	99.1822 - 99.1822	3	0.00	16.88	0.000	0.00	16.88	0.000
T14	79.1822 - 79.1822	3	0.00	16.88	0.000	0.00	16.88	0.000
T15	59.1822 - 59.1822	3	0.00	16.88	0.000	0.00	16.88	0.000
T16	39.1822 - 39.1822	3	0.00	16.88	0.000	0.00	16.88	0.000
T17	19.1822 - 19.1822	3	0.00	16.88	0.000	0.00	16.88	0.000
T18	14.4112 - 14.4112	3	0.00	16.88	0.000	0.00	16.88	0.000
T19	11.8302 - 11.8302	3	0.00	16.88	0.000	0.00	16.88	0.000
T20	9.49947 - 9.49947	3	0.00	16.88	0.000	0.00	16.88	0.000
T21	7.16874 - 7.16874	3	0.00	16.88	0.000	0.00	16.88	0.000
T21	7.16874 - 1.2	3	0.00	16.88	0.000	0.00	16.88	0.000

### Leg Interaction Design Data (Compression)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	Ratio $\frac{M_{uy}}{\phi M_{ry}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	311.351 - 310.351	2 3/4	0.024	0.108	0.000	0.120	1.000	4.8.1 ✓
T2	310.351 - 299.182	2 3/4	0.093	0.000	0.000	0.093 <sup>1</sup>	1.000	4.8.1 ✓
T3	299.182 - 279.182	2 3/4	0.107	0.000	0.000	0.107 <sup>1</sup>	1.000	4.8.1 ✓
T4	279.182 - 259.182	2 3/4	0.113	0.000	0.000	0.113 <sup>1</sup>	1.000	4.8.1 ✓
T5	259.182 - 239.182	2 3/4	0.150	0.000	0.000	0.150 <sup>1</sup>	1.000	4.8.1 ✓
T6	239.182 - 219.182	2 3/4	0.207	0.000	0.000	0.207 <sup>1</sup>	1.000	4.8.1 ✓
T7	219.182 - 199.182	2 3/4	0.231	0.000	0.000	0.231 <sup>1</sup>	1.000	4.8.1 ✓
T8	199.182 - 179.182	2 3/4	0.261	0.000	0.000	0.261 <sup>1</sup>	1.000	4.8.1 ✓
T9	179.182 - 159.182	2 3/4	0.286	0.000	0.000	0.286 <sup>1</sup>	1.000	4.8.1 ✓
T10	159.182 - 139.182	3	0.289	0.000	0.000	0.289 <sup>1</sup>	1.000	4.8.1 ✓
T11	139.182 -	3	0.333	0.000	0.000	0.333 <sup>1</sup>	1.000	4.8.1 ✓

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Section No.	Elevation ft	Size	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
			$P_u / \phi P_n$	$M_{ux} / \phi M_{nx}$	$M_{uy} / \phi M_{ny}$			
T12	119.182 - 99.1822	3	0.353	0.000	0.000	0.353 <sup>1</sup>	1.000	4.8.1 ✓
T13	99.1822 - 79.1822	3	0.379	0.000	0.000	0.379 <sup>1</sup>	1.000	4.8.1 ✓
T14	79.1822 - 59.1822	3	0.417	0.000	0.000	0.417 <sup>1</sup>	1.000	4.8.1 ✓
T15	59.1822 - 39.1822	3	0.431	0.000	0.000	0.431 <sup>1</sup>	1.000	4.8.1 ✓
T16	39.1822 - 19.1822	3	0.430	0.000	0.000	0.430 <sup>1</sup>	1.000	4.8.1 ✓
T17	19.1822 - 14.4112	3	0.414	0.000	0.000	0.414 <sup>1</sup>	1.000	4.8.1 ✓
T18	14.4112 - 11.8302	3	0.415	0.000	0.000	0.415 <sup>1</sup>	1.000	4.8.1 ✓
T19	11.8302 - 9.49947	3	0.379	0.000	0.000	0.379 <sup>1</sup>	1.000	4.8.1 ✓
T20	9.49947 - 7.16874	3	0.363	0.000	0.000	0.363 <sup>1</sup>	1.000	4.8.1 ✓
T21	7.16874 - 1.2	3	0.444	0.000	0.000	0.444 <sup>1</sup>	1.000	4.8.1 ✓

<sup>1</sup>  $P_u / \phi P_n$  controls

### Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	$L$	$L_u$	$Kl/r$	$A$ $in^2$	$P_u$ $K$	$\phi P_n$ $K$	Ratio
			ft	ft					$P_u / \phi P_n$
T2	310.351 - 299.182	7/8	5.692	2.715	134.1 K=0.90	0.6013	-2.18	7.56	0.289 <sup>1</sup> ✓
T3	299.182 - 279.182	7/8	5.518	2.632	130.0 K=0.90	0.6013	-1.58	8.04	0.196 <sup>1</sup> ✓
T4	279.182 - 259.182	7/8	5.518	2.632	130.0 K=0.90	0.6013	-1.48	8.04	0.185 <sup>1</sup> ✓
T5	259.182 - 239.182	7/8	5.518	2.632	130.0 K=0.90	0.6013	-3.31	8.04	0.412 <sup>1</sup> ✓
T6	239.182 - 219.182	7/8	5.518	2.632	130.0 K=0.90	0.6013	-3.71	8.04	0.462 <sup>1</sup> ✓
T7	219.182 - 199.182	7/8	5.518	2.632	130.0 K=0.90	0.6013	-3.57	8.04	0.444 <sup>1</sup> ✓
T8	199.182 - 179.182	7/8	5.518	2.632	130.0 K=0.90	0.6013	-2.73	8.04	0.340 <sup>1</sup> ✓
T9	179.182 - 159.182	7/8	5.518	2.632	130.0 K=0.90	0.6013	-3.26	8.04	0.406 <sup>1</sup> ✓
T10	159.182 - 139.182	1	5.518	2.621	113.2 K=0.90	0.7854	-5.81	13.84	0.420 <sup>1</sup> ✓
T11	139.182 - 119.182	7/8	5.518	2.621	129.4 K=0.90	0.6013	-5.51	8.11	0.679 <sup>1</sup> ✓

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T12	119.182 - 99.1822	7/8	5.518	2.621	129.4 K=0.90	0.6013	-4.07	8.11	0.502 <sup>1</sup> ✓
T13	99.1822 - 79.1822	7/8	5.518	2.621	129.4 K=0.90	0.6013	-4.33	8.11	0.534 <sup>1</sup> ✓
T14	79.1822 - 59.1822	7/8	5.518	2.621	129.4 K=0.90	0.6013	-4.11	8.11	0.506 <sup>1</sup> ✓
T15	59.1822 - 39.1822	7/8	5.518	2.621	129.4 K=0.90	0.6013	-2.47	8.11	0.304 <sup>1</sup> ✓
T16	39.1822 - 19.1822	7/8	5.518	2.621	129.4 K=0.90	0.6013	-3.73	8.11	0.460 <sup>1</sup> ✓
T17	19.1822 - 14.4112	1	5.505	2.615	113.0 K=0.90	0.7854	-4.32	13.90	0.310 <sup>1</sup> ✓
T18	14.4112 - 11.8302	1	5.627	2.673	115.5 K=0.90	0.7854	-4.03	13.31	0.303 <sup>1</sup> ✓
T19	11.8302 - 9.49947	1 1/4	3.418	3.247	87.3 K=0.70	1.2272	-4.37	31.64	0.138 <sup>1</sup> ✓
T20	9.49947 - 7.16874	1 1/4	3.418	3.247	87.3 K=0.70	1.2272	-4.96	31.64	0.157 <sup>1</sup> ✓
T21	7.16874 - 1.2	1 1/4	3.080	2.412	96.0 K=1.04	1.2272	-16.53	28.14	0.588 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	311.351 - 310.351	6 x 1	5.000	4.771	198.3 K=1.00	6.0000	0.00	34.46	0.000
T19	11.8302 - 9.49947	6 x 3/4	5.000	3.563	197.5 K=1.00	4.5000	-2.47	26.07	0.095 <sup>1</sup>
T20	9.49947 - 7.16874	6 x 3/4	5.000	3.563	197.5 K=1.00	4.5000	-2.26	26.07	0.087 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Horizontal Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>ux</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M <sub>uy</sub> kip-ft	φM <sub>uy</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T1	311.351 - 310.351	6 x 1	-0.72	24.30	0.030	-0.00	4.05	0.000
T19	11.8302 - 9.49947	6 x 3/4	0.00	18.23	0.000	0.00	2.28	0.000
T20	9.49947 - 7.16874	6 x 3/4	0.00	18.23	0.000	0.00	2.28	0.000

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Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{rx}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	$M_{uy}$ kip-ft	$\phi M_{ry}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
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### Horizontal Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	Ratio $\frac{M_{uy}}{\phi M_{ry}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	311.351 - 310.351	6 x 1	0.000	0.030	0.000	0.030	1.000	4.8.1 ✓
T19	11.8302 - 9.49947	6 x 3/4	0.095	0.000	0.000	0.095 <sup>1</sup>	1.000	4.8.1 ✓
T20	9.49947 - 7.16874	6 x 3/4	0.087	0.000	0.000	0.087 <sup>1</sup>	1.000	4.8.1 ✓

<sup>1</sup>  $P_u / \phi P_n$  controls

### Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	$L_u$ ft	$Kl/r$	A in <sup>2</sup>	$P_u$ K	$\phi P_n$ K	Ratio $\frac{P_u}{\phi P_n}$
T2	310.351 - 299.182	1 1/4	5.000	4.771	128.2 K=0.70	1.2272	-0.41	16.86	0.024 <sup>1</sup>
T4	279.182 - 259.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.12	6.90	0.017 <sup>1</sup>
T5	259.182 - 239.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.13	6.90	0.018 <sup>1</sup>
T6	239.182 - 219.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.53	6.90	0.076 <sup>1</sup>
T7	219.182 - 199.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.89	6.90	0.128 <sup>1</sup>
T8	199.182 - 179.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.56	6.90	0.080 <sup>1</sup>
T9	179.182 - 159.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.29	6.90	0.043 <sup>1</sup>
T10	159.182 - 139.182	1 1/4	5.000	4.750	127.7 K=0.70	1.2272	-1.01	17.01	0.059 <sup>1</sup>
T11	139.182 - 119.182	1	5.000	4.750	159.6 K=0.70	0.7854	-1.32	6.97	0.190 <sup>1</sup>
T12	119.182 - 99.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.16	6.97	0.023 <sup>1</sup>
T13	99.1822 - 79.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.85	6.97	0.121 <sup>1</sup>
T14	79.1822 - 59.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.61	6.97	0.087 <sup>1</sup>
T16	39.1822 - 19.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.43	6.97	0.062 <sup>1</sup>
T17	19.1822 -	1 1/4	5.000	4.750	127.7	1.2272	-0.53	17.01	0.031 <sup>1</sup>

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
	14.4112				K=0.70				✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T3	299.182 - 279.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.11	6.90	0.016 <sup>1</sup> ✓
T4	279.182 - 259.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.17	6.90	0.025 <sup>1</sup> ✓
T5	259.182 - 239.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.73	6.90	0.105 <sup>1</sup> ✓
T6	239.182 - 219.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.72	6.90	0.104 <sup>1</sup> ✓
T7	219.182 - 199.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.43	6.90	0.062 <sup>1</sup> ✓
T8	199.182 - 179.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.14	6.90	0.020 <sup>1</sup> ✓
T9	179.182 - 159.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.47	6.90	0.068 <sup>1</sup> ✓
T10	159.182 - 139.182	1 1/4	5.000	4.750	127.7 K=0.70	1.2272	-1.46	17.01	0.086 <sup>1</sup> ✓
T11	139.182 - 119.182	1	5.000	4.750	159.6 K=0.70	0.7854	-0.43	6.97	0.062 <sup>1</sup> ✓
T12	119.182 - 99.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.56	6.97	0.080 <sup>1</sup> ✓
T13	99.1822 - 79.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.93	6.97	0.133 <sup>1</sup> ✓
T14	79.1822 - 59.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.33	6.97	0.048 <sup>1</sup> ✓
T15	59.1822 - 39.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.19	6.97	0.028 <sup>1</sup> ✓
T16	39.1822 - 19.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.41	6.97	0.058 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T5	259.182 - 239.182	1	5.000	4.771	160.3 K=0.70	0.7854	-0.02	6.90	0.003 <sup>1</sup>



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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T11	139.182 - 119.182	1	5.000	4.750	159.6 K=0.70	0.7854	-0.26	6.97	0.037 <sup>1</sup> ✓
T14	79.1822 - 59.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.00	6.97	0.000 <sup>1</sup> ✓
T15	59.1822 - 39.1822	1	5.000	4.750	159.6 K=0.70	0.7854	-0.03	6.97	0.004 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T19	11.8302 - 9.49947	7/8	1.250	1.125	67.9 K=1.10	0.6013	-2.03	19.32	0.105 <sup>1</sup> ✓
T20	9.49947 - 7.16874	7/8	1.250	1.125	67.9 K=1.10	0.6013	-1.95	19.32	0.101 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T20	9.49947 - 7.16874	7/8	1.709	1.538	89.1 K=1.06	0.6013	-2.27	15.14	0.150 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Tension Checks

### Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	311.351 - 310.351	2 3/4	1.000	1.000	17.5	5.9396	9.18	267.28	0.034
T2	310.351 -	2 3/4	11.169	2.719	47.5	5.9396	17.92	267.28	0.067 <sup>1</sup>

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Section No.	Elevation ft	Size	L ft	$L_u$ ft	$Kl/r$	A $in^2$	$P_u$ K	$\phi P_n$ K	Ratio $\frac{P_u}{\phi P_n}$
T3	299.182 - 279.182	2 3/4	20.000	0.667	11.6	5.9396	6.29	267.28	0.024 <sup>1 #</sup>
T4	279.182 - 259.182	2 3/4	20.000	0.667	11.6	5.9396	4.31	267.28	0.016 <sup>1</sup>
T5	259.182 - 239.182	2 3/4	20.000	0.667	11.6	3.4123	12.96	166.35	0.078 <sup>1 #</sup>
T6	239.182 - 219.182	2 3/4	20.000	2.333	40.7	5.9396	19.58	267.28	0.073 <sup>1</sup>
T8	199.182 - 179.182	2 3/4	20.000	2.333	40.7	5.9396	5.10	267.28	0.019 <sup>1</sup>
T9	179.182 - 159.182	2 3/4	20.000	0.667	11.6	5.9396	5.05	267.28	0.019 <sup>1 #</sup>
T10	159.182 - 139.182	3	20.000	0.667	10.7	7.0686	8.45	318.09	0.027 <sup>1</sup>
T11	139.182 - 119.182	3	20.000	0.667	10.7	4.3026	32.71	209.75	0.156 <sup>1 #</sup>
T12	119.182 - 99.1822	3	20.000	2.333	37.3	7.0686	34.80	318.09	0.109 <sup>1</sup>
T13	99.1822 - 79.1822	3	20.000	0.667	10.7	4.3026	17.24	209.75	0.082 <sup>1 #</sup>
T14	79.1822 - 59.1822	3	20.000	0.667	10.7	7.0686	29.47	318.09	0.093 <sup>1</sup>
T15	59.1822 - 39.1822	3	20.000	0.667	10.7	4.3026	20.53	209.75	0.098 <sup>1 #</sup>
T16	39.1822 - 19.1822	3	20.000	0.667	10.7	7.0686	20.51	318.09	0.064 <sup>1</sup>

<sup>1</sup>  $P_u / \phi P_n$  controls

### Leg Bending Design Data (Tension)

Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{ux}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	$M_{uy}$ kip-ft	$\phi M_{uy}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T1	311.351 - 310.351	2 3/4	0.85	13.00	0.065	0.00	13.00	0.000
T2	310.351 - 299.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T3	299.182 - 279.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T4	279.182 - 259.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T5	259.182 - 239.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T6	239.182 - 219.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T8	199.182 - 179.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T9	179.182 - 159.182	2 3/4	0.00	13.00	0.000	0.00	13.00	0.000
T10	159.182 - 139.182	3	0.00	16.88	0.000	0.00	16.88	0.000
T11	139.182 - 119.182	3	0.00	16.88	0.000	0.00	16.88	0.000
T12	119.182 -	3	0.00	16.88	0.000	0.00	16.88	0.000

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Section No.	Elevation ft	Size	$M_{ux}$ kip-ft	$\phi M_{rx}$ kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	$M_{uy}$ kip-ft	$\phi M_{ry}$ kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
T13	99.1822 - 79.1822	3	0.00	16.88	0.000	0.00	16.88	0.000
T14	79.1822 - 59.1822	3	0.00	16.88	0.000	0.00	16.88	0.000
T15	59.1822 - 39.1822	3	0.00	16.88	0.000	0.00	16.88	0.000
T16	39.1822 - 19.1822	3	0.00	16.88	0.000	0.00	16.88	0.000

### Leg Interaction Design Data (Tension)

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	Ratio $\frac{M_{uy}}{\phi M_{ry}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	311.351 - 310.351	2 3/4	0.034	0.065	0.000	0.082	1.000	4.8.1 ✓
T2	310.351 - 299.182	2 3/4	0.067	0.000	0.000	0.067 <sup>1</sup>	1.000	4.8.1 ✓
T3	299.182 - 279.182	2 3/4	0.024	0.000	0.000	0.024 <sup>1#</sup>	1.000	4.8.1 ✓
T4	279.182 - 259.182	2 3/4	0.016	0.000	0.000	0.016 <sup>1</sup>	1.000	4.8.1 ✓
T5	259.182 - 239.182	2 3/4	0.078	0.000	0.000	0.078 <sup>1#</sup>	1.000	4.8.1 ✓
T6	239.182 - 219.182	2 3/4	0.073	0.000	0.000	0.073 <sup>1</sup>	1.000	4.8.1 ✓
T8	199.182 - 179.182	2 3/4	0.019	0.000	0.000	0.019 <sup>1</sup>	1.000	4.8.1 ✓
T9	179.182 - 159.182	2 3/4	0.019	0.000	0.000	0.019 <sup>1#</sup>	1.000	4.8.1 ✓
T10	159.182 - 139.182	3	0.027	0.000	0.000	0.027 <sup>1</sup>	1.000	4.8.1 ✓
T11	139.182 - 119.182	3	0.156	0.000	0.000	0.156 <sup>1#</sup>	1.000	4.8.1 ✓
T12	119.182 - 99.1822	3	0.109	0.000	0.000	0.109 <sup>1</sup>	1.000	4.8.1 ✓
T13	99.1822 - 79.1822	3	0.082	0.000	0.000	0.082 <sup>1#</sup>	1.000	4.8.1 ✓
T14	79.1822 - 59.1822	3	0.093	0.000	0.000	0.093 <sup>1</sup>	1.000	4.8.1 ✓
T15	59.1822 - 39.1822	3	0.098	0.000	0.000	0.098 <sup>1#</sup>	1.000	4.8.1 ✓
T16	39.1822 - 19.1822	3	0.064	0.000	0.000	0.064 <sup>1</sup>	1.000	4.8.1 ✓

<sup>1</sup>  $P_u / \phi P_n$  controls

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### Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T2	310.351 - 299.182	7/8	5.692	2.715	149.0	0.6013	2.36	27.06	0.087 <sup>1</sup>
T3	299.182 - 279.182	7/8	5.518	2.632	144.4	0.6013	1.53	27.06	0.057 <sup>1</sup>
T4	279.182 - 259.182	7/8	5.518	2.632	144.4	0.6013	1.37	27.06	0.050 <sup>1</sup>
T5	259.182 - 239.182	7/8	5.518	2.632	144.4	0.6013	3.25	27.06	0.120 <sup>1</sup>
T6	239.182 - 219.182	7/8	5.518	2.632	144.4	0.6013	3.43	27.06	0.127 <sup>1</sup>
T7	219.182 - 199.182	7/8	5.518	2.632	144.4	0.6013	3.40	27.06	0.126 <sup>1</sup>
T8	199.182 - 179.182	7/8	5.518	2.632	144.4	0.6013	2.48	27.06	0.092 <sup>1</sup>
T9	179.182 - 159.182	7/8	5.518	2.632	144.4	0.6013	3.15	27.06	0.116 <sup>1</sup>
T10	159.182 - 139.182	1	5.518	2.621	125.8	0.7854	5.48	35.34	0.155 <sup>1</sup>
T11	139.182 - 119.182	7/8	5.518	2.621	143.8	0.6013	5.30	27.06	0.196 <sup>1</sup>
T12	119.182 - 99.1822	7/8	5.518	2.621	143.8	0.6013	3.86	27.06	0.143 <sup>1</sup>
T13	99.1822 - 79.1822	7/8	5.518	2.621	143.8	0.6013	4.31	27.06	0.159 <sup>1</sup>
T14	79.1822 - 59.1822	7/8	5.518	2.621	143.8	0.6013	3.82	27.06	0.141 <sup>1</sup>
T15	59.1822 - 39.1822	7/8	5.518	2.621	143.8	0.6013	2.26	27.06	0.084 <sup>1</sup>
T16	39.1822 - 19.1822	7/8	5.518	2.621	143.8	0.6013	3.55	27.06	0.131 <sup>1</sup>
T17	19.1822 - 14.4112	1	5.505	2.615	125.5	0.7854	3.47	35.34	0.098 <sup>1</sup>
T18	14.4112 - 11.8302	1	5.627	2.673	128.3	0.7854	2.88	35.34	0.082 <sup>1</sup>
T19	11.8302 - 9.49947	1 1/4	3.418	3.247	124.7	1.2272	4.23	55.22	0.077 <sup>1</sup>
T20	9.49947 - 7.16874	1 1/4	3.418	3.247	124.7	1.2272	4.72	55.22	0.086 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T1	311.351 -	6 x 1	5.000	4.771	198.3	6.0000	0.00	194.40	0.000

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T19	310.351 11.8302 - 9.49947	6 x 3/4	5.000	3.563	197.5	4.5000	3.89	145.80	0.027 <sup>1</sup>
T20	9.49947 - 7.16874	6 x 3/4	5.000	3.563	197.5	4.5000	24.17	145.80	0.166 <sup>1</sup>
T21	7.16874 - 1.2	6 x 3/4	4.791	4.541	251.7	4.5000	12.21	145.80	0.084 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Horizontal Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>ux</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M <sub>uy</sub> kip-ft	φM <sub>uy</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T1	311.351 - 310.351	6 x 1	-0.72	24.30	0.030	-0.00	4.05	0.000
T19	11.8302 - 9.49947	6 x 3/4	0.00	18.23	0.000	0.00	2.28	0.000
T20	9.49947 - 7.16874	6 x 3/4	0.00	18.23	0.000	0.00	2.28	0.000
T21	7.16874 - 1.2	6 x 3/4	0.00	18.23	0.000	0.00	2.28	0.000

### Horizontal Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	311.351 - 310.351	6 x 1	0.000	0.030	0.000	0.030	1.000	4.8.1 ✓
T19	11.8302 - 9.49947	6 x 3/4	0.027	0.000	0.000	0.027 <sup>1</sup>	1.000	4.8.1 ✓
T20	9.49947 - 7.16874	6 x 3/4	0.166	0.000	0.000	0.166 <sup>1</sup>	1.000	4.8.1 ✓
T21	7.16874 - 1.2	6 x 3/4	0.084	0.000	0.000	0.084 <sup>1</sup>	1.000	4.8.1 ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T2	310.351 - 299.182	1 1/4	5.000	4.771	183.2	1.2272	1.03	55.22	0.019 <sup>1</sup> ✓

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T3	299.182 - 279.182	1	5.000	4.771	229.0	0.7854	0.84	35.34	0.024 <sup>1</sup>
T4	279.182 - 259.182	1	5.000	4.771	229.0	0.7854	0.19	35.34	0.005 <sup>1</sup>
T5	259.182 - 239.182	1	5.000	4.771	229.0	0.7854	0.22	35.34	0.006 <sup>1</sup>
T6	239.182 - 219.182	1	5.000	4.771	229.0	0.7854	0.69	35.34	0.020 <sup>1</sup>
T7	219.182 - 199.182	1	5.000	4.771	229.0	0.7854	0.95	35.34	0.027 <sup>1</sup>
T8	199.182 - 179.182	1	5.000	4.771	229.0	0.7854	0.60	35.34	0.017 <sup>1</sup>
T9	179.182 - 159.182	1	5.000	4.771	229.0	0.7854	0.42	35.34	0.012 <sup>1</sup>
T10	159.182 - 139.182	1 1/4	5.000	4.750	182.4	1.2272	1.13	55.22	0.020 <sup>1</sup>
T11	139.182 - 119.182	1	5.000	4.750	228.0	0.7854	1.53	35.34	0.043 <sup>1</sup>
T12	119.182 - 99.1822	1	5.000	4.750	228.0	0.7854	0.39	35.34	0.011 <sup>1</sup>
T13	99.1822 - 79.1822	1	5.000	4.750	228.0	0.7854	1.13	35.34	0.032 <sup>1</sup>
T14	79.1822 - 59.1822	1	5.000	4.750	228.0	0.7854	1.09	35.34	0.031 <sup>1</sup>
T15	59.1822 - 39.1822	1	5.000	4.750	228.0	0.7854	0.46	35.34	0.013 <sup>1</sup>
T16	39.1822 - 19.1822	1	5.000	4.750	228.0	0.7854	0.92	35.34	0.026 <sup>1</sup>
T17	19.1822 - 14.4112	1 1/4	5.000	4.750	182.4	1.2272	1.35	55.22	0.024 <sup>1</sup>
T18	14.4112 - 11.8302	7/8	5.000	4.750	260.6	0.6013	1.71	27.06	0.063 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T2	310.351 - 299.182	1 1/4	5.000	4.771	183.2	1.2272	6.29	55.22	0.114 <sup>1</sup>
T3	299.182 - 279.182	1	5.000	4.771	229.0	0.7854	0.27	35.34	0.008 <sup>1</sup>
T4	279.182 - 259.182	1	5.000	4.771	229.0	0.7854	0.25	35.34	0.007 <sup>1</sup>
T5	259.182 - 239.182	1	5.000	4.771	229.0	0.7854	0.80	35.34	0.023 <sup>1</sup>
T6	239.182 - 219.182	1	5.000	4.771	229.0	0.7854	1.06	35.34	0.030 <sup>1</sup>

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T7	219.182 - 199.182	1	5.000	4.771	229.0	0.7854	0.75	35.34	0.021 <sup>1</sup> ✓
T8	199.182 - 179.182	1	5.000	4.771	229.0	0.7854	0.40	35.34	0.011 <sup>1</sup> ✓
T9	179.182 - 159.182	1	5.000	4.771	229.0	0.7854	0.85	35.34	0.024 <sup>1</sup> ✓
T10	159.182 - 139.182	1 1/4	5.000	4.750	182.4	1.2272	1.92	55.22	0.035 <sup>1</sup> ✓
T11	139.182 - 119.182	1	5.000	4.750	228.0	0.7854	0.80	35.34	0.023 <sup>1</sup> ✓
T12	119.182 - 99.1822	1	5.000	4.750	228.0	0.7854	0.97	35.34	0.027 <sup>1</sup> ✓
T13	99.1822 - 79.1822	1	5.000	4.750	228.0	0.7854	1.16	35.34	0.033 <sup>1</sup> ✓
T14	79.1822 - 59.1822	1	5.000	4.750	228.0	0.7854	0.58	35.34	0.017 <sup>1</sup> ✓
T15	59.1822 - 39.1822	1	5.000	4.750	228.0	0.7854	0.52	35.34	0.015 <sup>1</sup> ✓
T16	39.1822 - 19.1822	1	5.000	4.750	228.0	0.7854	0.78	35.34	0.022 <sup>1</sup> ✓
T21	7.16874 - 1.2	6 x 3/4	0.428	0.178	9.8	4.5000	10.81	145.80	0.074 <sup>1</sup> ✓

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T3	299.182 - 279.182	1	5.000	4.771	229.0	0.7854	0.19	35.34	0.005 <sup>1</sup> ✓
T4	279.182 - 259.182	1	5.000	4.771	229.0	0.7854	0.20	35.34	0.006 <sup>1</sup> ✓
T5	259.182 - 239.182	1	5.000	4.771	229.0	0.7854	0.21	35.34	0.006 <sup>1</sup> ✓
T6	239.182 - 219.182	1	5.000	4.771	229.0	0.7854	7.00	35.34	0.198 <sup>1</sup> ✓
T7	219.182 - 199.182	1	5.000	4.771	229.0	0.7854	0.40	35.34	0.011 <sup>1</sup> ✓
T8	199.182 - 179.182	1	5.000	4.771	229.0	0.7854	0.45	35.34	0.013 <sup>1</sup> ✓
T9	179.182 - 159.182	1	5.000	4.771	229.0	0.7854	0.47	35.34	0.013 <sup>1</sup> ✓
T10	159.182 - 139.182	1 1/4	5.000	4.750	182.4	1.2272	9.00	55.22	0.163 <sup>1</sup> ✓
T11	139.182 - 119.182	1	5.000	4.750	228.0	0.7854	0.86	35.34	0.024 <sup>1</sup> ✓

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Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T12	119.182 - 99.1822	1	5.000	4.750	228.0	0.7854	0.71	35.34	0.020 <sup>1</sup>
T13	99.1822 - 79.1822	1	5.000	4.750	228.0	0.7854	8.02	35.34	0.227 <sup>1</sup>
T14	79.1822 - 59.1822	1	5.000	4.750	228.0	0.7854	0.84	35.34	0.024 <sup>1</sup>
T15	59.1822 - 39.1822	1	5.000	4.750	228.0	0.7854	0.88	35.34	0.025 <sup>1</sup>
T16	39.1822 - 19.1822	1	5.000	4.750	228.0	0.7854	0.88	35.34	0.025 <sup>1</sup>
T17	19.1822 - 14.4112	7/8	5.000	4.750	260.6	0.6013	1.51	27.06	0.056 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T19	11.8302 - 9.49947	7/8	1.250	1.125	61.7	0.6013	2.03	27.06	0.075 <sup>1</sup>
T20	9.49947 - 7.16874	7/8	1.250	1.125	61.7	0.6013	3.27	27.06	0.121 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	Kl/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
T20	9.49947 - 7.16874	7/8	1.709	1.538	84.4	0.6013	1.33	27.06	0.049 <sup>1</sup>

<sup>1</sup> P<sub>u</sub> / φP<sub>n</sub> controls

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	φP <sub>allow</sub> K	% Capacity	Pass Fail
L1	346.351 - 329.351	Pole	P10x.365 (10.75 OD)	1	-1.30	375.11	12.1	Pass
L2	329.351 -	Pole	P10x.365 (10.75 OD)	2	-2.23	375.11	46.6	Pass



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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
T1	311.351 311.351 - 310.351	Leg	2 3/4	3	8.94	267.28	12.0	Pass
T2	310.351 - 299.182	Leg	2 3/4	10	-21.06	226.69	9.3	Pass
T3	299.182 - 279.182	Leg	2 3/4	43	-25.24	236.75	10.7	Pass
T4	279.182 - 259.182	Leg	2 3/4	103	-26.74	236.75	11.3	Pass
T5	259.182 - 239.182	Leg	2 3/4	163	-35.53	236.75	15.0 15.2 (b)	Pass
T6	239.182 - 219.182	Leg	2 3/4	223	-49.00	236.75	20.7	Pass
T7	219.182 - 199.182	Leg	2 3/4	284	-54.67	236.75	23.1	Pass
T8	199.182 - 179.182	Leg	2 3/4	344	-61.76	236.75	26.1	Pass
T9	179.182 - 159.182	Leg	2 3/4	404	-67.76	236.75	28.6	Pass
T10	159.182 - 139.182	Leg	3	464	-82.96	287.27	28.9	Pass
T11	139.182 - 119.182	Leg	3	524	-95.66	287.27	33.3 39.6 (b)	Pass
T12	119.182 - 99.1822	Leg	3	584	-101.27	287.27	35.3	Pass
T13	99.1822 - 79.1822	Leg	3	644	-108.97	287.27	37.9 45.3 (b)	Pass
T14	79.1822 - 59.1822	Leg	3	704	-119.70	287.27	41.7	Pass
T15	59.1822 - 39.1822	Leg	3	764	-123.90	287.27	43.1 50.8 (b)	Pass
T16	39.1822 - 19.1822	Leg	3	824	-123.61	287.27	43.0	Pass
T17	19.1822 - 14.4112	Leg	3	884	-119.11	288.05	41.4 48.7 (b)	Pass
T18	14.4112 - 11.8302	Leg	3	905	-116.64	280.80	41.5	Pass
T19	11.8302 - 9.49947	Leg	3	917	-117.44	310.10	37.9 48.2 (b)	Pass
T20	9.49947 - 7.16874	Leg	3	934	-112.65	310.10	36.3 46.3 (b)	Pass
T21	7.16874 - 1.2	Leg	3	958	-120.71	271.97	44.4	Pass
T2	310.351 - 299.182	Diagonal	7/8	25	-2.18	7.56	28.9	Pass
T3	299.182 - 279.182	Diagonal	7/8	101	-1.58	8.04	19.6	Pass
T4	279.182 - 259.182	Diagonal	7/8	114	-1.48	8.04	18.5	Pass
T5	259.182 - 239.182	Diagonal	7/8	174	-3.31	8.04	41.2	Pass
T6	239.182 - 219.182	Diagonal	7/8	238	-3.71	8.04	46.2	Pass
T7	219.182 - 199.182	Diagonal	7/8	340	-3.57	8.04	44.4	Pass
T8	199.182 - 179.182	Diagonal	7/8	400	-2.73	8.04	34.0	Pass
T9	179.182 - 159.182	Diagonal	7/8	414	-3.26	8.04	40.6	Pass
T10	159.182 - 139.182	Diagonal	1	479	-5.81	13.84	42.0	Pass
T11	139.182 -	Diagonal	7/8	581	-5.51	8.11	67.9	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
T12	119.182 119.182 - 99.1822	Diagonal	7/8	594	-4.07	8.11	50.2	Pass
T13	99.1822 - 79.1822	Diagonal	7/8	659	-4.33	8.11	53.4	Pass
T14	79.1822 - 59.1822	Diagonal	7/8	761	-4.11	8.11	50.6	Pass
T15	59.1822 - 39.1822	Diagonal	7/8	774	-2.47	8.11	30.4	Pass
T16	39.1822 - 19.1822	Diagonal	7/8	834	-3.73	8.11	46.0	Pass
T17	19.1822 - 14.4112	Diagonal	1	897	-4.32	13.90	31.0	Pass
T18	14.4112 - 11.8302	Diagonal	1	909	-4.03	13.31	30.3	Pass
T19	11.8302 - 9.49947	Diagonal	1 1/4	919	-4.37	31.64	13.8	Pass
T20	9.49947 - 7.16874	Diagonal	1 1/4	940	-4.96	31.64	15.7	Pass
T21	7.16874 - 1.2	Diagonal	1 1/4	966	-16.53	28.14	58.8	Pass
T1	311.351 - 310.351	Horizontal	6 x 1	7	0.00	194.40	3.0	Pass
T19	11.8302 - 9.49947	Horizontal	6 x 3/4	918	-2.47	26.07	9.5	Pass
T20	9.49947 - 7.16874	Horizontal	6 x 3/4	936	24.17	145.80	16.6	Pass
T21	7.16874 - 1.2	Horizontal	6 x 3/4	961	12.21	145.80	8.4	Pass
T2	310.351 - 299.182	Top Girt	1 1/4	12	-0.41	16.86	2.4	Pass
T3	299.182 - 279.182	Top Girt	1	45	0.84	35.34	2.4	Pass
T4	279.182 - 259.182	Top Girt	1	105	-0.12	6.90	1.7	Pass
T5	259.182 - 239.182	Top Girt	1	167	-0.13	6.90	1.8	Pass
T6	239.182 - 219.182	Top Girt	1	226	-0.53	6.90	7.6	Pass
T7	219.182 - 199.182	Top Girt	1	286	-0.89	6.90	12.8	Pass
T8	199.182 - 179.182	Top Girt	1	346	-0.56	6.90	8.0	Pass
T9	179.182 - 159.182	Top Girt	1	407	-0.29	6.90	4.3	Pass
T10	159.182 - 139.182	Top Girt	1 1/4	467	-1.01	17.01	5.9	Pass
T11	139.182 - 119.182	Top Girt	1	527	-1.32	6.97	19.0	Pass
T12	119.182 - 99.1822	Top Girt	1	587	-0.16	6.97	2.3	Pass
T13	99.1822 - 79.1822	Top Girt	1	645	-0.85	6.97	12.1	Pass
T14	79.1822 - 59.1822	Top Girt	1	705	-0.61	6.97	8.7	Pass
T15	59.1822 - 39.1822	Top Girt	1	766	0.46	35.34	1.3	Pass
T16	39.1822 - 19.1822	Top Girt	1	825	-0.43	6.97	6.2	Pass
T17	19.1822 - 14.4112	Top Girt	1 1/4	885	-0.53	17.01	3.1	Pass
T18	14.4112 - 11.8302	Top Girt	7/8	907	1.71	27.06	6.3	Pass

**tnxTower**

**FDH Velocitel**  
 6521 Meridien Drive, Suite 107  
 Raleigh, North Carolina 27616  
 Phone: 9197551012  
 FAX: 9197551031

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<b>Project</b>	16PVUB1400	<b>Date</b>	14:48:13 11/09/16
<b>Client</b>	SBA Network Services, Inc.	<b>Designed by</b>	PHicks

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
T2	310.351 - 299.182	Bottom Girt	1 1/4	17	6.29	55.22	11.4	Pass
T3	299.182 - 279.182	Bottom Girt	1	49	-0.11	6.90	1.6	Pass
T4	279.182 - 259.182	Bottom Girt	1	108	-0.17	6.90	2.5	Pass
T5	259.182 - 239.182	Bottom Girt	1	169	-0.73	6.90	10.5	Pass
T6	239.182 - 219.182	Bottom Girt	1	228	-0.72	6.90	10.4	Pass
T7	219.182 - 199.182	Bottom Girt	1	288	-0.43	6.90	6.2	Pass
T8	199.182 - 179.182	Bottom Girt	1	348	-0.14	6.90	2.0	Pass
T9	179.182 - 159.182	Bottom Girt	1	408	-0.47	6.90	6.8	Pass
T10	159.182 - 139.182	Bottom Girt	1 1/4	468	-1.46	17.01	8.6	Pass
T11	139.182 - 119.182	Bottom Girt	1	528	-0.43	6.97	6.2	Pass
T12	119.182 - 99.1822	Bottom Girt	1	588	-0.56	6.97	8.0	Pass
T13	99.1822 - 79.1822	Bottom Girt	1	649	-0.93	6.97	13.3	Pass
T14	79.1822 - 59.1822	Bottom Girt	1	709	-0.33	6.97	4.8	Pass
T15	59.1822 - 39.1822	Bottom Girt	1	769	-0.19	6.97	2.8	Pass
T16	39.1822 - 19.1822	Bottom Girt	1	829	-0.41	6.97	5.8	Pass
T21	7.16874 - 1.2	Bottom Girt	6 x 3/4	964	10.81	145.80	7.4	Pass
T3	299.182 - 279.182	Mid Girt	1	51	0.19	35.34	0.5	Pass
T4	279.182 - 259.182	Mid Girt	1	111	0.20	35.34	0.6	Pass
T5	259.182 - 239.182	Mid Girt	1	171	0.21	35.34	0.6	Pass
T6	239.182 - 219.182	Mid Girt	1	233	7.00	35.34	19.8	Pass
T7	219.182 - 199.182	Mid Girt	1	292	0.40	35.34	1.1	Pass
T8	199.182 - 179.182	Mid Girt	1	352	0.45	35.34	1.3	Pass
T9	179.182 - 159.182	Mid Girt	1	412	0.47	35.34	1.3	Pass
T10	159.182 - 139.182	Mid Girt	1 1/4	471	9.00	55.22	16.3	Pass
T11	139.182 - 119.182	Mid Girt	1	531	-0.26	6.97	3.7	Pass
T12	119.182 - 99.1822	Mid Girt	1	592	0.71	35.34	2.0	Pass
T13	99.1822 - 79.1822	Mid Girt	1	651	8.02	35.34	22.7	Pass
T14	79.1822 - 59.1822	Mid Girt	1	712	0.84	35.34	2.4	Pass
T15	59.1822 - 39.1822	Mid Girt	1	772	0.88	35.34	2.5	Pass
T16	39.1822 - 19.1822	Mid Girt	1	832	0.88	35.34	2.5	Pass
T17	19.1822 - 14.4112	Mid Girt	7/8	888	1.51	27.06	5.6	Pass

<p><b>tnxTower</b></p> <p><b>FDH Velocitel</b> 6521 Meridien Drive, Suite 107 Raleigh, North Carolina 27616 Phone: 9197551012 FAX: 9197551031</p>	<p><b>Job</b></p> <p>West Hartford, CT15879-A-05</p>	<p><b>Page</b></p> <p>56 of 57</p>
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	<p><b>Client</b></p> <p>SBA Network Services, Inc.</p>	<p><b>Designed by</b></p> <p>PHicks</p>

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
T19	11.8302 - 9.49947	Redund Horz 1 Bracing	7/8	927	-2.03	19.32	10.5	Pass
T20	9.49947 - 7.16874	Redund Horz 1 Bracing	7/8	938	3.27	27.06	12.1	Pass
T20	9.49947 - 7.16874	Redund Diag 1 Bracing	7/8	939	-2.27	15.14	15.0	Pass
T3	299.182 - 279.182	Guy A@299.182	13/16	983	22.19	48.00	46.2	Pass
T6	239.182 - 219.182	Guy A@229.182	7/8	986	24.33	55.20	44.1	Pass
T10	159.182 - 139.182	Guy A@149.182	13/16	989	25.23	48.00	52.6	Pass
T13	99.1822 - 79.1822	Guy A@89.1822	3/4	992	22.35	40.80	54.8	Pass
T3	299.182 - 279.182	Guy B@299.182	3/4	982	23.92	40.80	58.6	Pass
T6	239.182 - 219.182	Guy B@229.182	13/16	985	25.57	48.00	53.3	Pass
T10	159.182 - 139.182	Guy B@149.182	7/8	988	28.30	55.20	51.3	Pass
T13	99.1822 - 79.1822	Guy B@89.1822	13/16	991	24.21	48.00	50.4	Pass
T3	299.182 - 279.182	Guy C@299.182	3/4	981	22.20	40.80	54.4	Pass
T6	239.182 - 219.182	Guy C@229.182	13/16	984	23.47	48.00	48.9	Pass
T10	159.182 - 139.182	Guy C@149.182	7/8	987	26.61	55.20	48.2	Pass
T13	99.1822 - 79.1822	Guy C@89.1822	13/16	990	23.03	48.00	48.0	Pass
						Summary		
						Pole (L2)	46.6	Pass
						Leg (T15)	50.8	Pass
						Diagonal (T11)	67.9	Pass
						Horizontal (T20)	16.6	Pass
						Top Girt (T11)	19.0	Pass
						Bottom Girt (T13)	13.3	Pass
						Mid Girt (T13)	22.7	Pass
						Redund Horz 1 Bracing (T20)	12.1	Pass
						Redund Diag 1 Bracing (T20)	15.0	Pass
						Guy A (T13)	54.8	Pass
						Guy B (T3)	58.6	Pass
						Guy C (T3)	54.4	Pass
						Bolt Checks	50.8	Pass
						<b>RATING =</b>	<b>67.9</b>	<b>Pass</b>

<b><i>tnxTower</i></b>  <b><i>FDH Velocitel</i></b> 6521 Meridien Drive, Suite 107 Raleigh, North Carolina 27606 Phone: 9197551031 FAX: 9197551031	<b>Job</b> West Hartford, CT15879-A-05	<b>Page</b> 57 of 57
	<b>Project</b> 16PVUB1400	<b>Date</b> 14:48:13 11/09/16
Program Version: 16.0.0.2704 File://full-server/Projects/2016 Effective - Client Jobs/SBANET_SBA Network Services, Inc/CT/West Hartford/16PVUB1400STR00_ATT/R.0/Analysis/ReportedTower/SBANET_SBA Network Services, Inc/T_TNX_08-12-2016.eri	<b>Client</b> SBANET_SBA Network Services, Inc	<b>Designed by</b> PHicks

## Guyed Tower Pad & Pier Calculator

### Project & Site Details

Project No.	16PVUB1400	Rev.	0
Project Name	West Hartford		
Site ID	CT15879-A		
Date	Wednesday, November 09, 2016		
Code	ANSI/TIA-222-G		
Overstress Capacity, Soil	110%		
Overstress Capacity, Steel	105%		

### Foundation Information

Density Concrete	0.15	kcf
Pier Shape	Round	-
Pier Diameter, d	2.3	ft
Pier Height Above Grade, ext	0.5	ft
Pad Width, W	7.5	ft
Pad Thickness, T	1.7	ft
Pad Bearing Depth, D	3.5	ft
Has is been Modified?	No	-

### Soil Information

Ultimate Bearing Capacity, Net	50	ksf	Boring Log
# of Layers Above Pad	1	-	B-1
Average Soil Unit Weight	170	pcf	
Soil Layer stop at Top of Pad	TRUE	Depth	1.8'

Layer	Depth at Bottom (ft)	Unit Weight (pcf)	Layer Thickness (ft)
1	1.8	170	1.8

### Pad Steel Information

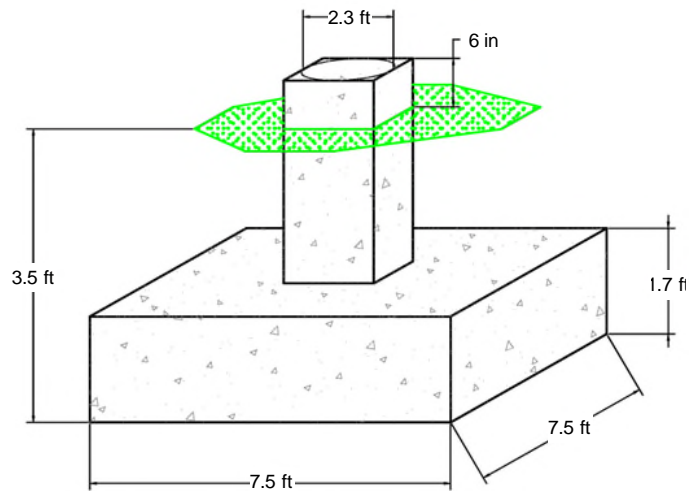
Horizontal Bar Size	#8	-
Pad Bar Diameter, d <sub>b</sub>	1	in
Number of Horizontal Bars, n	4	-
Strength of Concrete, f <sub>c</sub> '	3000	psi
Clear Cover, c <sub>c, pad</sub>	3	in
Yield Strength of Steel, F <sub>y</sub>	60	ksi

### Pier Steel Information

Vertical Bar Size	#7	-
Pier Bar Diameter, d <sub>v</sub>	0.875	in
Number of Vertical Bars, n <sub>v</sub>	5	-
Tie Size	#3	-
Tie Bar Diameter, d <sub>t</sub>	0.375	in
Clear Cover, c <sub>c, pier</sub>	3	in

### Tower Reactions

Shear Load, V <sub>TNX</sub>	8	k
Axial Load, P <sub>TNX</sub>	340	k



### Soil Bearing Capacity

Weight of Concrete	15.8	k
Axial Force, P <sub>u</sub>	337.5	k
Axial Bearing Stress, q <sub>u</sub>	6.5	ksf
Allowable Bearing Stress, Φq <sub>n</sub>	30.0	ksf
<b>Bearing Capacity</b>	<b>21.5%</b>	<b>PASS</b>

### Pad Steel Capacities

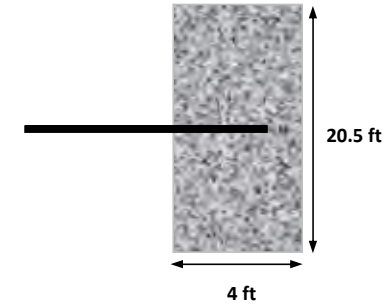
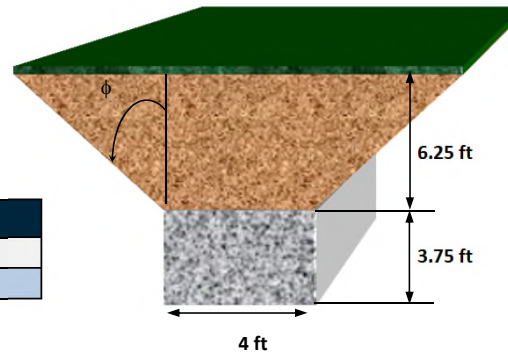
One-Way Critical Shear, V <sub>crit</sub>	61.2	k
Nominal Shear Strength, ΦV <sub>n</sub>	117.6	k
<b>One-Way Shear Capacity</b>	<b>52.0%</b>	<b>PASS</b>
Two-Way Critical Shear, V <sub>crit</sub>	65.2	k
Nominal Shear Strength, ΦV <sub>n</sub>	113.6	k
<b>Two-Way Shear Capacity</b>	<b>57.4%</b>	<b>PASS</b>
Moment at Edge of Pier, M <sub>u</sub>	161.4	k-ft
Nominal Flexural Strength, ΦM <sub>n</sub>	219.0	k-ft
<b>Steel Yielding?</b>	<b>OK</b>	
<b>Pad Flexural Capacity</b>	<b>73.7%</b>	<b>PASS</b>

### Pier Steel Capacities

Axial Compressive Load, P <sub>u</sub>	340.0	k
Nominal Compressive Strength, ΦP <sub>n</sub>	883.1	k
<b>Compressive Capacity</b>	<b>38.5%</b>	<b>PASS</b>
Reinforcement Stress, f <sub>t</sub>	14.7	ksi
Allowable Stress, F <sub>t</sub>	54.0	ksi
<b>Bending Capacity</b>	<b>27.3%</b>	<b>PASS</b>

## Guy Anchor Block Foundation Calculator

Project & Site Details	
Project No.	16PVUB1400
Project Name	West Hartford
Site ID	CT15879-A
Date	Wednesday, November 09, 2016
Code	ANSI/TIA-222-G



Anchor Block Information			
Density Concrete	150	pcf	Anchor
Length	20.5	ft	Outer
Width	4	ft	
Thickness	3.75	ft	
Depth to Top of Block	6.25	ft	
Anchor Angle from Grade	37	°	

Soil Information			
Frost Depth	3.33	ft	Boring Log
Water Table Depth	99	ft	B-2/3/4
Consider Lateral Passive Pressure within the Frost Depth?	Partial		
# of Layers Above Anchor:	2	Must Be Int. >=1,<=7	
# of Layers Adjacent Anchor:	1	Must Be Int. >=1,<=7	Soil Layers OK?
Total # of Layers:	3	Must Be Int. >=2,<=8	Yes

Layer	Depth at Bottom (ft)	Soil Type (C/S)	Unit Weight (pcf)	Thickness (ft)	Friction Angle (°)	Cohesion (psf)
1	3.33	S	135	3.33	30	0
2	6.25	S	135	2.92	30	0
3	10	S	135	3.75	30	0

Uplift Capacity		
Anchor Uplift	44	k
Allowable Uplift Load	255.2	k
Capacity	17.2%	Pass

Lateral Capacity		
Anchor Lateral	75	k
Allowable Lateral Load	236.36	k
Capacity	31.7%	Pass

Anchor Shaft Capacity		
Anchor Tension	87	k
No. of Anchors	2	-
Anchor Type	Solid Rod	-
Cross Sectional Area	3.976	in <sup>2</sup>
Yield Strength, F <sub>y</sub>	36	ksi
Factor (LRFD)	0.8	-
Allowable Tension	229.0	k
Capacity	38.0%	Pass