

Structural Analysis Report For a 100-ft Guyed Tower

Site Name: West Hartford Center CT
Site No.: 467475
Site Address: 14-20 Isham Road
West Hartford, CT 06107

Prepared for:
Verizon Wireless
99 East River Drive
East Hartford, CT 06108


March 6, 2019

Prepared by:
Dewberry Engineers Inc.
600 Parsippany Road, Suite 301
Parsippany, NJ 07054
Dewberry Project Number: 50104156

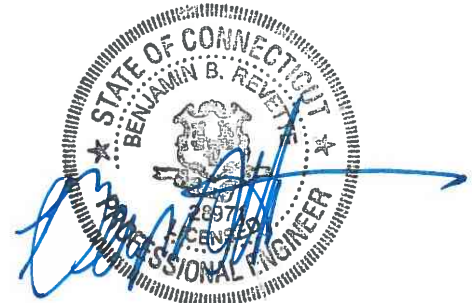
Tower Controlling Member	% Capacity	Pass/Fail
Tower Components	65.7	Pass
Foundation	73.0	Pass

Tower/Foundation Previously Reinforced?	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/>
Previous Reinforcement Verified?	YES <input type="checkbox"/> / NO <input type="checkbox"/> Date: N/A
Reinforcement Required?	YES <input type="checkbox"/> / NO <input checked="" type="checkbox"/>

Prepared by:


Brandon Kelsey
Structural Engineer

Reviewed by:



Benjamin Revette, P.E.
Connecticut Professional Engineer
License No.: 28971

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1.0 INTRODUCTION AND PROJECT SUMMARY

The objective of this report is to provide the structural analysis for the existing 100-ft Guyed tower on top of the existing 25-ft tall building located in West Hartford, CT to determine the structural integrity for the structure and foundation with the existing + proposed equipment. The telecommunication upgrade is proposed by Verizon Wireless.

Please refer to appendices for the structural analysis package regarding the structural analysis.

2.0 CODES, STANDARDS, AND REFERENCES

The structural analysis was completed according to the provisions of the following Codes and standards:

- TIA/EIA-222-G-2005, Structural Standard for Steel Antenna Supporting Structures and Antennas.
- International Building Code, 2015
- 2018 Connecticut State Building Code – Amendments to IBC 2015
- American Institute of Steel Construction *AISC 360-05, Specifications for Structural Steel Buildings*

The analysis was in compliance with the minimum requirements as specified by TIA-222-G for Hartford County, CT under the following load parameters:

- 97 mph basic wind velocity without ice
- 1" radial ice
- 50 mph basic wind velocity with ice
- 60 mph under service loads

The tower geometry, member sizes, existing antenna loading, and foundation design loading were referenced from the following reports, all of which can be found in Appendix B:

- Original Tower Design Drawings by Cianci & Cianci dated October 22, 1997.
- Tower Mapping Report by GPD Group dated July 9, 2012.
- Structural Tower Analysis by Centek dated July 22, 2016.
- RFDS by Verizon Wireless dated June 25, 2018.
- Site Visit notes by Dewberry Engineers Inc. dated July 23, 2018.

3.0 EXISTING AND PROPOSED TOWER LOADING

3.1 EXISTING (includes Reserved, if applicable) Antenna and Cable information:

Mounting Elevation (ft)	Center Line Elevation (ft)	QTY.	APPURTENANCES DESCRIPTION	COAX	
125	141	1	12' Omni	(2) 1-5/8" (1) 7/8"	
	130	1	4 Bay Dipole		
		1	10' Omni		
	128	1	6' Omni		
122	123.5	3	LLPX310R-V1	(12) 1-1/4" (1) 2" Flex Conduit (3) 7/8"	
	122	3	Samsung SP1-22132825WB RRH		
		1	2'x2'x1' Junction Box		
		1	VHLP1-23		
		3	13' Standoff Mount		
119	119	1	VHLP1-23	(2) 1/2"	
118	118	1	VHLP1-23		
106	115	3*	AWS RRH 4x45 (B66a)	(12) 1-5/8" (2) Hybrids	
	114	2	DB-T1-6Z-12AB-OZ OVP		
	111	3*	1900 RRH 4x30 (B25)		
	111	3*	700 RRH 4x30 (B13)		
	107	1	1		BXA-171063-12CF
		6	6		SBNHH-1D65B
		1	1		BXA-171085-8CF
		1	1		BXA-80063/4CF
		4	4		SACP 2x5516
		2	2		SWCP 2x5514
		106	3		Valmont 12' Lightweight T-Frame
69	69	1	4' Yagi	(1) 1/2"	
55	55	1	4' Yagi	(1) 1/2" (1) 1-5/8"	
32	32	1	2'x2'x1' Junction Box		

*(9) RRHs to be removed and replaced

3.2 PROPOSED Antenna Loading and Cable information:

Mounting Elevation (ft)	Center Line Elevation (ft)	QTY.	APPURTENANCES DESCRIPTION	COAX
106	111	3	B5/B13 RRH	-
		3	B2/B66a RRH	

3.3 Method:

tnxTower, a commercially available engineering software program, was used to create a theoretical mathematical model of the tower members and calculate primary member stresses under various loading conditions. Selected output from the analysis is included in Appendix A.

4.0 TOWER ANALYSIS RESULTS SUMMARY

4.1 Tower Structure Results

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	125 - 105	Leg	2	2	-16241.10	74093.50	21.9	Pass
		Diagonal	7/8	40	-2357.90	9631.38	24.5	Pass
		Horizontal	L2x2x3/16	17	1814.74	23166.00	7.8	Pass
		Top Girt	L2x2x3/16	5	157.38	18739.00	0.8	Pass
		Bottom Girt	L2x2x3/16	8	847.40	23166.00	3.7	Pass
		Guy A@116.958	3/4	258	18436.30	34980.00	52.7	Pass
		Guy B@116.958	3/4	257	20039.50	34980.00	57.3	Pass
		Guy C@116.958	3/4	256	19577.70	34980.00	56.0	Pass
		Top Guy Pull-Off@116.958	3" x 1/4" Plate	35	2484.12	24300.00	21.2	Pass
T2	105 - 85	Leg	2	54	-45727.90	74093.50	61.7	Pass
		Diagonal	7/8	64	-5634.81	9631.38	58.5	Pass
		Horizontal	L2x2x3/16	68	2253.60	23166.00	9.7	Pass
		Top Girt	L2x2x3/16	55	1459.91	18739.00	7.8	Pass
		Bottom Girt	L2x2x3/16	59	2094.34	23166.00	9.0	Pass
T3	85 - 65	Leg	2 1/4	105	-70546.00	107392.00	65.7	Pass
		Diagonal	7/8	151	-5967.60	9729.92	61.3	Pass
		Horizontal	L2x2x3/16	119	2965.63	23166.00	12.8	Pass
		Top Girt	L2x2x3/16	107	804.15	18739.00	4.3	Pass
		Bottom Girt	L2x2x3/16	110	1311.36	23166.00	5.7	Pass
		Guy A@76.9583	7/8	261	22898.10	47820.00	47.9	Pass
		Guy B@76.9583	7/8	260	26011.30	47820.00	54.4	Pass
		Guy C@76.9583	7/8	259	24582.70	47820.00	51.4	Pass
Top Guy Pull-Off@76.9583	3" x 1/4" Plate	136	7254.38	24300.00	29.9	Pass		
T4	65 - 45	Leg	2	156	-46576.10	74093.50	62.9	Pass
		Diagonal	7/8	204	-4839.71	9631.38	50.2	Pass
		Horizontal	L2x2x1/8	197	2947.56	15693.80	18.8	Pass
		Top Girt	L2x2x1/8	158	1842.66	15693.80	11.7	Pass
		Bottom Girt	L2x2x1/8	160	1537.32	15693.80	9.8	Pass
T5	45 - 29	Leg	2	207	-31415.50	74603.20	42.1	Pass
		Diagonal	7/8	246	-2921.46	9676.41	30.2	Pass
		Horizontal	L2x2x1/8	239	2869.30	15693.80	18.3	Pass
		Top Girt	L2x2x1/8	209	1592.61	15693.80	10.1	Pass
		Bottom Girt	L2x2x1/8	211	5132.28	15693.80	32.7	Pass
T6	29 - 25	Leg	2	248	-38021.90	95668.20	39.7	Pass
		Top Girt	L3x3x1/8	250	4929.85	23793.80	20.7	Pass
		Bottom Girt	12" x 3/8" Plate	254	-253.69	116106.00	0.2	Pass
Summary								
Leg (T3)							65.7	Pass
Diagonal (T3)							61.3	Pass
Horizontal (T4)							18.8	Pass
Top Girt (T6)							20.7	Pass
Bottom Girt (T5)							32.7	Pass
Guy A (T1)							52.7	Pass
Guy B (T1)							57.3	Pass
Guy C (T1)							56.0	Pass
Top Guy Pull-Off (T3)							29.9	Pass
Bolt Checks							24.8	Pass
RATING =							65.7	Pass

The above (tower Structural results” table displays the calculated stress ratio capacity of the tower member.

**Note: Capacities up to 105% are considered acceptable (where applicable)*

4.2 Foundation results

Guy forces are transferred to the existing building structure via three (3) 7/8” ø and three (3) 3/4” ø galvanized steel guy wires with turnbuckles. All guy anchorage posts are positively attached to the existing building structure. Connections to the existing building were originally designed by Cianci & Cianci Structural Engineers job no: 97-113-01 dated October 22, 1997.

Review of the guy anchor and tower base connections consisted of a comparison of the proposed reactions and the design reactions obtained from the aforementioned design documents:

Calculated Proposed + Existing Equipment Loading Reactions Compared To Previous Reactions:

CONDITION	CALCULATED TOWER REACTIONS (Rev G) (kips)	Original DESIGN REACTIONS (Rev F) (kips)	Original DESIGN REACTIONS X 1.35 (Rev G) (kips)	Capacity	PASS/ FAIL
Tower Base Vert.	104.46	106	143.1	73.0%	PASS
Tower Base Horiz.	0.86	1.6	2.16	39.8%	PASS
Guy Anchor A @ 45' Vert.	33.61	45.1	60.89	55.2%	PASS
Guy Anchor A @ 45' Horiz.	22.38	31.7	42.80	52.3%	PASS
Guy Anchor B @ 39' Vert.	39.11	51.6	69.66	56.1%	PASS
Guy Anchor B @ 39' Horiz.	22.73	32.0	43.2	52.6%	PASS
Guy Anchor C @ 37.5' Vert.	36.90	47.8	64.53	57.2%	PASS
Guy Anchor C @ 37.5' Horiz.	22.83	31.6	42.66	53.5%	PASS

5.0 CONCLUSIONS AND COMMENTARY

After analysis, it was determined that the existing tower structure **is adequate** to support the proposed forces as a result of the telecommunication upgrade.

This analysis is limited to the tower structure only. No building analysis or condition assessment was considered and is not part of the scope of this project. This analysis demonstrates a reduction of overall loading from the original design but does not evaluate the imposed tower and guy loads on the building structure. Our analysis assumes the building and the tower have been properly maintained and are in good condition. Any discovery of damage or disrepair should immediately be brought to the attention of the tower owner, building owner, and Dewberry Engineers.

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 Verizon Wireless to verify that the tower modeled and analyzed is the correct structure modeled. Dewberry Engineers Inc. reserves the right to add to or modify this report if more information becomes available. The conclusions reached by Dewberry Engineers Inc. in this report are only applicable to the previously mentioned existing structural elements supporting the proposed wireless telecommunications installation. The results of this report are based on the assumption that existing structural elements have been installed per the original design documents, have been well maintained and are uncompromised. This report does not imply that a thorough inspection of the existing structure has been performed. Any deviation of the support condition, loading, location, placement, equipment configuration, etc, will require Dewberry Engineers Inc. to generate an additional structural analysis.

6.0 ASSUMPTIONS

This feasibility structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. Dewberry Engineers Inc. has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

1. The tower member sizes and shapes are considered accurate as supplied. The material grade is as per data supplied and/or as assumed and as stated in the materials section.
2. The antenna configuration is as supplied and/or as modeled in the analysis. It is assumed to be complete and accurate. All antennas, mounts, coax and waveguides are assumed to be properly installed and supported as per manufacturer requirements.
3. Some assumptions are made regarding antennas and mount sizes and their projected areas based on best interpretation of data supplied and of best knowledge of antenna type and industry practice.
4. All mounts, if applicable, are considered adequate to support the loading. No actual analysis of the mount(s) is performed. This analysis is limited to analyzing the tower only.
5. Foundations are properly designed and constructed to resist the original design loads indicated in the documents provided.
6. The tower and structures have been properly maintained in accordance with TIA Standards and/or with manufacturer's specifications.

7. All welds and connections are assumed to develop at least the member capacity unless determined otherwise and explicitly stated in this report.
8. All prior structural modifications are assumed to be as per data supplied/ available and to have been properly installed.
9. All existing loading was obtained from the structural analysis found in Appendix B, prepared by Black & Veatch, and is assumed to be accurate.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and Dewberry Engineering Inc. should be allowed to review any new information to determine its effect on the structural integrity of the tower.

7.0 DISCLAIMER OF WARRANTIES

The engineering services rendered by Dewberry Engineers Inc. in connection with this Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. All tower components have been assumed to only resist dead loads when no other loads are applied. No allowance was made for any damaged, bent, missing, loose or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

Dewberry Engineers Inc. does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. Dewberry Engineers Inc. provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to calculate the structural integrity for the existing tower under existing and proposed loadings.

If the amount of ice accumulation is in excess of the specified code recommended amount, that should be considered in the structural analysis.

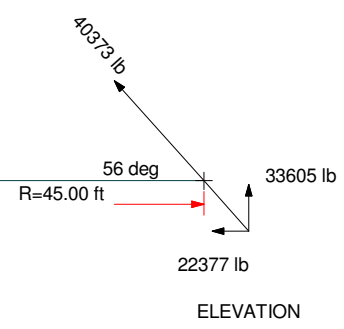
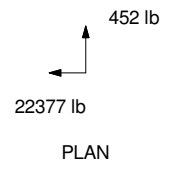
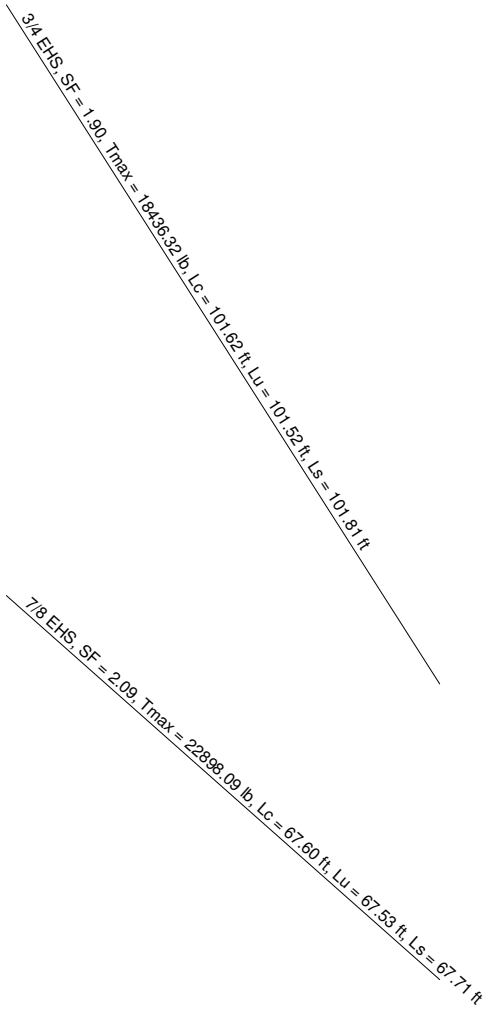
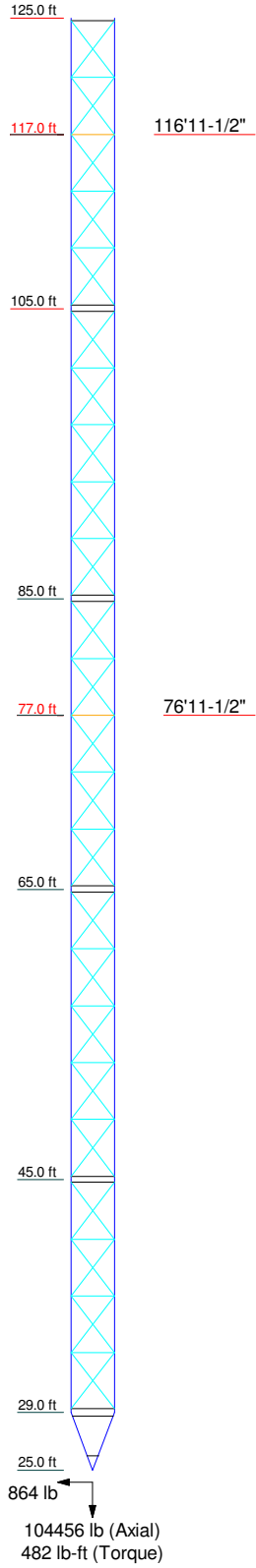
Dewberry Engineers Inc. makes no warranties, expresses and/or implied in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. Dewberry will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of Dewberry pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

tnxTOWER OUTPUT FOR PROPOSED LOADING

Guy Tensions and Tower Reactions
 TIA-222-G - 99 mph/50 mph 1.0000 in Ice Exposure C

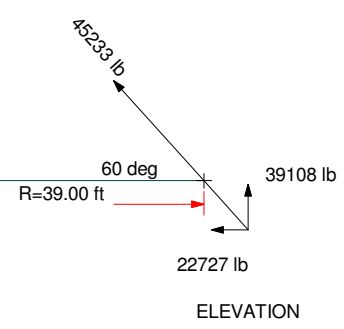
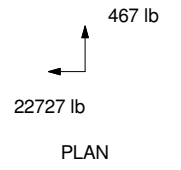
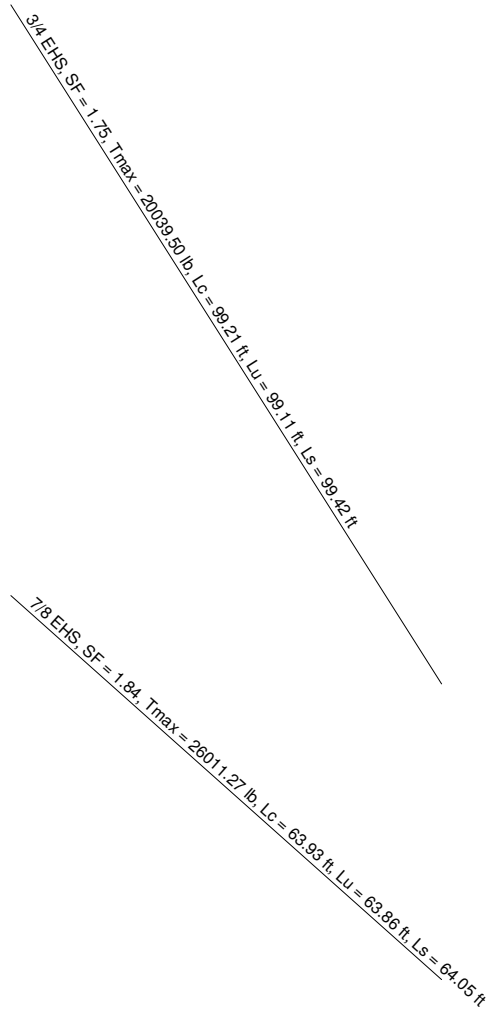
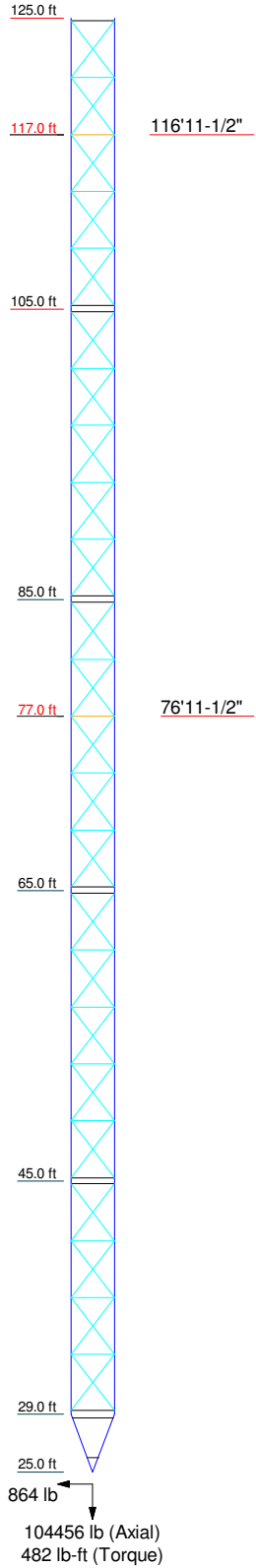
Maximum Values
 Anchor 'A'@45 ft Azimuth 0 deg Elev 25 ft
 Plane through centroid of tower



Dewberry Engineers Inc.			Job: West Hartford Center CT		
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Parsippany, NJ 07054			Client: Verizon Wireless	Drawn by: Bkelsey	App'd:
Phone: (973) 739-9400			Code: TIA-222-G	Date: 09/05/18	Scale: NTS
FAX: (973) 739-9710			Path:		Dwg No. E-6

Guy Tensions and Tower Reactions
TIA-222-G - 99 mph/50 mph 1.0000 in Ice Exposure C

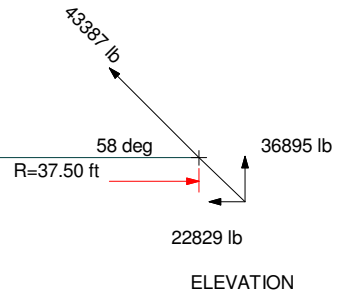
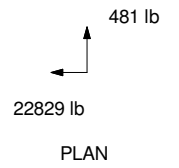
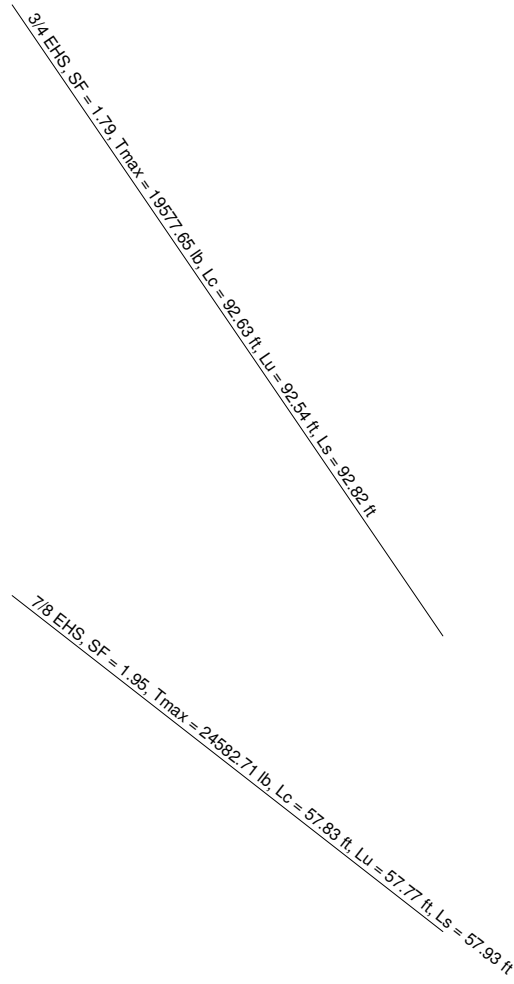
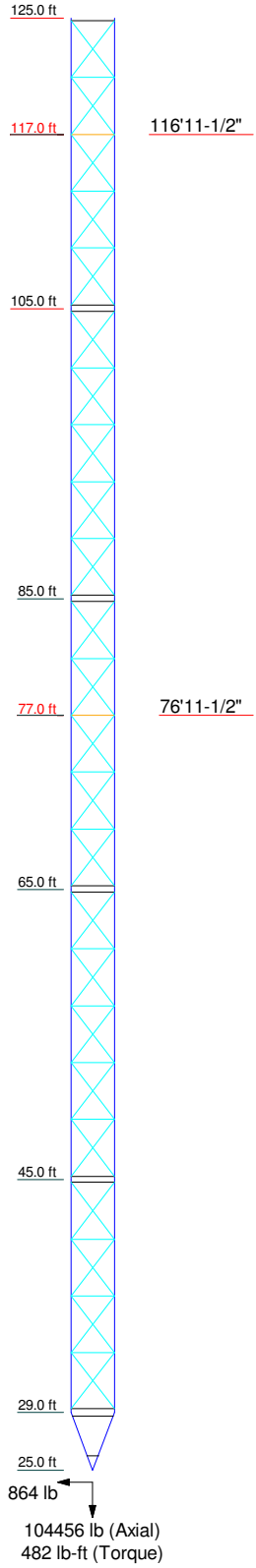
Maximum Values
Anchor 'B'@39 ft Azimuth 120 deg Elev 25 ft
Plane through centroid of tower



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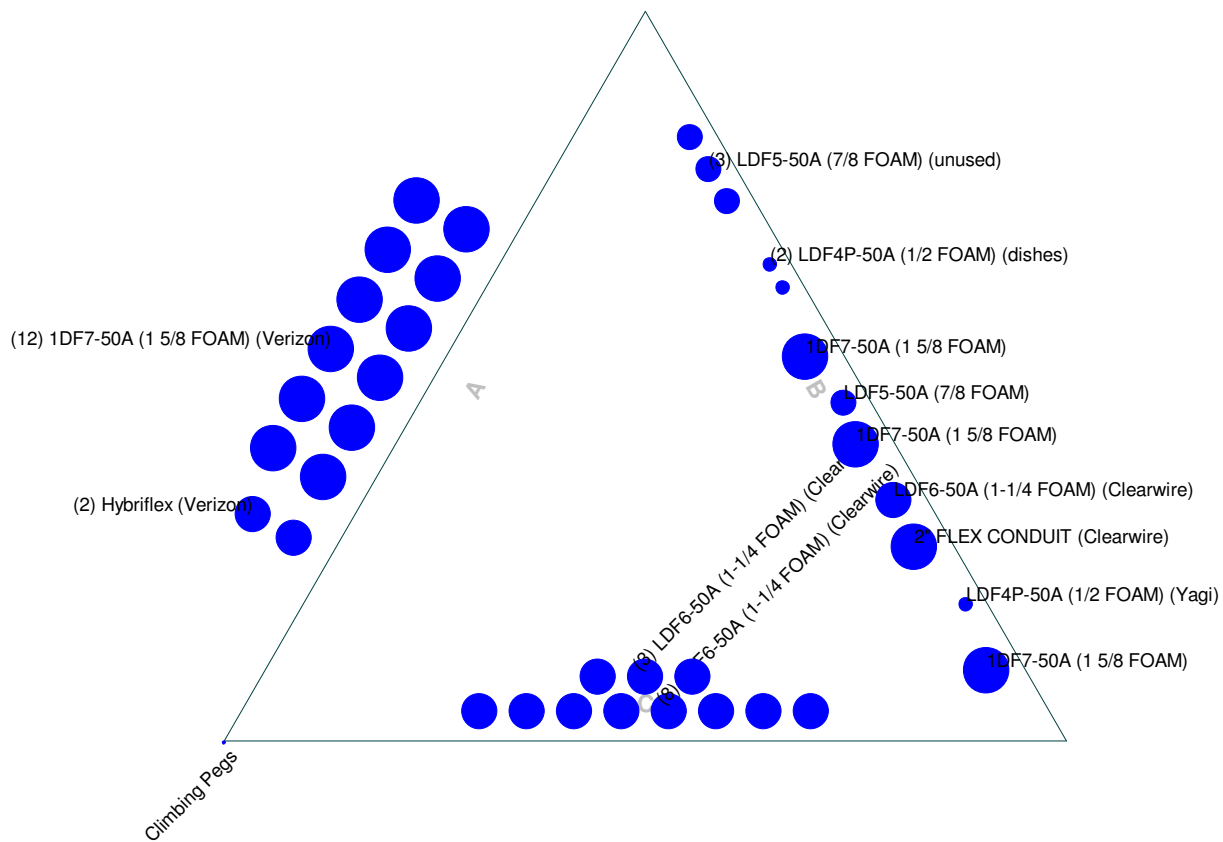
Maximum Values
 Anchor 'C'@37.5 ft Azimuth 240 deg Elev 31.5 ft
 Plane through centroid of tower



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FAX: (973) 739-9710			Path:		Dwg No. E-6

Feed Line Plan

— Round
 — Flat
 — App In Face
 — App Out Face



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Phone: (973) 739-9400		Code: TIA-222-G	Date: 09/05/18 Scale: NTS
FAX: (973) 739-9710		Path:	Dwg No. E-7

tnxTower Dewberry Engineers Inc. 600 Parsippany Road, Suite 301 Parsippany, NJ 07054 Phone: (973) 739-9400 FAX: (973) 739-9710	Job West Hartford Center CT	Page 1 of 38
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	Client Verizon Wireless	Designed by Bkelsey

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 125.00 ft above the ground line.

The base of the tower is set at an elevation of 25.00 ft above the ground line.

The face width of the tower is 3.04 ft at the top and tapered at the base.

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

The following design criteria apply:

Tower is located in Hartford County, Connecticut.

Basic wind speed of 99 mph.

Structure Class II.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 1.0000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

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

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

Pressures are calculated at each section.

Safety factor used in guy design is 1.

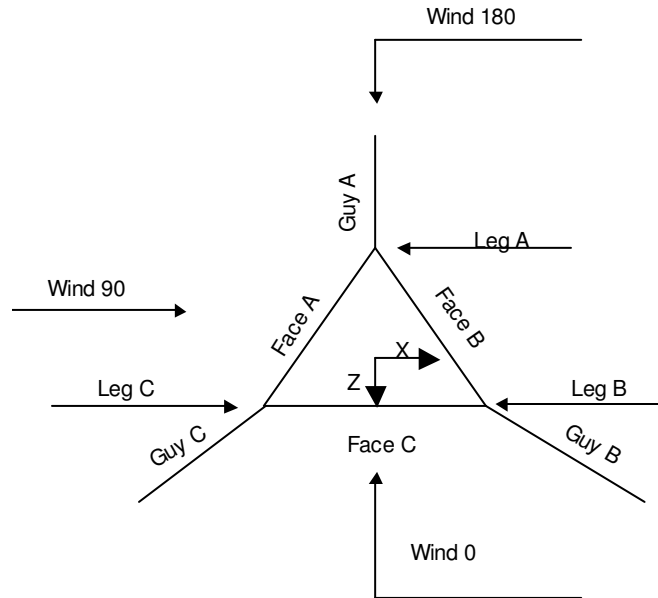
Stress ratio used in tower member design is 1.

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

Options

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

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	Client Verizon Wireless	Designed by Bkelsey



Corner & Starmount Guyed Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	125.00-105.00			3.04	1	20.00
T2	105.00-85.00			3.04	1	20.00
T3	85.00-65.00			3.04	1	20.00
T4	65.00-45.00			3.04	1	20.00
T5	45.00-29.00			3.04	1	16.00
T6	29.00-25.00			3.04	1	4.00

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	125.00-105.00	3.92	X Brace	No	Yes	2.5000	2.5000
T2	105.00-85.00	3.92	X Brace	No	Yes	2.5000	2.5000
T3	85.00-65.00	3.92	X Brace	No	Yes	2.5000	2.5000
T4	65.00-45.00	3.92	X Brace	No	Yes	2.5000	2.5000

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	Client	Verizon Wireless	Designed by	Bkelsey

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T5	45.00-29.00	3.90	X Brace	No	Yes	2.5000	2.5000
T6	29.00-25.00	2.79	X Brace	No	Yes	2.5390	12.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 125.00-105.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T2 105.00-85.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T3 85.00-65.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T4 65.00-45.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T5 45.00-29.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T6 29.00-25.00	Solid Round	2	A572-50 (50 ksi)	Flat Bar		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 125.00-105.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T2 105.00-85.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T3 85.00-65.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 65.00-45.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T5 45.00-29.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T6 29.00-25.00	Single Angle	L3x3x1/8	A36 (36 ksi)	Flat Bar	12" x 3/8" Plate	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 125.00-105.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)

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

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 125.00-105.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 105.00-85.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 85.00-65.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 65.00-45.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 45.00-29.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 29.00-25.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 125.00-105.00	Flange	0.7500	3	0.6250	0	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T2 105.00-85.00	Flange	0.7500	3	0.6250	0	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T3 85.00-65.00	Flange	0.7500	3	0.6250	0	0.6250	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T4 65.00-45.00	Flange	0.7500	3	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T5 45.00-29.00	Flange	0.7500	3	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
T6 29.00-25.00	Flange	0.7500	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L _u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
116.958	EHS	A 3/4	5830.00	10%	19000	1.155	101.53	45.00	0.0000	25.00	100%
		B 3/4	5830.00	10%	19000	1.155	99.12	39.00	0.0000	25.00	100%
		C 3/4	5830.00	10%	19000	1.155	92.55	37.50	0.0000	31.50	100%

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76.9583	EHS	A	7/8	7970.00	10%	19000	1.581	67.54	45.00	0.0000	25.00	100%
		B	7/8	7970.00	10%	19000	1.581	63.87	39.00	0.0000	25.00	100%
		C	7/8	7970.00	10%	19000	1.581	57.78	37.50	0.0000	31.50	100%

Guy Data (cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
116.958	Corner						
76.9583	Corner						

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
116.96	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Flat Bar	3" x 1/4" Plate
76.96	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Flat Bar	3" x 1/4" Plate

Guy Data (cont'd)

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
116.958	117.26	114.49	106.89		1.01	0.97	0.84	
76.9583	106.78	100.98	91.34		1.7 sec/pulse 0.45	1.7 sec/pulse 0.40	1.6 sec/pulse 0.33	
					1.2 sec/pulse	1.1 sec/pulse	1.0 sec/pulse	

Guy Data (cont'd)

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm		Pull Off		Diagonal	
			K _x	K _y	K _x	K _y	K _x	K _y
116.958	No	No			1	1	1	1
76.9583	No	No			1	1	1	1

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Guy Data (cont'd)

Guy Elevation ft	Torque-Arm				Pull Off				Diagonal			
	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U
116.958	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
76.9583	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q _z psf	q _z Ice psf	Ice Thickness in
116.958	A	70.98	25	6	2.1592
	B	70.98	25	6	2.1592
	C	74.23	25	6	2.1689
76.9583	A	50.98	23	6	2.0889
	B	50.98	23	6	2.0889
	C	54.23	24	6	2.1019

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation ft	Guy Location	Chord Angle °	Guy Tension Top Bottom lb	F _x lb	F _y lb	F _z lb	M _x lb-ft	M _y lb-ft	M _z lb-ft
116.958	A	64.8140	5936.11 5830.00	0.00	5382.38	-2503.49	-9446.85	0.00	0.00
	B	67.9511	5936.11 5830.00	1912.54	5510.03	1104.20	4835.45	0.00	-8375.24
	C	67.3018	5928.61 5830.00	-1964.69	5477.39	1134.31	4806.81	-0.00	8325.63
			Sum:	-52.15	16369.79	-264.98	195.40	-0.00	-49.60
76.9583	A	50.2294	8052.07 7970.00	0.00	6210.75	-5124.69	-10900.77	0.00	0.00
	B	54.3662	8052.07 7970.00	4041.89	6561.50	2333.59	5758.19	0.00	-9973.49
	C	51.8213	8041.80 7970.00	-4285.54	6338.99	2474.26	5562.92	-0.00	9635.26
			Sum:	-243.65	19111.24	-316.84	420.35	-0.00	-338.22

Guy-Mast Forces (Excluding Wind) - Ice

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		lb	lb	lb	lb-ft	lb-ft	lb-ft
116.958	A	64.8140	8886.57 8075.46	0.00	8122.28	-3605.51	-14255.78	0.00	0.00
	B	67.9511	8763.74 7952.61	2714.62	8183.98	1567.29	7182.04	0.00	-12439.66
	C	67.3018	8710.02 7951.09	-2781.48	8096.23	1605.89	7105.03	-0.00	12306.28
76.9583			Sum:	-66.86	24402.50	-432.34	31.29	-0.00	-133.38
	A	50.2294	11508.15 11033.45	0.00	8971.25	-7207.94	-15745.84	0.00	0.00
	B	54.3662	11405.37 10930.66	5633.30	9368.58	3252.39	8221.61	0.00	-14240.24
	C	51.8213	11353.89 10934.92	-5964.31	9026.64	3443.49	7921.53	-0.00	13720.49
			Sum:	-331.00	27366.46	-512.05	397.30	-0.00	-519.75

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		lb	lb	lb	lb-ft	lb-ft	lb-ft
116.958	A	64.8140	5936.11 5830.00	0.00	5382.38	-2503.49	-9446.85	0.00	0.00
	B	67.9511	5936.11 5830.00	1912.54	5510.03	1104.20	4835.45	0.00	-8375.24
	C	67.3018	5928.61 5830.00	-1964.69	5477.39	1134.31	4806.81	-0.00	8325.63
76.9583			Sum:	-52.15	16369.79	-264.98	195.40	-0.00	-49.60
	A	50.2294	8052.07 7970.00	0.00	6210.75	-5124.69	-10900.77	0.00	0.00
	B	54.3662	8052.07 7970.00	4041.89	6561.50	2333.59	5758.19	0.00	-9973.49
	C	51.8213	8041.80 7970.00	-4285.54	6338.99	2474.26	5562.92	-0.00	9635.26
			Sum:	-243.65	19111.24	-316.84	420.35	-0.00	-338.22

Guy-Tensioning Information

		Temperature At Time Of Tensioning															
Guy Elevation	H	V	0 F		20 F		40 F		60 F		80 F		100 F		120 F		
			Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	
116.958	A	43.24	91.96	6279	0.94	6129	0.96	5979	0.99	5830	1.01	5681	1.04	5531	1.07	5382	1.10
	B	37.24	91.96	6180	0.91	6063	0.93	5946	0.95	5830	0.97	5714	0.99	5597	1.01	5481	1.03
	C	35.74	85.46	6200	0.79	6076	0.81	5953	0.82	5830	0.84	5707	0.86	5584	0.88	5461	0.90
76.9583	A	43.24	51.96	9357	0.38	8894	0.40	8432	0.43	7970	0.45	7509	0.48	7049	0.51	6590	0.54
	B	37.24	51.96	9122	0.35	8737	0.37	8353	0.38	7970	0.40	7587	0.42	7204	0.45	6822	0.47
	C	35.74	45.46	9267	0.28	8834	0.30	8402	0.31	7970	0.33	7539	0.35	7108	0.37	6678	0.39

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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
Climbing Pegs	C	No	Ar (CaAa)	125.00 - 29.00	0.0000	0.5	1	1	0.2500 0.0000	0.1500		0.31
1DF7-50A (1 5/8 FOAM) (Verizon)	A	No	Ar (CaAa)	106.00 - 29.00	1.0000	0	12	6	0.5000	1.9800		0.82
Hybriflex (Verizon)	A	No	Ar (CaAa)	106.00 - 29.00	1.0000	-0.25	2	1	0.5000	1.5400		1.08
LDF6-50A (1-1/4 FOAM) (Clearwire)	C	No	Ar (CaAa)	122.00 - 29.00	-0.5000	0	8	8	0.5000	1.5500		0.66
LDF6-50A (1-1/4 FOAM) (Clearwire)	C	No	Ar (CaAa)	122.00 - 29.00	-2.0000	0	3	3	0.5000	1.5500		0.66
1DF7-50A (1 5/8 FOAM)	B	No	Ar (CaAa)	125.00 - 29.00	-0.5000	-0.05	1	1	0.5000	1.9800		0.82
1DF7-50A (1 5/8 FOAM)	B	No	Ar (CaAa)	125.00 - 29.00	-0.5000	0.07	1	1	0.5000	1.9800		0.82
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	125.00 - 29.00	-0.5000	0.02	1	1	0.5000	1.0900		0.33
LDF4P-50A (1/2 FOAM) (dishes)	B	No	Ar (CaAa)	122.00 - 29.00	-0.5000	-0.15	2	2	0.5000	0.6300		0.15
LDF5-50A (7/8 FOAM) (unused)	B	No	Ar (CaAa)	122.00 - 29.00	-0.5000	-0.3	3	3	0.5000	1.0900		0.33
LDF6-50A (1-1/4 FOAM) (Clearwire)	B	No	Ar (CaAa)	122.00 - 29.00	-0.5000	0.15	1	1	0.5000	1.5500		0.66
2" FLEX CONDUIT (Clearwire)	B	No	Ar (CaAa)	122.00 - 29.00	-0.5000	0.21	1	1	0.5000	2.0000		0.32
LDF4P-50A (1/2 FOAM) (Yagi)	B	No	Ar (CaAa)	69.00 - 55.00	-0.5000	0.3	2	2	0.5000	0.6300		0.15
LDF4P-50A (1/2 FOAM) (Yagi)	B	No	Ar (CaAa)	55.00 - 29.00	-0.5000	0.3	1	1	0.5000	0.6300		0.15
1DF7-50A (1 5/8 FOAM)	B	No	Ar (CaAa)	69.00 - 29.00	-0.5000	0.38	1	1	0.5000	1.9800		0.82

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight lb
T1	125.00-105.00	A	0.000	0.000	2.684	0.000	12.00
		B	0.000	0.000	23.836	0.000	77.99
		C	0.000	0.000	29.285	0.000	129.62
T2	105.00-85.00	A	0.000	0.000	53.680	0.000	240.00
		B	0.000	0.000	26.260	0.000	84.80
		C	0.000	0.000	34.400	0.000	151.40

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Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight lb
T3	85.00-65.00	A	0.000	0.000	53.680	0.000	240.00
		B	0.000	0.000	27.556	0.000	89.28
		C	0.000	0.000	34.400	0.000	151.40
T4	65.00-45.00	A	0.000	0.000	53.680	0.000	240.00
		B	0.000	0.000	32.110	0.000	105.70
		C	0.000	0.000	34.400	0.000	151.40
T5	45.00-29.00	A	0.000	0.000	42.944	0.000	192.00
		B	0.000	0.000	25.184	0.000	83.36
		C	0.000	0.000	27.520	0.000	121.12
T6	29.00-25.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight lb
T1	125.00-105.00	A	2.266	0.000	0.000	3.884	0.000	81.30
		B		0.000	0.000	98.222	0.000	1550.91
		C		0.000	0.000	79.867	0.000	1252.12
T2	105.00-85.00	A	2.223	0.000	0.000	77.098	0.000	1596.59
		B		0.000	0.000	107.519	0.000	1655.27
		C		0.000	0.000	91.577	0.000	1418.56
T3	85.00-65.00	A	2.171	0.000	0.000	76.389	0.000	1561.42
		B		0.000	0.000	112.222	0.000	1686.16
		C		0.000	0.000	90.691	0.000	1382.81
T4	65.00-45.00	A	2.105	0.000	0.000	75.484	0.000	1517.09
		B		0.000	0.000	130.333	0.000	1921.69
		C		0.000	0.000	89.561	0.000	1337.73
T5	45.00-29.00	A	2.023	0.000	0.000	59.495	0.000	1170.63
		B		0.000	0.000	97.710	0.000	1435.64
		C		0.000	0.000	70.536	0.000	1026.40
T6	29.00-25.00	A	1.960	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
T1	125.00-105.00	1.6411	1.7831	1.3182	0.8902
T2	105.00-85.00	-1.6745	0.1590	0.4840	0.7254
T3	85.00-65.00	-1.5256	0.2137	0.5185	0.7476
T4	65.00-45.00	-1.0413	0.3980	0.9432	0.9073
T5	45.00-29.00	-1.1261	0.3724	1.0973	0.9843
T6	29.00-25.00	0.0000	0.0000	0.0000	0.0000

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Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T1	1	Climbing Pegs	105.00 - 125.00	0.6000	0.2767
T1	2	1DF7-50A (1 5/8 FOAM)	105.00 - 106.00	0.6000	0.2767
T1	3	Hybriflex	105.00 - 106.00	0.6000	0.2767
T1	4	LDF6-50A (1-1/4 FOAM)	105.00 - 122.00	1.0000	1.0000
T1	5	LDF6-50A (1-1/4 FOAM)	105.00 - 122.00	1.0000	1.0000
T1	6	1DF7-50A (1 5/8 FOAM)	105.00 - 125.00	0.6000	0.2767
T1	7	1DF7-50A (1 5/8 FOAM)	105.00 - 125.00	0.6000	0.2767
T1	8	LDF5-50A (7/8 FOAM)	105.00 - 125.00	1.0000	1.0000
T1	9	LDF4P-50A (1/2 FOAM)	105.00 - 122.00	1.0000	1.0000
T1	10	LDF5-50A (7/8 FOAM)	105.00 - 122.00	1.0000	1.0000
T1	11	LDF6-50A (1-1/4 FOAM)	105.00 - 122.00	1.0000	1.0000
T1	12	2" FLEX CONDUIT	105.00 - 122.00	0.6000	0.2767
T2	1	Climbing Pegs	85.00 - 105.00	0.6000	0.2798
T2	2	1DF7-50A (1 5/8 FOAM)	85.00 - 105.00	0.6000	0.2798
T2	3	Hybriflex	85.00 - 105.00	0.6000	0.2798
T2	4	LDF6-50A (1-1/4 FOAM)	85.00 - 105.00	1.0000	1.0000
T2	5	LDF6-50A (1-1/4 FOAM)	85.00 - 105.00	1.0000	1.0000
T2	6	1DF7-50A (1 5/8 FOAM)	85.00 - 105.00	0.6000	0.2798
T2	7	1DF7-50A (1 5/8 FOAM)	85.00 - 105.00	0.6000	0.2798
T2	8	LDF5-50A (7/8 FOAM)	85.00 - 105.00	1.0000	1.0000
T2	9	LDF4P-50A (1/2 FOAM)	85.00 - 105.00	1.0000	1.0000
T2	10	LDF5-50A (7/8 FOAM)	85.00 - 105.00	1.0000	1.0000
T2	11	LDF6-50A (1-1/4 FOAM)	85.00 - 105.00	1.0000	1.0000
T2	12	2" FLEX CONDUIT	85.00 - 105.00	0.6000	0.2798
T3	1	Climbing Pegs	65.00 - 85.00	0.6000	0.2919
T3	2	1DF7-50A (1 5/8 FOAM)	65.00 - 85.00	0.6000	0.2919
T3	3	Hybriflex	65.00 - 85.00	0.6000	0.2919
T3	4	LDF6-50A (1-1/4 FOAM)	65.00 - 85.00	1.0000	1.0000
T3	5	LDF6-50A (1-1/4 FOAM)	65.00 - 85.00	1.0000	1.0000
T3	6	1DF7-50A (1 5/8 FOAM)	65.00 - 85.00	0.6000	0.2919
T3	7	1DF7-50A (1 5/8 FOAM)	65.00 - 85.00	0.6000	0.2919
T3	8	LDF5-50A (7/8 FOAM)	65.00 - 85.00	1.0000	1.0000
T3	9	LDF4P-50A (1/2 FOAM)	65.00 - 85.00	1.0000	1.0000
T3	10	LDF5-50A (7/8 FOAM)	65.00 - 85.00	1.0000	1.0000
T3	11	LDF6-50A (1-1/4 FOAM)	65.00 - 85.00	1.0000	1.0000
T3	12	2" FLEX CONDUIT	65.00 - 85.00	0.6000	0.2919
T3	13	LDF4P-50A (1/2 FOAM)	65.00 - 69.00	1.0000	1.0000
T3	15	1DF7-50A (1 5/8 FOAM)	65.00 - 69.00	0.6000	0.2919
T4	1	Climbing Pegs	45.00 - 65.00	0.6000	0.3046
T4	2	1DF7-50A (1 5/8 FOAM)	45.00 - 65.00	0.6000	0.3046
T4	3	Hybriflex	45.00 - 65.00	0.6000	0.3046
T4	4	LDF6-50A (1-1/4 FOAM)	45.00 - 65.00	1.0000	1.0000
T4	5	LDF6-50A (1-1/4 FOAM)	45.00 - 65.00	1.0000	1.0000
T4	6	1DF7-50A (1 5/8 FOAM)	45.00 - 65.00	0.6000	0.3046
T4	7	1DF7-50A (1 5/8 FOAM)	45.00 - 65.00	0.6000	0.3046
T4	8	LDF5-50A (7/8 FOAM)	45.00 - 65.00	1.0000	1.0000
T4	9	LDF4P-50A (1/2 FOAM)	45.00 - 65.00	1.0000	1.0000

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T4	10	LDF5-50A (7/8 FOAM)	45.00 - 65.00	1.0000	1.0000
T4	11	LDF6-50A (1-1/4 FOAM)	45.00 - 65.00	1.0000	1.0000
T4	12	2" FLEX CONDUIT	45.00 - 65.00	0.6000	0.3046
T4	13	LDF4P-50A (1/2 FOAM)	55.00 - 65.00	1.0000	1.0000
T4	14	LDF4P-50A (1/2 FOAM)	45.00 - 55.00	1.0000	1.0000
T4	15	1DF7-50A (1 5/8 FOAM)	45.00 - 65.00	0.6000	0.3046
T5	1	Climbing Pegs	29.00 - 45.00	0.6000	0.3178
T5	2	1DF7-50A (1 5/8 FOAM)	29.00 - 45.00	0.6000	0.3178
T5	3	Hybriflex	29.00 - 45.00	0.6000	0.3178
T5	4	LDF6-50A (1-1/4 FOAM)	29.00 - 45.00	1.0000	1.0000
T5	5	LDF6-50A (1-1/4 FOAM)	29.00 - 45.00	1.0000	1.0000
T5	6	1DF7-50A (1 5/8 FOAM)	29.00 - 45.00	0.6000	0.3178
T5	7	1DF7-50A (1 5/8 FOAM)	29.00 - 45.00	0.6000	0.3178
T5	8	LDF5-50A (7/8 FOAM)	29.00 - 45.00	1.0000	1.0000
T5	9	LDF4P-50A (1/2 FOAM)	29.00 - 45.00	1.0000	1.0000
T5	10	LDF5-50A (7/8 FOAM)	29.00 - 45.00	1.0000	1.0000
T5	11	LDF6-50A (1-1/4 FOAM)	29.00 - 45.00	1.0000	1.0000
T5	12	2" FLEX CONDUIT	29.00 - 45.00	0.6000	0.3178
T5	14	LDF4P-50A (1/2 FOAM)	29.00 - 45.00	1.0000	1.0000
T5	15	1DF7-50A (1 5/8 FOAM)	29.00 - 45.00	0.6000	0.3178

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight	
			ft ft ft	°	ft	ft ²	ft ²	lb	
10'x3" Dia Omni	A	From Leg	0.25	0.0000	125.00	No Ice	3.00	3.00	35.00
			0.00			1/2" Ice	4.03	4.03	56.79
			5.00			1" Ice	5.03	5.03	85.14
4 Bay DiPole	B	From Leg	0.25	0.0000	125.00	No Ice	3.15	3.15	32.00
			0.00			1/2" Ice	5.67	5.67	42.00
			5.00			1" Ice	8.19	8.19	52.00
12'x3" Dia Omni	B	From Leg	0.25	0.0000	125.00	No Ice	3.60	3.60	36.00
			0.00			1/2" Ice	4.83	4.83	62.06
			16.00			1" Ice	6.08	6.08	95.92
6'x3" Dia Omni	C	From Leg	0.25	0.0000	125.00	No Ice	1.77	1.77	20.00
			0.00			1/2" Ice	2.13	2.13	33.24
			3.00			1" Ice	2.50	2.50	50.59
Valmont 13' standoff Mounting Frame (Clearwire)	A	From Leg	2.25	0.0000	122.00	No Ice	20.60	12.90	517.00
			0.00			1/2" Ice	28.80	19.40	784.00
			0.00			1" Ice	37.00	25.90	1051.00
Valmont 13' standoff Mounting Frame (Clearwire)	B	From Leg	2.25	0.0000	122.00	No Ice	20.60	12.90	517.00
			0.00			1/2" Ice	28.80	19.40	784.00
			0.00			1" Ice	37.00	25.90	1051.00
Valmont 13' standoff Mounting Frame (Clearwire)	C	From Leg	2.25	0.0000	122.00	No Ice	20.60	12.90	517.00
			0.00			1/2" Ice	28.80	19.40	784.00
			0.00			1" Ice	37.00	25.90	1051.00
LLPX310R-V1 W/ Mast Pipe (Clearwire)	A	From Leg	4.50	0.0000	122.00	No Ice	4.95	3.36	64.50
			-6.00			1/2" Ice	5.45	4.13	106.52
			1.50			1" Ice	5.90	4.78	154.21
LLPX310R-V1 W/ Mast Pipe	B	From Leg	4.50	0.0000	122.00	No Ice	4.95	3.36	64.50

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz Lateral	Vert					
(Clearwire)			-6.00			1/2" Ice	5.45	4.13	106.52
			1.50			1" Ice	5.90	4.78	154.21
LLPX310R-V1 W/ Mast Pipe	C	From Leg	4.50	0.0000	122.00	No Ice	4.95	3.36	64.50
(Clearwire)			-6.00			1/2" Ice	5.45	4.13	106.52
			1.50			1" Ice	5.90	4.78	154.21
(3) 2-3/8" OD Mast Pipe (6' Long)	A	From Leg	4.50	0.0000	122.00	No Ice	1.43	1.43	21.96
(Clearwire)			2.00			1/2" Ice	1.92	1.92	32.79
			0.00			1" Ice	2.29	2.29	47.67
(3) 2-3/8" OD Mast Pipe (6' Long)	B	From Leg	4.50	0.0000	122.00	No Ice	1.43	1.43	21.96
(Clearwire)			2.00			1/2" Ice	1.92	1.92	32.79
			0.00			1" Ice	2.29	2.29	47.67
(3) 2-3/8" OD Mast Pipe (6' Long)	C	From Leg	4.50	0.0000	122.00	No Ice	1.43	1.43	21.96
(Clearwire)			2.00			1/2" Ice	1.92	1.92	32.79
			0.00			1" Ice	2.29	2.29	47.67
Samsung SPI-22132825WB RRH	A	From Leg	1.00	0.0000	122.00	No Ice	2.00	0.50	30.00
(Clearwire)			0.00			1/2" Ice	2.18	0.60	44.19
			0.00			1" Ice	2.37	0.70	60.98
Samsung SPI-22132825WB RRH	B	From Leg	1.00	0.0000	122.00	No Ice	2.00	0.50	30.00
(Clearwire)			0.00			1/2" Ice	2.18	0.60	44.19
			0.00			1" Ice	2.37	0.70	60.98
Samsung SPI-22132825WB RRH	C	From Leg	1.00	0.0000	122.00	No Ice	2.00	0.50	30.00
(Clearwire)			0.00			1/2" Ice	2.18	0.60	44.19
			0.00			1" Ice	2.37	0.70	60.98
2'x2'xl' junction box	B	From Face	1.00	0.0000	122.00	No Ice	4.80	2.40	30.00
(Clearwire)			0.00			1/2" Ice	5.07	2.60	69.31
			0.00			1" Ice	5.35	2.81	112.70
valmont 12' T-Frame (Verizon)	A	From Leg	1.50	0.0000	106.00	No Ice	10.60	10.60	540.00
			0.00			1/2" Ice	18.40	18.40	702.00
			0.00			1" Ice	26.20	26.20	864.00
valmont 12' T-Frame (Verizon)	B	From Leg	1.50	0.0000	106.00	No Ice	10.60	10.60	540.00
			0.00			1/2" Ice	18.40	18.40	702.00
			0.00			1" Ice	26.20	26.20	864.00
valmont 12' T-Frame (Verizon)	C	From Leg	1.50	0.0000	106.00	No Ice	10.60	10.60	540.00
			0.00			1/2" Ice	18.40	18.40	702.00
			0.00			1" Ice	26.20	26.20	864.00
BXA-171063-12CF w/ Mast Pipe (Verizon)	A	From Leg	3.00	0.0000	106.00	No Ice	5.26	5.53	50.00
			-6.00			1/2" Ice	5.92	6.79	98.59
			1.00			1" Ice	6.54	7.91	154.81
(2) SBNHH-1D65B w/ Mast Pipe (Verizon)	A	From Leg	3.00	0.0000	106.00	No Ice	8.62	7.30	84.80
			-0.50			1/2" Ice	9.28	8.58	156.34
			1.00			1" Ice	9.91	9.72	236.09
BXA-171085-8CF w/ Mast Pipe (Verizon)	A	From Leg	3.00	0.0000	106.00	No Ice	3.87	4.04	46.40
			2.50			1/2" Ice	4.59	5.17	86.17
			1.00			1" Ice	5.23	6.15	132.00
BXA-80063/4CF w/ Mast Pipe (Verizon)	A	From Leg	3.00	0.0000	106.00	No Ice	5.67	4.34	54.10
			5.00			1/2" Ice	6.41	5.47	103.99
			1.00			1" Ice	7.07	6.45	160.28
SACP 2x5516 w/ Mast Pipe (Verizon)	B	From Leg	3.00	0.0000	106.00	No Ice	5.87	5.12	60.20
			-6.00			1/2" Ice	6.57	6.30	112.95
			1.00			1" Ice	7.21	7.34	172.60
(2) SBNHH-1D65B w/ Mast Pipe (Verizon)	B	From Leg	3.00	0.0000	106.00	No Ice	8.62	7.30	84.80
			-0.50			1/2" Ice	9.28	8.58	156.34
			1.00			1" Ice	9.91	9.72	236.09
SACP 2x5516 w/ Mast Pipe (Verizon)	B	From Leg	3.00	0.0000	106.00	No Ice	5.87	5.12	60.20
			2.50			1/2" Ice	6.57	6.30	112.95
			1.00			1" Ice	7.21	7.34	172.60
SWCP 2x5514 w/ Mast Pipe	B	From Leg	3.00	0.0000	106.00	No Ice	7.16	7.17	64.20

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	lb
(Verizon)			5.00						
			1.00			1/2" Ice	7.90	8.34	135.30
			1.00			1" Ice	8.57	9.36	213.68
SACP 2x5516 w/ Mast Pipe	C	From Leg	3.00		0.0000	No Ice	5.87	5.12	60.20
(Verizon)			-6.00			1/2" Ice	6.57	6.30	112.95
			1.00			1" Ice	7.21	7.34	172.60
(2) SBNHH-1D65B w/ Mast Pipe	C	From Leg	3.00		0.0000	No Ice	8.62	7.30	84.80
(Verizon)			-0.50			1/2" Ice	9.28	8.58	156.34
			1.00			1" Ice	9.91	9.72	236.09
SACP 2x5516 w/ Mast Pipe	C	From Leg	3.00		0.0000	No Ice	5.87	5.12	60.20
(Verizon)			2.50			1/2" Ice	6.57	6.30	112.95
			1.00			1" Ice	7.21	7.34	172.60
SWCP 2x5514 w/ Mast Pipe	C	From Leg	3.00		0.0000	No Ice	7.16	7.17	64.20
(Verizon)			5.00			1/2" Ice	7.90	8.34	135.30
			1.00			1" Ice	8.57	9.36	213.68
B5/B13 RRH	A	From Face	0.50		0.0000	No Ice	1.88	1.01	82.00
(Verizon)			-1.25			1/2" Ice	2.05	1.14	98.43
			5.00			1" Ice	2.22	1.28	117.53
B5/B13 RRH	B	From Face	0.50		0.0000	No Ice	1.88	1.01	82.00
(Verizon)			-1.25			1/2" Ice	2.05	1.14	98.43
			5.00			1" Ice	2.22	1.28	117.53
B5/B13 RRH	C	From Face	0.50		0.0000	No Ice	1.88	1.01	82.00
(Verizon)			-1.25			1/2" Ice	2.05	1.14	98.43
			5.00			1" Ice	2.22	1.28	117.53
B2/B66A RRH	A	From Face	0.50		0.0000	No Ice	1.88	1.25	97.50
(Verizon)			1.25			1/2" Ice	2.05	1.39	115.84
			5.00			1" Ice	2.22	1.54	136.97
B2/B66A RRH	B	From Face	0.50		0.0000	No Ice	1.88	1.25	97.50
(Verizon)			1.25			1/2" Ice	2.05	1.39	115.84
			5.00			1" Ice	2.22	1.54	136.97
B2/B66A RRH	C	From Face	0.50		0.0000	No Ice	1.88	1.25	97.50
(Verizon)			1.25			1/2" Ice	2.05	1.39	115.84
			5.00			1" Ice	2.22	1.54	136.97
(2) DB-T1-6Z-12AB-OZ	B	From Face	0.50		0.0000	No Ice	2.82	1.85	26.00
OVP			0.00			1/2" Ice	3.04	2.03	51.02
(Verizon)			8.00			1" Ice	3.25	2.22	79.31
4' Yagi	A	From Leg	2.00		0.0000	No Ice	1.20	1.20	20.00
			0.00			1/2" Ice	1.80	1.80	30.00
			0.00			1" Ice	2.40	2.40	40.00
4' Yagi	A	From Leg	2.00		0.0000	No Ice	1.20	1.20	20.00
			0.00			1/2" Ice	1.80	1.80	30.00
			0.00			1" Ice	2.40	2.40	40.00
2'x2'x1' junction box	B	From Face	0.50		0.0000	No Ice	4.80	2.40	30.00
			0.00			1/2" Ice	5.07	2.60	69.31
			0.00			1" Ice	5.35	2.81	112.70

Dishes

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Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				ft °	°	°	ft	ft	ft ²	lb	
VHLP1-23	B	Paraboloid w/o Radome	From Leg	4.00 -6.00 0.00	0.0000		122.00	1.27	No Ice 1/2" Ice 1" Ice	1.27 1.44 1.61	15.00 22.39 29.78
VHLP1-23	C	Paraboloid w/o Radome	From Leg	0.50 0.00 0.00	0.0000		119.00	1.27	No Ice 1/2" Ice 1" Ice	1.27 1.44 1.61	15.00 22.39 29.78
VHLP1-23	B	Paraboloid w/o Radome	From Leg	0.50 0.00 0.00	0.0000		118.00	1.27	No Ice 1/2" Ice 1" Ice	1.27 1.44 1.61	15.00 22.39 29.78

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		psf	ft ²	e	ft ²	ft ²	ft ²		ft ²	ft ²
T1 125.00-105.00	115.00	1.303	28	64.133	A	2.454	10.084	6.667	53.17	2.684	0.000
					B	2.454	10.084		53.17	23.836	0.000
					C	2.454	10.084		53.17	29.285	0.000
T2 105.00-85.00	95.00	1.252	27	64.133	A	2.873	10.084	6.667	51.45	53.680	0.000
					B	2.873	10.084		51.45	26.260	0.000
					C	2.873	10.084		51.45	34.400	0.000
T3 85.00-65.00	75.00	1.191	25	64.550	A	2.437	10.892	7.500	56.27	53.680	0.000
					B	2.437	10.892		56.27	27.556	0.000
					C	2.437	10.892		56.27	34.400	0.000
T4 65.00-45.00	55.00	1.116	24	64.133	A	2.873	10.084	6.667	51.45	53.680	0.000
					B	2.873	10.084		51.45	32.110	0.000
					C	2.873	10.084		51.45	34.400	0.000
T5 45.00-29.00	37.00	1.027	22	51.307	A	2.394	8.058	5.333	51.03	42.944	0.000
					B	2.394	8.058		51.03	25.184	0.000
					C	2.394	8.058		51.03	27.520	0.000
T6 29.00-25.00	27.00	0.961	20	6.793	A	0.697	1.456	1.456	67.64	0.000	0.000
					B	0.697	1.456		67.64	0.000	0.000
					C	0.697	1.456		67.64	0.000	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation	z	K _Z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		psf	in	ft ²	e	ft ²	ft ²	ft ²		ft ²	ft ²
T1 125.00-105.00	115.00	1.303	7	2.2659	71.686	A	2.454	49.398	21.773	41.99	3.884	0.000
						B	2.454	49.398		41.99	98.222	0.000
						C	2.454	49.398		41.99	79.867	0.000
T2 105.00-85.00	95.00	1.252	7	2.2231	71.544	A	2.873	48.654	21.487	41.70	77.098	0.000
						B	2.873	48.654		41.70	107.519	0.000
						C	2.873	48.654		41.70	91.577	0.000
T3 85.00-65.00	75.00	1.191	6	2.1711	71.787	A	2.437	48.394	21.974	43.23	76.389	0.000

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Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e ft ²	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
T4 65.00-45.00	55.00	1.116	6	2.1048	71.149	B	2.437	48.394	20.699	43.23	112.222	0.000
						C	2.437	48.394			90.691	0.000
						A	2.873	46.603			75.484	0.000
T5 45.00-29.00	37.00	1.027	6	2.0230	56.701	B	2.873	46.603	16.123	41.84	130.333	0.000
						C	2.873	46.603			89.561	0.000
						A	2.394	36.290			59.495	0.000
T6 29.00-25.00	27.00	0.961	5	1.9603	8.191	B	2.394	36.290	4.310	41.68	97.710	0.000
						C	2.394	36.290			70.536	0.000
						A	0.697	5.390			0.000	0.000
						B	0.697	5.390		70.81	0.000	0.000
						C	0.697	5.390		70.81	0.000	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e ft ²	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
T1 125.00-105.00	115.00	1.303	10	64.133	A	2.454	10.084	6.667	53.17	2.684	0.000
					B	2.454	10.084			23.836	0.000
					C	2.454	10.084			29.285	0.000
T2 105.00-85.00	95.00	1.252	10	64.133	A	2.873	10.084	6.667	51.45	53.680	0.000
					B	2.873	10.084			26.260	0.000
					C	2.873	10.084			34.400	0.000
T3 85.00-65.00	75.00	1.191	9	64.550	A	2.437	10.892	7.500	56.27	53.680	0.000
					B	2.437	10.892			27.556	0.000
					C	2.437	10.892			34.400	0.000
T4 65.00-45.00	55.00	1.116	9	64.133	A	2.873	10.084	6.667	51.45	53.680	0.000
					B	2.873	10.084			32.110	0.000
					C	2.873	10.084			34.400	0.000
T5 45.00-29.00	37.00	1.027	8	51.307	A	2.394	8.058	5.333	51.03	42.944	0.000
					B	2.394	8.058			25.184	0.000
					C	2.394	8.058			27.520	0.000
T6 29.00-25.00	27.00	0.961	8	6.793	A	0.697	1.456	1.456	67.64	0.000	0.000
					B	0.697	1.456			67.64	0.000
					C	0.697	1.456			67.64	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face	
T1 125.00-105.00	219.61	1079.98	A	0.195	2.611	28	1	1	8.239	1628.83	81.44	C
			B	0.195	2.611	1	1	8.239				
			C	0.195	2.611	1	1	8.239				
T2 105.00-85.00	476.20	1078.89	A	0.202	2.589	27	1	1	8.670	2048.60	102.43	C
			B	0.202	2.589	1	1	8.670				
			C	0.202	2.589	1	1	8.670				
T3	480.68	1250.35	A	0.206	2.574	25	1	1	8.707	1968.54	98.43	C

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
85.00-65.00			B	0.206	2.574		1	1	8.707			
			C	0.206	2.574		1	1	8.707			
T4	497.10	1035.95	A	0.202	2.589	24	1	1	8.670	1909.82	95.49	C
65.00-45.00			B	0.202	2.589		1	1	8.670			
			C	0.202	2.589		1	1	8.670			
T5	396.48	830.96	A	0.204	2.584	22	1	1	7.029	1401.67	87.60	C
45.00-29.00			B	0.204	2.584		1	1	7.029			
			C	0.204	2.584		1	1	7.029			
T6	0.00	196.59	A	0.317	2.252	20	1	1	1.577	61.84	15.46	C
29.00-25.00			B	0.317	2.252		1	1	1.577			
			C	0.317	2.252		1	1	1.577			
Sum Weight:	2070.07	5472.71								9019.28		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
T1	219.61	1079.98	A	0.195	2.611	28	0.8	1	7.749	1598.54	79.93	C
125.00-105.00			B	0.195	2.611		0.8	1	7.749			
			C	0.195	2.611		0.8	1	7.749			
T2	476.20	1078.89	A	0.202	2.589	27	0.8	1	8.095	2014.82	100.74	C
105.00-85.00			B	0.202	2.589		0.8	1	8.095			
			C	0.202	2.589		0.8	1	8.095			
T3	480.68	1250.35	A	0.206	2.574	25	0.8	1	8.219	1941.45	97.07	C
85.00-65.00			B	0.206	2.574		0.8	1	8.219			
			C	0.206	2.574		0.8	1	8.219			
T4	497.10	1035.95	A	0.202	2.589	24	0.8	1	8.095	1879.72	93.99	C
65.00-45.00			B	0.202	2.589		0.8	1	8.095			
			C	0.202	2.589		0.8	1	8.095			
T5	396.48	830.96	A	0.204	2.584	22	0.8	1	6.550	1378.64	86.17	C
45.00-29.00			B	0.204	2.584		0.8	1	6.550			
			C	0.204	2.584		0.8	1	6.550			
T6	0.00	196.59	A	0.317	2.252	20	0.8	1	1.437	56.37	14.09	C
29.00-25.00			B	0.317	2.252		0.8	1	1.437			
			C	0.317	2.252		0.8	1	1.437			
Sum Weight:	2070.07	5472.71								8869.55		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
T1	219.61	1079.98	A	0.195	2.611	28	0.85	1	7.871	1643.22	82.16	C
125.00-105.00			B	0.195	2.611		0.85	1	7.871			
			C	0.195	2.611		0.85	1	7.871			
T2	476.20	1078.89	A	0.202	2.589	27	0.85	1	8.239	2116.90	105.84	C

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
105.00-85.00			B	0.202	2.589		0.85	1	8.239			
			C	0.202	2.589		0.85	1	8.239			
T3	480.68	1250.35	A	0.206	2.574	25	0.85	1	8.341	2034.25	101.71	C
85.00-65.00			B	0.206	2.574		0.85	1	8.341			
			C	0.206	2.574		0.85	1	8.341			
T4	497.10	1035.95	A	0.202	2.589	24	0.85	1	8.239	1963.55	98.18	C
65.00-45.00			B	0.202	2.589		0.85	1	8.239			
			C	0.202	2.589		0.85	1	8.239			
T5	396.48	830.96	A	0.204	2.584	22	0.85	1	6.670	1445.82	90.36	C
45.00-29.00			B	0.204	2.584		0.85	1	6.670			
			C	0.204	2.584		0.85	1	6.670			
T6	0.00	196.59	A	0.317	2.252	20	0.85	1	1.472	57.74	14.43	C
29.00-25.00			B	0.317	2.252		0.85	1	1.472			
			C	0.317	2.252		0.85	1	1.472			
Sum Weight:	2070.07	5472.71								9261.47		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
T1	2884.32	3858.21	A	0.723	1.779	7	1	1	43.349	907.31*	45.37	C
125.00-105.00			B	0.723	1.779		1	1	43.349			
			C	0.723	1.779		1	1	43.349			
T2	4670.42	3769.36	A	0.72	1.779	7	1	1	43.043	869.80*	43.49	C
105.00-85.00			B	0.72	1.779		1	1	43.043			
			C	0.72	1.779		1	1	43.043			
T3	4630.38	3885.86	A	0.708	1.777	6	1	1	41.967	830.39*	41.52	C
85.00-65.00			B	0.708	1.777		1	1	41.967			
			C	0.708	1.777		1	1	41.967			
T4	4776.51	3503.21	A	0.695	1.776	6	1	1	40.520	770.99*	38.55	C
65.00-45.00			B	0.695	1.776		1	1	40.520			
			C	0.695	1.776		1	1	40.520			
T5	3632.67	2704.48	A	0.682	1.776	6	1	1	31.374	565.23*	35.33	C
45.00-29.00			B	0.682	1.776		1	1	31.374			
			C	0.682	1.776		1	1	31.374			
T6	0.00	525.45	A	0.743	1.785	5	1	1	5.237	41.53	10.38	C
29.00-25.00			B	0.743	1.785		1	1	5.237			
			C	0.743	1.785		1	1	5.237			
Sum Weight:	20594.30	18246.58				*2.1A _g limit				3985.26		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	

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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1 125.00-105.00	2884.32	3858.21	A	0.723	1.779	7	0.8	1	42.858	907.31*	45.37	C
			B	0.723	1.779							
			C	0.723	1.779							
T2 105.00-85.00	4670.42	3769.36	A	0.72	1.779	7	0.8	1	42.468	869.80*	43.49	C
			B	0.72	1.779							
			C	0.72	1.779							
T3 85.00-65.00	4630.38	3885.86	A	0.708	1.777	6	0.8	1	41.479	830.39*	41.52	C
			B	0.708	1.777							
			C	0.708	1.777							
T4 65.00-45.00	4776.51	3503.21	A	0.695	1.776	6	0.8	1	39.945	770.99*	38.55	C
			B	0.695	1.776							
			C	0.695	1.776							
T5 45.00-29.00	3632.67	2704.48	A	0.682	1.776	6	0.8	1	30.895	565.23*	35.33	C
			B	0.682	1.776							
			C	0.682	1.776							
T6 29.00-25.00	0.00	525.45	A	0.743	1.785	5	0.8	1	5.098	40.42	10.11	C
			B	0.743	1.785							
			C	0.743	1.785							
Sum Weight:	20594.30	18246.58			*2.1A _g limit				3984.16			

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1 125.00-105.00	2884.32	3858.21	A	0.723	1.779	7	0.85	1	42.981	907.31*	45.37	C
			B	0.723	1.779							
			C	0.723	1.779							
T2 105.00-85.00	4670.42	3769.36	A	0.72	1.779	7	0.85	1	42.612	869.80*	43.49	C
			B	0.72	1.779							
			C	0.72	1.779							
T3 85.00-65.00	4630.38	3885.86	A	0.708	1.777	6	0.85	1	41.601	830.39*	41.52	C
			B	0.708	1.777							
			C	0.708	1.777							
T4 65.00-45.00	4776.51	3503.21	A	0.695	1.776	6	0.85	1	40.089	770.99*	38.55	C
			B	0.695	1.776							
			C	0.695	1.776							
T5 45.00-29.00	3632.67	2704.48	A	0.682	1.776	6	0.85	1	31.015	565.23*	35.33	C
			B	0.682	1.776							
			C	0.682	1.776							
T6 29.00-25.00	0.00	525.45	A	0.743	1.785	5	0.85	1	5.133	40.70	10.17	C
			B	0.743	1.785							
			C	0.743	1.785							
Sum Weight:	20594.30	18246.58			*2.1A _g limit				3984.43			

Tower Forces - Service - Wind Normal To Face

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1 125.00-105.00	219.61	1079.98	A	0.195	2.611	10	1	1	8.239	598.28	29.91	C
			B	0.195	2.611		1	1	8.239			
			C	0.195	2.611		1	1	8.239			
T2 105.00-85.00	476.20	1078.89	A	0.202	2.589	10	1	1	8.670	752.47	37.62	C
			B	0.202	2.589		1	1	8.670			
			C	0.202	2.589		1	1	8.670			
T3 85.00-65.00	480.68	1250.35	A	0.206	2.574	9	1	1	8.707	723.06	36.15	C
			B	0.206	2.574		1	1	8.707			
			C	0.206	2.574		1	1	8.707			
T4 65.00-45.00	497.10	1035.95	A	0.202	2.589	9	1	1	8.670	701.50	35.07	C
			B	0.202	2.589		1	1	8.670			
			C	0.202	2.589		1	1	8.670			
T5 45.00-29.00	396.48	830.96	A	0.204	2.584	8	1	1	7.029	514.85	32.18	C
			B	0.204	2.584		1	1	7.029			
			C	0.204	2.584		1	1	7.029			
T6 29.00-25.00	0.00	196.59	A	0.317	2.252	8	1	1	1.577	22.71	5.68	C
			B	0.317	2.252		1	1	1.577			
			C	0.317	2.252		1	1	1.577			
Sum Weight:	2070.07	5472.71								3312.87		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1 125.00-105.00	219.61	1079.98	A	0.195	2.611	10	0.8	1	7.749	587.16	29.36	C
			B	0.195	2.611		0.8	1	7.749			
			C	0.195	2.611		0.8	1	7.749			
T2 105.00-85.00	476.20	1078.89	A	0.202	2.589	10	0.8	1	8.095	740.06	37.00	C
			B	0.202	2.589		0.8	1	8.095			
			C	0.202	2.589		0.8	1	8.095			
T3 85.00-65.00	480.68	1250.35	A	0.206	2.574	9	0.8	1	8.219	713.11	35.66	C
			B	0.206	2.574		0.8	1	8.219			
			C	0.206	2.574		0.8	1	8.219			
T4 65.00-45.00	497.10	1035.95	A	0.202	2.589	9	0.8	1	8.095	690.44	34.52	C
			B	0.202	2.589		0.8	1	8.095			
			C	0.202	2.589		0.8	1	8.095			
T5 45.00-29.00	396.48	830.96	A	0.204	2.584	8	0.8	1	6.550	506.39	31.65	C
			B	0.204	2.584		0.8	1	6.550			
			C	0.204	2.584		0.8	1	6.550			
T6 29.00-25.00	0.00	196.59	A	0.317	2.252	8	0.8	1	1.437	20.71	5.18	C
			B	0.317	2.252		0.8	1	1.437			
			C	0.317	2.252		0.8	1	1.437			
Sum Weight:	2070.07	5472.71								3257.87		

Tower Forces - Service - Wind 90 To Face

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1 125.00-105.00	219.61	1079.98	A	0.195	2.611	10	0.85	1	7.871	603.57	30.18	C
			B	0.195	2.611		0.85	1	7.871			
			C	0.195	2.611		0.85	1	7.871			
T2 105.00-85.00	476.20	1078.89	A	0.202	2.589	10	0.85	1	8.239	777.56	38.88	C
			B	0.202	2.589		0.85	1	8.239			
			C	0.202	2.589		0.85	1	8.239			
T3 85.00-65.00	480.68	1250.35	A	0.206	2.574	9	0.85	1	8.341	747.20	37.36	C
			B	0.206	2.574		0.85	1	8.341			
			C	0.206	2.574		0.85	1	8.341			
T4 65.00-45.00	497.10	1035.95	A	0.202	2.589	9	0.85	1	8.239	721.23	36.06	C
			B	0.202	2.589		0.85	1	8.239			
			C	0.202	2.589		0.85	1	8.239			
T5 45.00-29.00	396.48	830.96	A	0.204	2.584	8	0.85	1	6.670	531.06	33.19	C
			B	0.204	2.584		0.85	1	6.670			
			C	0.204	2.584		0.85	1	6.670			
T6 29.00-25.00	0.00	196.59	A	0.317	2.252	8	0.85	1	1.472	21.21	5.30	C
			B	0.317	2.252		0.85	1	1.472			
			C	0.317	2.252		0.85	1	1.472			
Sum Weight:	2070.07	5472.71								3401.83		

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Leg Weight	3389.24			
Bracing Weight	2083.48			
Total Member Self-Weight	5472.71			
Guy Weight	637.74			
Total Weight	13719.66			
Wind 0 deg - No Ice		23.88	-13773.30	26.21
Wind 30 deg - No Ice		6887.50	-11742.97	71.92
Wind 60 deg - No Ice		10804.38	-6220.74	259.91
Wind 90 deg - No Ice		11880.95	-84.88	303.40
Wind 120 deg - No Ice		11395.42	6454.75	321.95
Wind 150 deg - No Ice		6940.00	12005.80	310.90
Wind 180 deg - No Ice		-58.43	13586.37	135.79
Wind 210 deg - No Ice		-6859.45	11742.91	-41.65
Wind 240 deg - No Ice		-10977.05	6240.77	25.37
Wind 270 deg - No Ice		-11895.07	16.25	-81.45
Wind 300 deg - No Ice		-11263.82	-6418.53	-244.41
Wind 330 deg - No Ice		-6994.36	-12006.97	-282.55
Member Ice	12773.86			
Guy Ice	3691.28			
Total Weight Ice	63669.55			
Wind 0 deg - Ice		1.96	-6802.75	684.68
Wind 30 deg - Ice		3431.04	-5882.95	630.73
Wind 60 deg - Ice		5919.34	-3411.13	495.44
Wind 90 deg - Ice		6825.66	-27.02	221.92
Wind 120 deg - Ice		5911.80	3371.80	-139.22
Wind 150 deg - Ice		3391.83	5869.94	-441.29
Wind 180 deg - Ice		-16.16	6786.38	-614.48
Wind 210 deg - Ice		-3419.52	5882.92	-618.30

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Dewberry Engineers Inc. 600 Parsippany Road, Suite 301 Parsippany, NJ 07054 Phone: (973) 739-9400 FAX: (973) 739-9710</p>	<p>Job</p> <p style="text-align: center;">West Hartford Center CT</p>	<p>Page</p> <p style="text-align: center;">22 of 38</p>
	<p>Project</p> <p style="text-align: center;">50002925 / 50104156</p>	<p>Date</p> <p style="text-align: center;">09:40:55 09/05/18</p>
	<p>Client</p> <p style="text-align: center;">Verizon Wireless</p>	<p>Designed by</p> <p style="text-align: center;">Bkelsey</p>

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Wind 240 deg - Ice		-5937.95	3389.16	-377.46
Wind 270 deg - Ice		-6831.47	-1.17	-130.70
Wind 300 deg - Ice		-5910.05	-3387.12	166.75
Wind 330 deg - Ice		-3414.15	-5870.42	452.96
Total Weight	13719.66			
Wind 0 deg - Service		8.77	-5059.06	9.63
Wind 30 deg - Service		2529.84	-4313.30	26.42
Wind 60 deg - Service		3968.55	-2284.94	95.47
Wind 90 deg - Service		4363.98	-31.18	111.44
Wind 120 deg - Service		4185.64	2370.89	118.26
Wind 150 deg - Service		2549.13	4409.84	114.20
Wind 180 deg - Service		-21.46	4990.40	49.88
Wind 210 deg - Service		-2519.54	4313.28	-15.30
Wind 240 deg - Service		-4031.97	2292.29	9.32
Wind 270 deg - Service		-4369.17	5.97	-29.92
Wind 300 deg - Service		-4137.31	-2357.59	-89.77
Wind 330 deg - Service		-2569.09	-4410.27	-103.78

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy

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Comb. No.	Description
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	125 - 105	Leg	Max Tension	4	4898.10	-274.66	150.40
			Max. Compression	25	-17948.44	96.55	53.07
			Max. Mx	5	-5226.24	877.88	12.83
			Max. My	2	-5606.45	12.93	-878.91
			Max. Vy	5	1379.20	-327.28	-14.58
			Max. Vx	2	-1569.52	-2.37	310.76
		Diagonal	Max Tension	13	2602.46	0.00	0.00
			Max. Compression	2	-2357.90	0.00	0.00
			Max. Mx	15	-568.85	-6.17	0.07
			Max. My	2	-1939.39	-0.39	0.88
			Max. Vy	15	10.97	-6.17	0.07
			Max. Vx	2	0.37	-0.39	0.88
		Horizontal	Max Tension	10	1814.74	0.00	0.00
			Max. Compression	10	-204.71	0.00	0.00
			Max. Mx	14	1109.48	-19.66	0.00
			Max. My	16	113.80	0.00	0.00
			Max. Vy	14	25.87	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Top Girt	Max Tension	10	157.38	0.00	0.00
			Max. Compression	12	-112.17	0.00	0.00
			Max. Mx	15	105.40	-19.66	0.00
			Max. My	16	46.99	0.00	0.00
			Max. Vy	15	25.87	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Bottom Girt	Max Tension	10	847.40	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	614.21	-19.66	0.00
			Max. My	16	627.93	0.00	0.00
			Max. Vy	14	25.87	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Guy A	Bottom Tension	9	18331.72		
			Top Tension	9	18436.32		
			Top Cable Vert	9	16702.94		
			Top Cable Norm	9	7804.46		
			Top Cable Tan	9	20.13		
			Bot Cable Vert	9	-16505.07		
			Bot Cable Norm	9	7975.89		
			Bot Cable Tan	9	141.00		
		Guy B	Bottom Tension	11	19935.18		
			Top Tension	11	20039.50		
			Top Cable Vert	11	18578.81		
			Top Cable Norm	11	7510.56		
Top Cable Tan	11		31.72				
Bot Cable Vert	11		-18391.99				
Bot Cable Norm	11		7689.18				
Bot Cable Tan	11		151.76				
Guy C	Bottom Tension	4	19480.23				

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Top Tension	4	19577.65		
			Top Cable Vert	4	18072.28		
			Top Cable Norm	4	7528.43		
			Top Cable Tan	4	0.80		
			Bot Cable Vert	4	-17886.81		
			Bot Cable Norm	4	7716.31		
			Bot Cable Tan	4	0.80		
		Top Guy Pull-Off	Max Tension	10	4230.08	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	15	2444.89	20.41	0.00
			Max. My	16	1963.25	0.00	-0.00
			Max. Vy	15	26.86	0.00	0.00
			Max. Vx	16	0.00	0.00	0.00
T2	105 - 85	Leg	Max Tension	4	22176.83	316.11	-151.95
			Max. Compression	2	-54180.53	2.20	177.07
			Max. Mx	5	-11279.13	-615.54	13.97
			Max. My	2	-16156.26	-12.05	636.35
			Max. Vy	10	-2488.44	153.31	-78.05
			Max. Vx	2	-2840.54	2.20	177.07
		Diagonal	Max Tension	4	2988.89	0.00	0.00
			Max. Compression	2	-5634.80	0.00	0.00
			Max. Mx	16	-338.35	-7.02	0.14
			Max. My	12	-2027.49	-0.13	-4.58
			Max. Vy	16	11.13	-7.02	0.14
			Max. Vx	12	1.87	-2.27	-4.57
		Horizontal	Max Tension	17	2253.60	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	1696.55	-19.22	0.00
			Max. My	16	1552.45	0.00	0.00
			Max. Vy	14	-25.29	0.00	0.00
			Max. Vx	16	0.00	0.00	0.00
		Top Girt	Max Tension	2	1459.91	0.00	0.00
			Max. Compression	12	-264.31	0.00	0.00
			Max. Mx	14	788.58	-19.22	0.00
			Max. My	16	770.00	0.00	0.00
			Max. Vy	14	-25.29	0.00	0.00
			Max. Vx	16	0.00	0.00	0.00
		Bottom Girt	Max Tension	4	2094.34	0.00	0.00
			Max. Compression	2	-1130.43	0.00	0.00
			Max. Mx	14	882.86	-19.22	0.00
			Max. My	16	925.51	0.00	0.00
			Max. Vy	14	-25.29	0.00	0.00
			Max. Vx	16	0.00	0.00	0.00
T3	85 - 65	Leg	Max Tension	4	36395.77	121.90	-57.56
			Max. Compression	2	-70546.02	-8.66	65.25
			Max. Mx	10	-52124.90	670.44	-333.47
			Max. My	2	-54184.44	35.55	767.29
			Max. Vy	10	-2483.33	670.44	-333.47
			Max. Vx	2	-2834.45	35.55	767.29
		Diagonal	Max Tension	4	4135.04	0.00	0.00
			Max. Compression	2	-5967.60	0.00	0.00
			Max. Mx	16	-2430.55	-7.58	0.15
			Max. My	12	-2436.22	0.20	-7.83
			Max. Vy	16	11.09	-7.58	0.15
			Max. Vx	12	3.18	-2.72	-7.83
		Horizontal	Max Tension	2	2965.63	0.00	0.00
			Max. Compression	2	-1652.44	0.00	0.00
			Max. Mx	14	2165.30	-18.69	0.00
			Max. My	16	1293.80	0.00	0.00
			Max. Vy	14	24.60	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft	
T4	65 - 45	Top Girt	Max Tension	23	804.15	0.00	0.00	
			Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	14	765.28	-18.69	0.00	
			Max. My	16	766.03	0.00	0.00	
			Max. Vy	14	24.60	0.00	0.00	
			Max. Vx	16	-0.00	0.00	0.00	
			Bottom Girt	Max Tension	17	1311.36	0.00	0.00
				Max. Compression	1	0.00	0.00	0.00
				Max. Mx	14	1214.87	-18.69	0.00
				Max. My	15	1276.73	0.00	-0.00
				Max. Vy	14	24.60	0.00	0.00
			Guy A	Max. Vx	15	0.00	0.00	0.00
				Bottom Tension	10	22817.14		
					10	22898.09		
				Top Cable Vert	10	17612.85		
		Top Cable Norm		10	14632.43			
		Top Cable Tan		10	44.09			
		Bot Cable Vert		10	-17462.24			
		Bot Cable Norm		10	14685.11			
		Bot Cable Tan		10	198.53			
		Guy B		Bottom Tension	10	25930.35		
			Top Tension	10	26011.27			
			Top Cable Vert	10	21134.79			
			Top Cable Norm	10	15162.57			
			Top Cable Tan	10	61.64			
		Guy C	Bot Cable Vert	10	-20993.50			
			Bot Cable Norm	10	15218.81			
			Bot Cable Tan	10	209.11			
			Bottom Tension	6	24511.92			
			Top Tension	6	24582.71			
			Top Cable Vert	6	19323.48			
		Top Guy Pull-Off	Top Cable Norm	6	15195.68			
			Top Cable Tan	6	64.05			
			Bot Cable Vert	6	-19194.46			
			Bot Cable Norm	6	15243.61			
			Bot Cable Tan	6	198.41			
			Max Tension	2	7254.38	0.00	0.00	
			Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	14	4443.33	19.42	0.00	
			Max. My	16	4556.50	0.00	-0.00	
			Max. Vy	14	25.55	0.00	0.00	
		Leg	Max. Vx	16	0.00	0.00	0.00	
Max Tension	4		2251.10	-73.75	48.29			
Max. Compression	2		-53949.20	12.86	-290.30			
Max. Mx	10		-44463.51	-247.01	143.53			
Max. My	2		-46523.89	12.86	-290.33			
Max. Vy	6		-1708.03	-108.77	-57.44			
Max. Vx	2		2000.21	-8.67	126.27			
Diagonal	Max Tension		4	924.84	0.00	0.00		
	Max. Compression		2	-4839.71	0.00	0.00		
	Max. Mx		16	-2736.83	-6.97	0.43		
	Max. My		2	-4834.92	-0.90	7.09		
	Max. Vy		16	10.52	-6.97	0.43		
Horizontal	Max. Vx		2	-2.87	-4.22	7.08		
	Max Tension		17	2947.56	0.00	0.00		
	Max. Compression		1	0.00	0.00	0.00		
	Max. Mx	14	2677.31	-16.94	0.00			
	Max. My	15	2774.03	0.00	-0.00			
	Max. Vy	14	22.29	0.00	0.00			
	Max. Vx	15	0.00	0.00	0.00			
Top Girt	Max Tension	2	1842.66	0.00	0.00			

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft		
T5	45 - 29	Bottom Girt	Max. Compression	1	0.00	0.00	0.00		
			Max. Mx	14	1240.47	-16.94	0.00		
			Max. My	15	1474.36	0.00	-0.00		
			Max. Vy	14	22.29	0.00	0.00		
			Max. Vx	15	0.00	0.00	0.00		
			Max Tension	2	1537.32	0.00	0.00		
			Max. Compression	1	0.00	0.00	0.00		
			Max. Mx	14	1441.68	-16.94	0.00		
			Max. My	15	1459.13	0.00	-0.00		
			Max. Vy	14	22.29	0.00	0.00		
			Max. Vx	15	0.00	0.00	0.00		
			Max Tension	1	0.00	0.00	0.00		
			Leg	Max. Compression	16	-34659.89	1240.91	657.76	
				Max. Mx	15	-34648.15	1244.43	655.66	
				Max. My	17	-34619.53	-44.17	-1400.31	
				Max. Vy	15	5942.53	-1185.19	756.21	
				Max. Vx	17	6815.91	-61.42	19.62	
				Diagonal	Max Tension	1	0.00	0.00	0.00
					Max. Compression	2	-2921.46	0.00	0.00
					Max. Mx	16	-2537.09	-6.41	0.31
		Max. My			2	-2187.93	0.46	1.24	
		Horizontal		Max. Vy	16	9.91	-6.41	0.31	
			Max. Vx	2	0.51	0.46	1.24		
			Max Tension	17	2869.30	0.00	0.00		
			Max. Compression	1	0.00	0.00	0.00		
		Top Girt	Max. Mx	14	2533.42	-16.14	0.00		
			Max. My	15	2851.58	0.00	-0.00		
			Max. Vy	14	-21.23	0.00	0.00		
			Max. Vx	15	0.00	0.00	0.00		
			Max Tension	17	1592.61	0.00	0.00		
			Max. Compression	1	0.00	0.00	0.00		
			Max. Mx	14	1429.86	-16.14	0.00		
			Max. My	15	1530.14	0.00	-0.00		
		Bottom Girt	Max. Vy	14	-21.23	0.00	0.00		
			Max. Vx	15	0.00	0.00	0.00		
			Max Tension	16	5132.28	0.00	0.00		
			Max. Compression	1	0.00	0.00	0.00		
		T6	29 - 25	Leg	Max. Mx	14	5006.13	-16.14	0.00
					Max. My	15	5108.78	0.00	-0.00
					Max. Vy	14	-21.23	0.00	0.00
Max. Vx	15				0.00	0.00	0.00		
Max Tension	1				0.00	0.00	0.00		
Max. Compression	16				-38021.92	51.18	171.52		
Max. Mx	16				-34423.26	1406.48	-52.80		
Max. My	15				-37962.53	48.82	185.97		
Max. Vy	16				7731.00	-379.62	-27.62		
Max. Vx	6				-165.10	-284.95	19.99		
Top Girt	Max Tension			16	4929.85	71.36	-71.49		
	Max. Compression			1	0.00	0.00	0.00		
	Max. Mx			15	4914.93	152.22	-8.42		
	Max. My			15	4920.28	68.83	-73.94		
Bottom Girt	Max. Vy			15	54.23	152.22	-8.42		
	Max. Vx			15	28.78	151.86	-7.01		
	Max Tension			8	9.38	6.14	-133.06		
	Max. Compression			2	-253.69	-6.13	-119.44		
	Max. Mx			15	-206.04	-25.01	-221.21		
	Max. My			16	-200.01	-23.98	-223.58		
Max. Vy	15	-76.12	-25.01	-221.21					
Max. Vx	8	-113.25	-9.22	-144.86					

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Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb	
Mast	Max. Vert	16	104455.97	33.51	-73.57	
	Max. H _x	12	59599.38	547.17	310.32	
	Max. H _z	4	60060.49	-560.20	327.31	
	Max. M _x	1	0.00	9.76	-19.85	
	Max. M _z	1	0.00	9.76	-19.85	
	Max. Torsion	22	449.31	6.99	-80.51	
	Min. Vert	35	48062.12	263.81	-189.22	
	Min. H _x	4	60060.49	-560.20	327.31	
	Min. H _z	8	56673.90	9.25	-863.70	
	Min. M _x	1	0.00	9.76	-19.85	
	Min. M _z	1	0.00	9.76	-19.85	
	Min. Torsion	15	-481.59	0.18	-63.27	
	Guy C @ 37.5 ft Elev 31.5 ft Azimuth 240 deg	Max. Vert	10	-613.14	-152.81	88.75
		Max. H _x	10	-613.14	-152.81	88.75
Max. H _z		3	-36684.28	-19543.30	11582.96	
Min. Vert		5	-36895.08	-19893.52	11201.25	
Min. H _x		5	-36895.08	-19893.52	11201.25	
Min. H _z		10	-613.14	-152.81	88.75	
Guy B @ 39 ft Elev 25 ft Azimuth 120 deg	Max. Vert	6	-793.35	210.44	121.74	
	Max. H _x	11	-39108.19	19814.49	11135.09	
	Max. H _z	13	-38762.16	19400.89	11503.84	
	Min. Vert	11	-39108.19	19814.49	11135.09	
	Min. H _x	6	-793.35	210.44	121.74	
	Min. H _z	6	-793.35	210.44	121.74	
Guy A @ 45 ft Elev 25 ft Azimuth 0 deg	Max. Vert	2	-604.07	0.30	-203.14	
	Max. H _x	10	-32899.82	452.01	-22107.60	
	Max. H _z	2	-604.07	0.30	-203.14	
	Min. Vert	9	-33604.69	239.17	-22376.61	
	Min. H _x	6	-32688.36	-414.37	-21987.00	
	Min. H _z	9	-33604.69	239.17	-22376.61	

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _z lb-ft	Torque lb-ft
Dead Only	48489.68	-9.76	19.85	0.00	0.00	-2.80
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	90344.43	-1.09	-209.01	0.00	0.00	25.58
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	73878.09	348.37	-67.95	0.00	0.00	77.75
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	60060.49	560.20	-327.31	0.00	0.00	245.83
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	71763.73	252.62	-205.27	0.00	0.00	229.90

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Dewberry Engineers Inc. 600 Parsippany Road, Suite 301 Parsippany, NJ 07054 Phone: (973) 739-9400 FAX: (973) 739-9710</p>	Job	West Hartford Center CT	Page	28 of 38	
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<i>Load Combination</i>	<i>Vertical lb</i>	<i>Shear_x lb</i>	<i>Shear_z lb</i>	<i>Overturning Moment, M_x lb-ft</i>	<i>Overturning Moment, M_z lb-ft</i>	<i>Torque lb-ft</i>
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	85705.86	270.77	328.40	0.00	0.00	243.59
1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy	69954.47	-70.88	556.54	0.00	0.00	320.77
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	56673.90	-9.25	863.70	0.00	0.00	166.00
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	71145.68	57.22	549.39	0.00	0.00	-31.35
1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy	88289.61	-234.00	311.95	0.00	0.00	40.12
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	73754.68	-226.10	-203.04	0.00	0.00	-47.23
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	59599.38	-547.17	-310.32	0.00	0.00	-256.06
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	74632.49	-353.51	-36.58	0.00	0.00	-283.02
1.2 Dead+1.0 Ice+1.0 Temp+Guy	102204.83	-7.13	66.06	0.00	0.00	-1.42
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	104348.57	-0.18	63.27	0.00	0.00	481.59
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	104455.97	-33.51	73.57	0.00	0.00	456.33
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	104289.62	-52.37	78.71	0.00	0.00	327.16
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	103823.21	-40.44	84.18	0.00	0.00	107.99
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	103063.13	5.93	104.20	0.00	0.00	-117.85
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	103031.17	-14.63	79.04	0.00	0.00	-297.21
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	102868.93	-13.65	69.88	0.00	0.00	-431.60
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	102641.36	-6.99	80.51	0.00	0.00	-449.31
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	102466.66	-12.44	107.69	0.00	0.00	-253.16
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	102991.03	36.20	92.97	0.00	0.00	-50.87
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	103508.75	48.14	93.64	0.00	0.00	137.17
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	104064.51	29.19	87.66	0.00	0.00	309.58
Dead+ Wind 0 deg - Service+Guy	48655.28	-6.48	-307.08	0.00	0.00	5.68
Dead+ Wind 30 deg - Service+Guy	48829.81	84.33	-171.10	0.00	0.00	21.43
Dead+ Wind 60 deg - Service+Guy	48962.26	168.12	-96.80	0.00	0.00	62.05
Dead+ Wind 90 deg - Service+Guy	48927.45	179.88	23.05	0.00	0.00	66.28
Dead+ Wind 120 deg - Service+Guy	48837.79	245.81	186.77	0.00	0.00	78.41
Dead+ Wind 150 deg - Service+Guy	48618.43	86.52	209.34	0.00	0.00	85.46
Dead+ Wind 180 deg - Service+Guy	48408.74	-10.64	256.35	0.00	0.00	37.20
Dead+ Wind 210 deg - Service+Guy	48231.26	-108.02	211.07	0.00	0.00	-12.45
Dead+ Wind 240 deg - Service+Guy	48062.12	-263.81	189.22	0.00	0.00	10.86
Dead+ Wind 270 deg -	48144.62	-198.42	26.26	0.00	0.00	-10.67

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Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _z lb-ft	Torque lb-ft
Service+Guy						
Dead+Wind 300 deg - Service+Guy	48252.16	-185.36	-94.89	0.00	0.00	-60.01
Dead+Wind 330 deg - Service+Guy	48434.03	-99.45	-169.68	0.00	0.00	-78.20

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-13719.60	0.00	-3.43	13719.54	-5.25	0.046%
2	37.64	-16337.41	-23078.22	-39.89	16336.50	23045.77	0.115%
3	10134.30	-16316.15	-17235.90	-10135.09	16315.74	17218.62	0.067%
4	18216.00	-16300.41	-10476.51	-18209.99	16300.27	10470.54	0.032%
5	20085.69	-16328.12	-135.71	-20069.63	16327.70	144.54	0.071%
6	20113.34	-16357.85	11401.02	-20085.79	16356.99	-11385.12	0.112%
7	9929.28	-16347.96	17155.62	-9914.45	16347.56	-17146.61	0.068%
8	-92.92	-16334.56	20754.60	96.72	16334.32	-20739.40	0.059%
9	-10089.42	-16355.82	17235.81	10073.99	16355.44	-17227.91	0.067%
10	-20245.57	-16371.56	11520.83	20215.94	16370.66	-11506.35	0.116%
11	-20108.29	-16343.84	25.91	20089.26	16343.35	-17.05	0.081%
12	-18149.48	-16314.11	-10330.80	18139.82	16313.79	10313.02	0.076%
13	-10016.25	-16324.01	-17157.50	10014.37	16323.53	17137.52	0.078%
14	0.00	-66285.50	0.00	-1.13	66285.49	-5.62	0.009%
15	1.27	-66286.31	-7865.99	-2.06	66286.21	7858.63	0.011%
16	3974.01	-66266.06	-6805.05	-3973.92	66265.96	6796.52	0.013%
17	6867.03	-66251.22	-3945.44	-6862.14	66251.15	3940.34	0.011%
18	7923.50	-66278.38	-26.78	-7919.07	66278.34	27.94	0.007%
19	6859.94	-66307.37	3907.15	-6855.51	66307.32	-3904.78	0.008%
20	3935.75	-66297.82	6793.22	-3932.17	66297.79	-6790.31	0.007%
21	-15.47	-66284.69	7849.62	16.33	66284.66	-7844.36	0.008%
22	-3962.49	-66304.94	6805.03	3959.04	66304.91	-6802.58	0.006%
23	-6885.65	-66319.78	3923.47	6879.69	66319.72	-3921.25	0.010%
24	-7929.31	-66292.61	-1.41	7923.45	66292.57	1.87	0.009%
25	-6858.19	-66263.63	-3922.47	6854.70	66263.59	3918.34	0.008%
26	-3958.07	-66273.17	-6793.70	3956.92	66273.11	6788.05	0.009%
27	8.65	-13719.54	-5298.86	-9.65	13719.53	5294.58	0.030%
28	2326.52	-13715.05	-3956.82	-2325.14	13715.03	3953.72	0.023%
29	4181.82	-13711.43	-2405.08	-4178.49	13711.41	2403.34	0.026%
30	4611.04	-13717.79	-31.16	-4607.02	13717.78	31.24	0.028%
31	4617.39	-13724.62	2617.32	-4613.14	13724.60	-2615.30	0.032%
32	2279.45	-13722.35	3938.39	-2277.08	13722.34	-3935.63	0.025%
33	-21.33	-13719.27	4764.60	21.69	13719.26	-4761.54	0.021%
34	-2316.21	-13724.15	3956.80	2314.34	13724.15	-3954.68	0.020%
35	-4647.74	-13727.77	2644.82	4643.60	13727.76	-2644.07	0.029%
36	-4616.23	-13721.40	5.95	4611.59	13721.39	-7.16	0.033%
37	-4166.55	-13714.58	-2371.63	4161.96	13714.57	2368.70	0.037%
38	-2299.41	-13716.85	-3938.82	2296.38	13716.84	3935.05	0.033%

Non-Linear Convergence Results

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Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00041742
2	Yes	15	0.00082572	0.00081444
3	Yes	15	0.00064723	0.00051545
4	Yes	10	0.00041506	0.00048907
5	Yes	14	0.00069853	0.00057243
6	Yes	14	0.00087257	0.00086804
7	Yes	14	0.00067998	0.00057512
8	Yes	9	0.00070166	0.00087415
9	Yes	15	0.00066371	0.00051078
10	Yes	15	0.00083464	0.00079379
11	Yes	15	0.00071319	0.00058226
12	Yes	10	0.00086693	0.00083235
13	Yes	15	0.00068492	0.00059590
14	Yes	7	0.00000001	0.00027591
15	Yes	11	0.00076358	0.00032815
16	Yes	10	0.00090609	0.00039979
17	Yes	9	0.00075114	0.00037053
18	Yes	10	0.00000001	0.00022535
19	Yes	10	0.00000001	0.00023356
20	Yes	10	0.00000001	0.00021989
21	Yes	9	0.00000001	0.00025333
22	Yes	10	0.00000001	0.00021423
23	Yes	10	0.00078302	0.00030642
24	Yes	10	0.00064062	0.00028382
25	Yes	10	0.00054307	0.00022953
26	Yes	11	0.00057426	0.00024890
27	Yes	8	0.00000001	0.00040092
28	Yes	8	0.00000001	0.00034761
29	Yes	8	0.00000001	0.00040015
30	Yes	8	0.00000001	0.00041596
31	Yes	8	0.00000001	0.00045183
32	Yes	8	0.00000001	0.00034021
33	Yes	8	0.00000001	0.00029510
34	Yes	8	0.00000001	0.00030505
35	Yes	8	0.00000001	0.00044353
36	Yes	8	0.00000001	0.00047889
37	Yes	8	0.00000001	0.00051409
38	Yes	8	0.00000001	0.00044332

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	125 - 105	1.517	37	0.1003	0.0619
T2	105 - 85	1.102	27	0.1046	0.0557
T3	85 - 65	0.659	27	0.0899	0.0448
T4	65 - 45	0.378	27	0.0512	0.0445
T5	45 - 29	0.201	27	0.0443	0.0428
T6	29 - 25	0.042	27	0.0496	0.0388

Critical Deflections and Radius of Curvature - Service Wind

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Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
125.00	10'x3" Dia Omni	37	1.517	0.1003	0.0619	176659
122.00	VHLP1-23	37	1.456	0.1014	0.0612	176659
119.00	VHLP1-23	37	1.395	0.1024	0.0604	147216
118.00	VHLP1-23	37	1.374	0.1027	0.0602	126185
116.96	Guy	27	1.353	0.1030	0.0599	109840
106.00	valmont 12' T-Frame	27	1.124	0.1047	0.0561	51384
76.96	Guy	27	0.524	0.0742	0.0443	23857
69.00	4' Yagi	27	0.421	0.0578	0.0445	30882
55.00	4' Yagi	27	0.286	0.0431	0.0441	91149
32.00	2'x2'x1' junction box	27	0.074	0.0486	0.0396	181524

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	125 - 105	12.879	2	0.8279	0.3396
T2	105 - 85	9.415	2	0.8336	0.3206
T3	85 - 65	5.981	10	0.7204	0.2973
T4	65 - 45	3.526	10	0.4868	0.2766
T5	45 - 29	1.751	10	0.4145	0.2562
T6	29 - 25	0.357	10	0.4234	0.2326

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
125.00	10'x3" Dia Omni	2	12.879	0.8279	0.3396	52730
122.00	VHLP1-23	2	12.368	0.8318	0.3369	52730
119.00	VHLP1-23	2	11.856	0.8353	0.3342	43942
118.00	VHLP1-23	2	11.684	0.8363	0.3333	37664
116.96	Guy	2	11.505	0.8372	0.3324	32785
106.00	valmont 12' T-Frame	2	9.593	0.8352	0.3216	15597
76.96	Guy	10	4.869	0.6253	0.2884	4269
69.00	4' Yagi	10	3.940	0.5276	0.2804	5444
55.00	4' Yagi	10	2.601	0.4291	0.2673	14208
32.00	2'x2'x1' junction box	10	0.623	0.4212	0.2371	56077

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T1	125	Leg	A325N	0.7500	3	1994.27	29820.60	0.067	✓	1 Bolt Tension
		Top Girt	A325N	0.6250	1	157.38	6830.86	0.023	✓	1 Member Block Shear

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T2	105	Leg	A325N	0.7500	3	7392.28	29820.60	0.248	✓	1 Bolt Tension
		Top Girt	A325N	0.6250	1	1459.91	6830.86	0.214	✓	1 Member Block Shear
T3	85	Leg	A325N	0.7500	3	5994.07	29820.60	0.201	✓	1 Bolt Tension
		Top Girt	A325N	0.6250	1	804.15	6830.86	0.118	✓	1 Member Block Shear
T4	65	Leg	A325N	0.7500	3	3769.49	29820.60	0.126	✓	1 Bolt Tension
T5	45	Leg	A325N	0.7500	3	3851.10	29820.60	0.129	✓	1 Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
T1	116.96 (A) (258)	3/4 EHS	5830.00	58299.91	18436.30	34980.00	1.000	1.897 ✓
	116.96 (B) (257)	3/4 EHS	5830.00	58299.91	20039.50	34980.00	1.000	1.746 ✓
	116.96 (C) (256)	3/4 EHS	5830.00	58299.91	19577.70	34980.00	1.000	1.787 ✓
T3	76.96 (A) (261)	7/8 EHS	7970.00	79699.84	22898.10	47820.00	1.000	2.088 ✓
	76.96 (B) (260)	7/8 EHS	7970.00	79699.84	26011.30	47820.00	1.000	1.838 ✓
	76.96 (C) (259)	7/8 EHS	7970.00	79699.84	24582.70	47820.00	1.000	1.945 ✓

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	Mast Stability Index	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	2	20.00	3.92	94.0 K=1.00	3.1416	1.00	-16241.10	74093.50	0.219 ¹ ✓
T2	105 - 85	2	20.00	3.92	94.0 K=1.00	3.1416	1.00	-45727.90	74093.50	0.617 ¹ ✓
T3	85 - 65	2 1/4	20.00	3.92	83.6 K=1.00	3.9761	1.00	-70546.00	107392.00	0.657 ¹ ✓
T4	65 - 45	2	20.00	3.92	94.0 K=1.00	3.1416	1.00	-46576.10	74093.50	0.629 ¹ ✓
T5	45 - 29	2	16.00	3.90	93.5 K=1.00	3.1416	1.00	-31415.50	74603.20	0.421 ¹ ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	Mast Stability Index	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T6	29 - 25	2	4.37	3.05	73.1 K=1.00	3.1416	1.00	-38021.90	95668.20	0.397 ¹

¹ P_u / φP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	7/8	4.96	2.34	115.7 K=0.90	0.6013	-2357.90	9631.38	0.245 ¹
T2	105 - 85	7/8	4.96	2.34	115.7 K=0.90	0.6013	-5634.81	9631.38	0.585 ¹
T3	85 - 65	7/8	4.96	2.33	114.8 K=0.90	0.6013	-5967.60	9729.92	0.613 ¹
T4	65 - 45	7/8	4.96	2.34	115.7 K=0.90	0.6013	-4839.71	9631.38	0.502 ¹
T5	45 - 29	7/8	4.94	2.34	115.3 K=0.90	0.6013	-2921.46	9676.41	0.302 ¹

¹ P_u / φP_n controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	L2x2x3/16	3.04	2.87	103.8 K=1.19	0.7150	-204.71	13143.80	0.016 ¹
T3	85 - 65	L2x2x3/16	3.04	2.85	103.4 K=1.19	0.7150	-1652.44	13189.30	0.125 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	L2x2x3/16	3.04	2.63	100.1 K=1.25	0.7150	-112.17	13668.70	0.008 ¹
T2	105 - 85	L2x2x3/16	3.04	2.63	100.1 K=1.25	0.7150	-264.31	13668.70	0.019 ¹

tnxTower Dewberry Engineers Inc. 600 Parsippany Road, Suite 301 Parsippany, NJ 07054 Phone: (973) 739-9400 FAX: (973) 739-9710	Job	West Hartford Center CT	Page	34 of 38
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	Client	Verizon Wireless	Designed by	Bkelsey

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
									✓

¹ P_u / φP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	105 - 85	L2x2x3/16	3.04	2.87	103.8 K=1.19	0.7150	-1130.43	13143.80	0.086 ¹ ✓
T6	29 - 25	12" x 3/8" Plate	0.76	0.59	65.8 K=1.00	4.5000	-253.69	116106.00	0.002 ¹ ✓

¹ P_u / φP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	2	20.00	3.92	94.0	3.1416	4898.10	141372.00	0.035 ¹ ✓
T2	105 - 85	2	20.00	0.21	5.0	3.1416	22176.80	141372.00	0.157 ¹ ✓
T3	85 - 65	2 1/4	20.00	3.92	83.6	3.9761	36395.80	178924.00	0.203 ¹ ✓
T4	65 - 45	2	20.00	0.21	5.0	3.1416	2251.10	141372.00	0.016 ¹ ✓

¹ P_u / φP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	7/8	4.96	2.34	128.5	0.6013	2602.46	19482.80	0.134 ¹ ✓
T2	105 - 85	7/8	4.96	2.34	128.5	0.6013	2988.89	19482.80	0.153 ¹ ✓

tnxTower Dewberry Engineers Inc. 600 Parsippany Road, Suite 301 Parsippany, NJ 07054 Phone: (973) 739-9400 FAX: (973) 739-9710	Job	West Hartford Center CT	Page	35 of 38
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	Client	Verizon Wireless	Designed by	Bkelsey

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T3	85 - 65	7/8	4.96	2.33	127.6	0.6013	4135.04	19482.80	0.212 ¹ ✓
T4	65 - 45	7/8	4.96	2.34	128.5	0.6013	924.84	19482.80	0.047 ¹ ✓

¹ P_u / φP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	L2x2x3/16	3.04	2.87	55.9	0.7150	1814.74	23166.00	0.078 ¹ ✓
T2	105 - 85	L2x2x3/16	3.04	2.87	55.9	0.7150	2253.60	23166.00	0.097 ¹ ✓
T3	85 - 65	L2x2x3/16	3.04	2.85	55.5	0.7150	2965.63	23166.00	0.128 ¹ ✓
T4	65 - 45	L2x2x1/8	3.04	2.87	55.1	0.4844	2947.56	15693.80	0.188 ¹ ✓
T5	45 - 29	L2x2x1/8	3.04	2.87	55.1	0.4844	2869.30	15693.80	0.183 ¹ ✓

¹ P_u / φP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	L2x2x3/16	3.04	2.63	55.9	0.4308	157.38	18739.00	0.008 ¹ ✓
T2	105 - 85	L2x2x3/16	3.04	2.63	55.9	0.4308	1459.91	18739.00	0.078 ¹ ✓
T3	85 - 65	L2x2x3/16	3.04	2.61	55.5	0.4308	804.15	18739.00	0.043 ¹ ✓
T4	65 - 45	L2x2x1/8	3.04	2.87	55.1	0.4844	1842.66	15693.80	0.117 ¹ ✓
T5	45 - 29	L2x2x1/8	3.04	2.87	55.1	0.4844	1592.61	15693.80	0.101 ¹ ✓
T6	29 - 25	L3x3x1/8	2.88	2.71	34.3	0.7344	4929.85	23793.80	0.207 ¹ ✓

¹ P_u / φP_n controls

tnxTower Dewberry Engineers Inc. 600 Parsippany Road, Suite 301 Parsippany, NJ 07054 Phone: (973) 739-9400 FAX: (973) 739-9710	Job West Hartford Center CT	Page 36 of 38
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	Client Verizon Wireless	Designed by Bkelsey

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	L2x2x3/16	3.04	2.87	55.9	0.7150	847.40	23166.00	0.037 ¹
T2	105 - 85	L2x2x3/16	3.04	2.87	55.9	0.7150	2094.34	23166.00	0.090 ¹
T3	85 - 65	L2x2x3/16	3.04	2.85	55.5	0.7150	1311.36	23166.00	0.057 ¹
T4	65 - 45	L2x2x1/8	3.04	2.87	55.1	0.4844	1537.32	15693.80	0.098 ¹
T5	45 - 29	L2x2x1/8	3.04	2.87	55.1	0.4844	5132.28	15693.80	0.327 ¹
T6	29 - 25	12" x 3/8" Plate	0.76	0.59	65.8	4.5000	9.38	145800.00	0.000 ¹

¹ P_u / φP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	125 - 105	3" x 1/4" Plate	3.04	2.87	477.8	0.7500	2484.12	24300.00	0.102
T3	85 - 65	3" x 1/4" Plate	3.04	2.85	474.3	0.7500	7254.38	24300.00	0.299 ¹

¹ P_u / φP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M _{ux} lb-ft	φM _{ux} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M _{uy} lb-ft	φM _{uy} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T1	125 - 105	3" x 1/4" Plate	20.41	126.56	0.161	-0.00	1518.75	0.000
T3	85 - 65	3" x 1/4" Plate	0.00	126.56	0.000	0.00	1518.75	0.000

Top Guy Pull-Off 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	125 - 105	3" x 1/4" Plate	0.102	0.161	0.000	0.212	1.000	4.8.1 ✓

tnxTower Dewberry Engineers Inc. 600 Parsippany Road, Suite 301 Parsippany, NJ 07054 Phone: (973) 739-9400 FAX: (973) 739-9710	Job West Hartford Center CT	Page 37 of 38
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	Client Verizon Wireless	Designed by Bkelsey

Section No.	Elevation ft	Size	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
			P_u	M_{ux}	M_{uy}			
			ϕP_n	ϕM_{nx}	ϕM_{ny}			
T3	85 - 65	3" x 1/4" Plate	0.299	0.000	0.000	0.299 ¹	1.000	4.8.1 ✓

¹ $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	125 - 105	Leg	2	2	-16241.10	74093.50	21.9	Pass
		Diagonal	7/8	40	-2357.90	9631.38	24.5	Pass
		Horizontal	L2x2x3/16	17	1814.74	23166.00	7.8	Pass
		Top Girt	L2x2x3/16	5	157.38	18739.00	0.8	Pass
		Bottom Girt	L2x2x3/16	8	847.40	23166.00	3.7	Pass
		Guy A@116.958	3/4	258	18436.30	34980.00	52.7	Pass
		Guy B@116.958	3/4	257	20039.50	34980.00	57.3	Pass
		Guy C@116.958	3/4	256	19577.70	34980.00	56.0	Pass
		Top Guy	3" x 1/4" Plate	35	2484.12	24300.00	21.2	Pass
		Pull-Off@116.958						
T2	105 - 85	Leg	2	54	-45727.90	74093.50	61.7	Pass
		Diagonal	7/8	64	-5634.81	9631.38	58.5	Pass
		Horizontal	L2x2x3/16	68	2253.60	23166.00	9.7	Pass
		Top Girt	L2x2x3/16	55	1459.91	18739.00	7.8	Pass
		Bottom Girt	L2x2x3/16	59	2094.34	23166.00	9.0	Pass
T3	85 - 65	Leg	2 1/4	105	-70546.00	107392.00	65.7	Pass
		Diagonal	7/8	151	-5967.60	9729.92	61.3	Pass
		Horizontal	L2x2x3/16	119	2965.63	23166.00	12.8	Pass
		Top Girt	L2x2x3/16	107	804.15	18739.00	4.3	Pass
		Bottom Girt	L2x2x3/16	110	1311.36	23166.00	5.7	Pass
		Guy A@76.9583	7/8	261	22898.10	47820.00	47.9	Pass
		Guy B@76.9583	7/8	260	26011.30	47820.00	54.4	Pass
		Guy C@76.9583	7/8	259	24582.70	47820.00	51.4	Pass
		Top Guy	3" x 1/4" Plate	136	7254.38	24300.00	29.9	Pass
		Pull-Off@76.9583						
T4	65 - 45	Leg	2	156	-46576.10	74093.50	62.9	Pass
		Diagonal	7/8	204	-4839.71	9631.38	50.2	Pass
		Horizontal	L2x2x1/8	197	2947.56	15693.80	18.8	Pass
		Top Girt	L2x2x1/8	158	1842.66	15693.80	11.7	Pass
		Bottom Girt	L2x2x1/8	160	1537.32	15693.80	9.8	Pass
T5	45 - 29	Leg	2	207	-31415.50	74603.20	42.1	Pass
		Diagonal	7/8	246	-2921.46	9676.41	30.2	Pass
		Horizontal	L2x2x1/8	239	2869.30	15693.80	18.3	Pass
		Top Girt	L2x2x1/8	209	1592.61	15693.80	10.1	Pass
		Bottom Girt	L2x2x1/8	211	5132.28	15693.80	32.7	Pass
T6	29 - 25	Leg	2	248	-38021.90	95668.20	39.7	Pass
		Top Girt	L3x3x1/8	250	4929.85	23793.80	20.7	Pass
		Bottom Girt	12" x 3/8" Plate	254	-253.69	116106.00	0.2	Pass
Summary								
						Leg (T3)	65.7	Pass
						Diagonal (T3)	61.3	Pass
						Horizontal (T4)	18.8	Pass
						Top Girt	20.7	Pass

<i>tnxTower</i> <i>Dewberry Engineers Inc.</i> 600 Parsippany Road, Suite 301 Parsippany, NJ 07054 Phone: (973) 739-9400 FAX: (973) 739-9710	Job West Hartford Center CT	Page 38 of 38
	Project 50002925 / 50104156	Date 09:40:55 09/05/18
	Client Verizon Wireless	Designed by Bkelsey

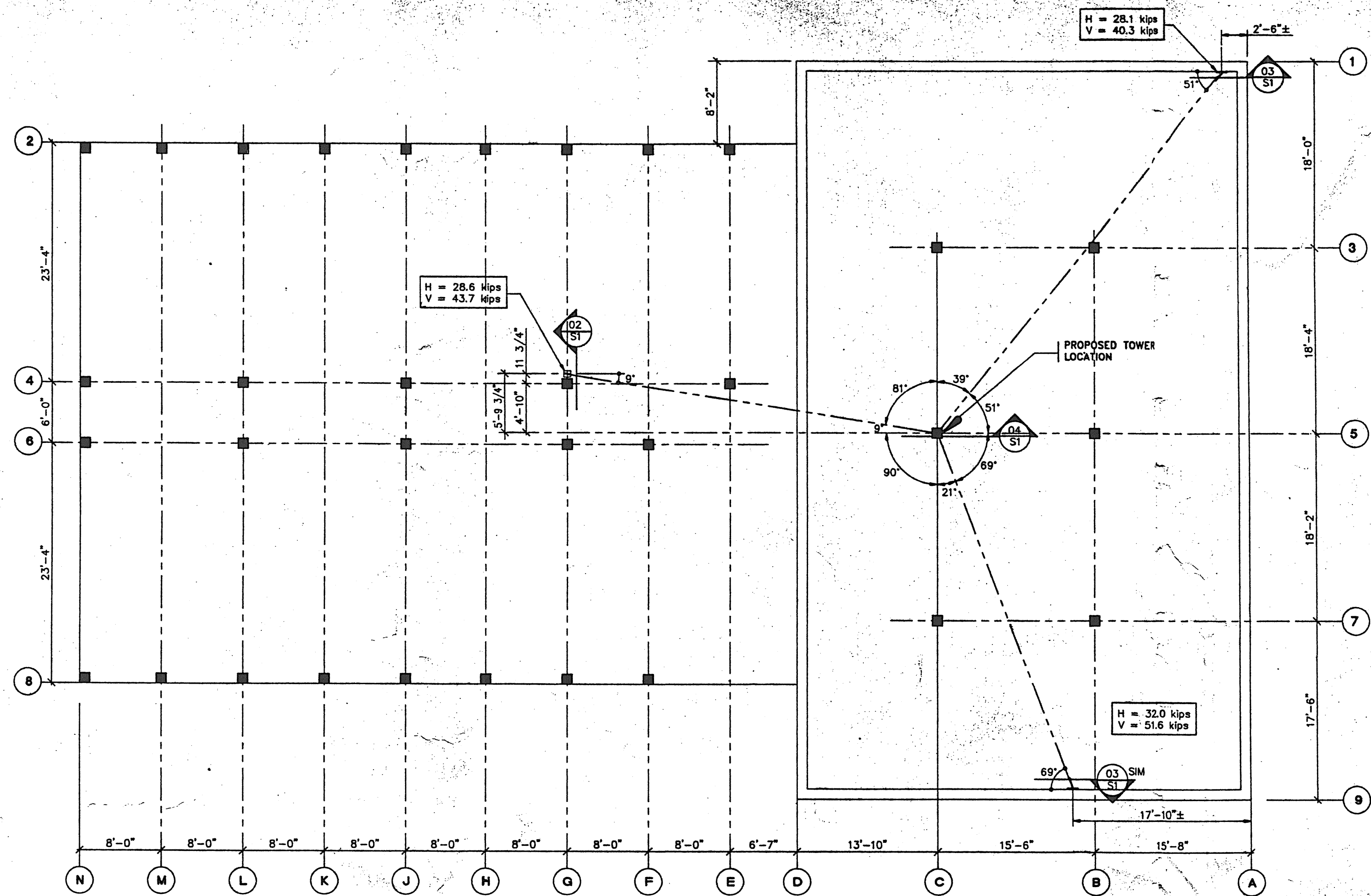
Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
						(T6)		
						Bottom Girt (T5)	32.7	Pass
						Guy A (T1)	52.7	Pass
						Guy B (T1)	57.3	Pass
						Guy C (T1)	56.0	Pass
						Top Guy Pull-Off (T3)	29.9	Pass
						Bolt Checks	24.8	Pass
						RATING =	65.7	Pass

APPENDIX B
REFERENCED STRUCTURAL ANALYSIS REPORT

Municipality	Ultimate Wind Speed, V_{ult}	Nominal Wind Speed, V_{asd}	Seismic Design Category ¹		Ground Snow Load, P_g (psf)
			Site (Soil) Class A-D	Site (Soil) Class E	
Tolland	125	97	B	B	35
Torrington	120	93	B	B	40
Trumbull	125	97	B	C	30
Union	125	97	B	B	40
Vernon	125	97	B	B	30
Voluntown	135	105	B	B	30
Wallingford	125	97	B	B	30
Warren	115	89	B	B	40
Washington	120	93	B	B	35
Waterbury	125	97	B	B	35
Waterford ²	135	105	B	B	30
Watertown	120	93	B	B	35
Westbrook ²	135	105	B	B	30
West Hartford	125	97	B	B	30
West Haven	125	97	B	B	30
Weston	120	93	B	C	30
Westport	120	93	B	C	30
Wethersfield	125	97	B	B	30
Willington	125	97	B	B	35
Wilton	120	93	B	C	30
Winchester	120	93	B	B	40
Windham	130	101	B	B	30
Windsor	125	97	B	B	35
Windsor Locks	125	97	B	B	35
Wolcott	125	97	B	B	35
Woodbridge	125	97	B	B	30
Woodbury	120	93	B	B	35
Woodstock	130	101	B	B	40

Footnotes:

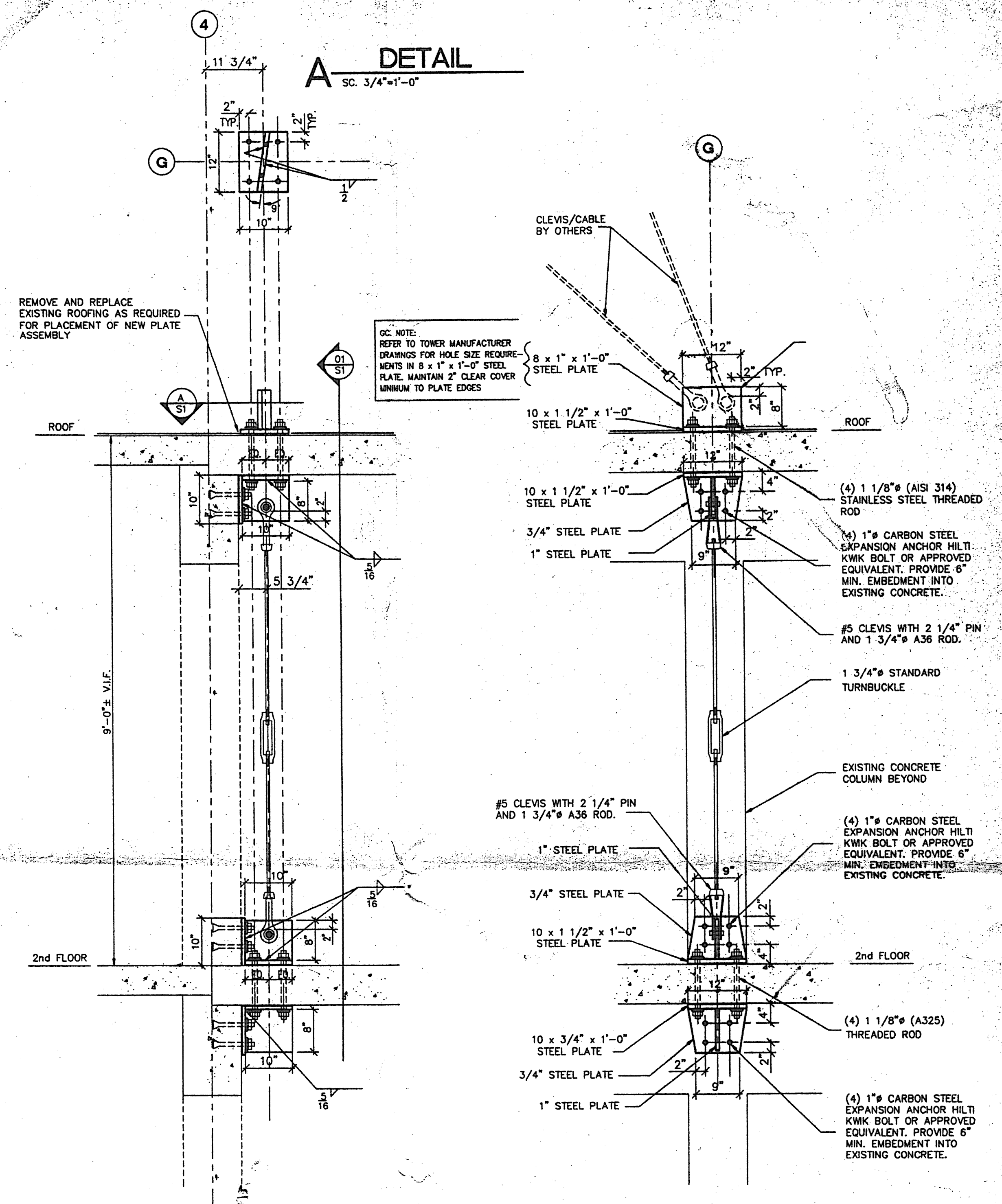
1. If *Site Class F* is present, the Short Period Spectral Response Acceleration (S_{DS}) shall be determined according to Section 1613.3 of the *International Building Code*, and the *Seismic Design Category* shall be determined in accordance with Table 301.2.2.1.1.
2. Areas south of Interstate 95 in this municipality are classified as a *wind-borne debris region*. See Section R202 for exceptions.



ROOF FRAMING PLAN

SC. 1/8"=1'-0"

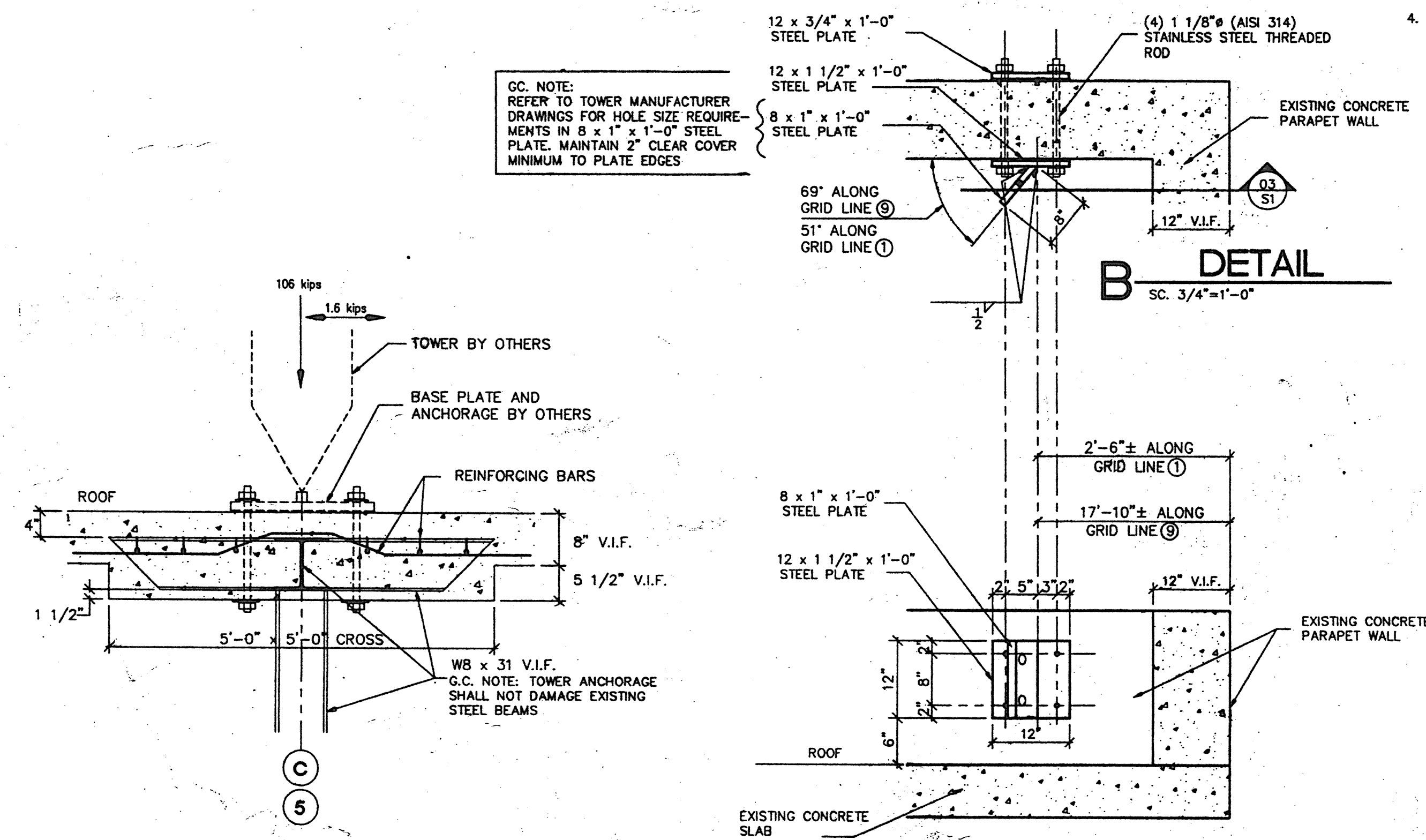
1. VERIFY ALL DIMENSIONS IN THE FIELD PRIOR TO START OF NEW WORK
2. FILL ALL VOIDS WHERE NEW PLATES COME IN CONTACT WITH EXISTING CONCRETE WITH NON SHRINK GROUT FOR FULL BEARING.
3. ALL REACTIONS ARE FURNISHED BY PAUL J. FORD AND CO. DATED 10/14/97. TOWER AND CABLE DESIGNS FURNISHED BY OTHERS
4. EXISTING DRAWING INFORMATION PER DRAWINGS PREPARED BY MYLCHREEST AND REYNOLDS CONSULTING ENGINEERS DATED MARCH 1946 AND DRAWINGS BY JOHN HUNTINGTON A.I.A. DATED MAY 1952.



02 SECTION SC. 3/4"=1'-0"

01 SECTION SC. 3/4"=1'-0"

- STEEL NOTES:
1. ALL STEEL SHALL BE ASTM-A36 (UNLESS OTHERWISE NOTED ON DRAWINGS).
 2. ALL STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH THE AISC "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS - ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN" (AISC/ASD - 89).
 3. ALL EXTERIOR STEEL SHALL BE HOT DIPPED GALVANIZED.
 4. ALL WELDS SHALL BE MADE ONLY BY WELDERS WHO HAVE BEEN QUALIFIED AS PRESCRIBED IN THE "STANDARD CODE OF WELDING IN BUILDING CONSTRUCTION" OF THE AMERICAN WELDING SOCIETY (AWS D1.1-90).
 5. SUBMIT SHOP DRAWINGS, FOR REVIEW PRIOR TO FABRICATION.



04 SECTION SC. 3/4"=1'-0"

03 SECTION SC. 3/4"=1'-0"

rev. no.	by	date	remarks
CELLULAR ANTENNA • 14 - 20 ISHAM ROAD WEST HARTFORD, CONNECTICUT			
ROOF FRAMING PLAN			
CIANCI & CIANCI STRUCTURAL ENGINEERS HARTFORD, CT (860) 627-6415			drawing no.
job no.	scale	date	S-1
97-119-01	AS NOTED	10/22/97	

C:\CAD\DWG\97\095\9711901 Wed Oct 22 15:51:22 1997

Prepared by: Paul J. Ford and Company 250 East Broad Street Suite 500 Columbus, Ohio 43215 (614)-221-6679 Fax (614)-221-0166

19636971

Tower 100 FT GUYED
 Location HARTFORD COUNTY, CT
 Client GENERAL TOWER CO.
 Design 80 MPH + SIMULTANEOUS 1/2" ICE
 According to ANSI/EIA 222-F 1996

P.O. BOX 8597 FORT WORTH, TX 76124-0597
 (817) 457-3060 FAX (817) 429-6016
 Page 1 Of 1
 By KRH Date _____
 FWT No. _____ PJF No. 19-636-97R
 Revision No. 1 Date 11-10-1997

ANTENNA LIST

NO	EL.	ANTENNA	AZ	COAX
1-4	98'	(4)ALP9212	0°	(4)-1 5/8"
5-8	98'	(4)ALP9212	120°	(4)-1 5/8"
9-12	98'	(4)ALP9212	240°	(4)-1 5/8"
-	98'	SECTOR ANTENNA MOUNT		
13-16	78'	(4)ALP9212	0°	(4)-1 5/8"
17-20	78'	(4)ALP9212	120°	(4)-1 5/8"
21-24	78'	(4)ALP9212	240°	(4)-1 5/8"
-	78'	SECTOR ANTENNA MOUNT		
25-27	72'	(3)PD220	-	(3)-7/8"
-	72'	(3)6' SIDEARMS	-	-
28-31	65'	(4)ALP9212	0°	(4)-1 5/8"
32-35	65'	(4)ALP9212	120°	(4)-1 5/8"
36-39	65'	(4)ALP9212	240°	(4)-1 5/8"
-	65'	SECTOR ANTENNA MOUNT		
40-42	50'	(3)PD220	-	(3)-7/8"
-	50'	(3)6' SIDEARMS	-	-

- STEP BOLTS ON ONE TOWER LEG
- COAX ASSUMED TO BE EQUALLY DISTRIBUTED TO ALL THREE TOWER FACES

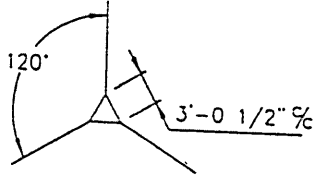
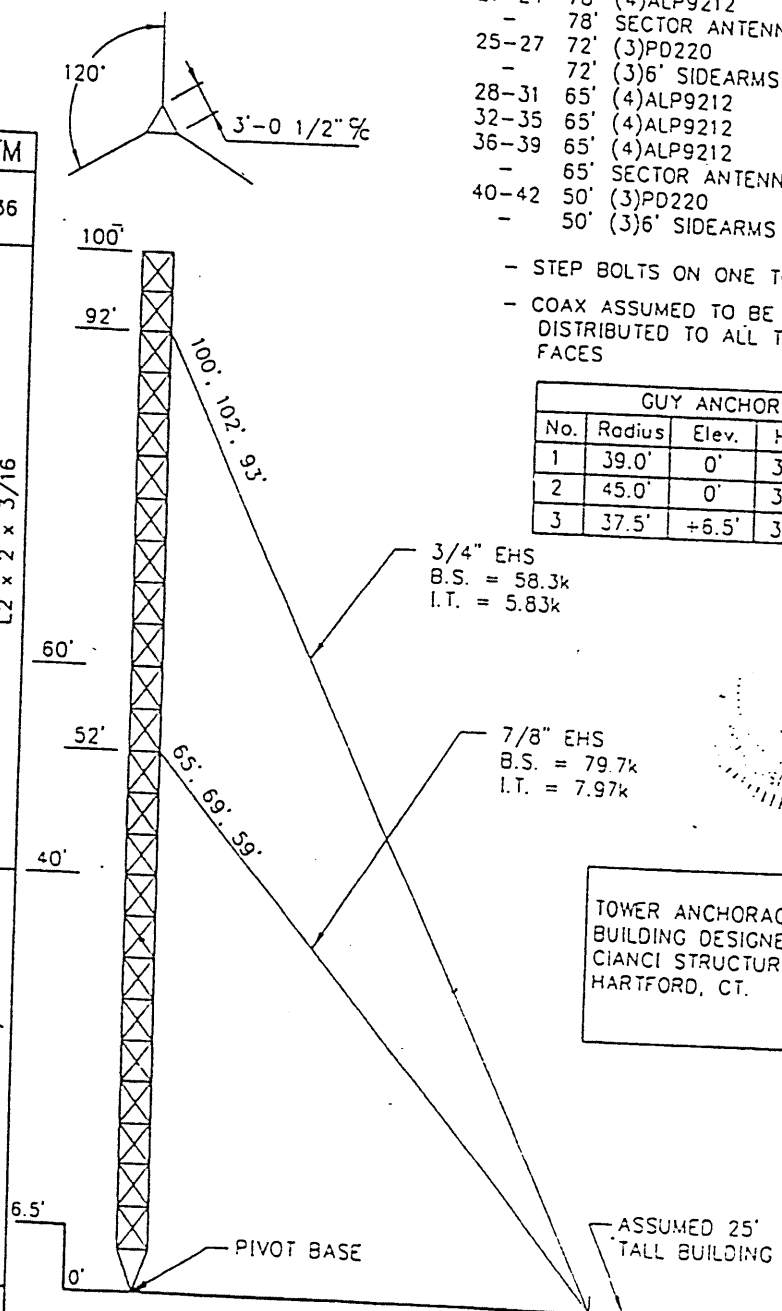
GUY ANCHORAGE				
No.	Radius	Elev.	Horiz	Vert
1	39.0'	0'	32.0k	51.6k
2	45.0'	0'	31.7k	45.1k
3	37.5'	+6.5'	31.6k	47.8k

3/4" EHS
 B.S. = 58.3k
 I.T. = 5.83k

7/8" EHS
 B.S. = 79.7k
 I.T. = 7.97k

Handwritten signature and date: 11-10-97

TOWER ANCHORAGE TO EXISTING BUILDING DESIGNED BY CIANCI & CIANCI STRUCTURAL ENGINEERS, HARTFORD, CT.



ASTM	
50KSI	A36
2"φ	2"φ
2 1/4"φ	7/8"φ
2"φ	5/8"φ
DIAGONALS	L2 x 2 x 1/8
GIRTS	L2 x 2 x 3/16

BASE REACTION
 H = 1.6k
 V = 105k

GUY ANCHOR REACTION
 (SEE CHART)

SEE CHART

ASSUMED 25' TALL BUILDING

PIVOT BASE

STRUCTURAL & EQUIPMENT MAPPING REPORT



SITE ID: HFC1539C

SITE NAME: Wireless Solutions – West Hartford

SITE ADDRESS: 14-20 Isham Road
West Hartford, CT 06091
Hartford County

COORDINATES: 41° 45' 41.57" N
72° 44' 25.57" W

ELEVATION: 145' ±

TOWER: 125' Guyed Tower

OWNER: General Tower Company

TOWER MANUFACTURER: FWT

TOWER TAG: Unknown

MAPPING COMPLETED BY: GPD & Northeast Towers, Inc.

WEATHER CONDITIONS: Sunny

MAPPING COMPLETED FOR:



July 9, 2012

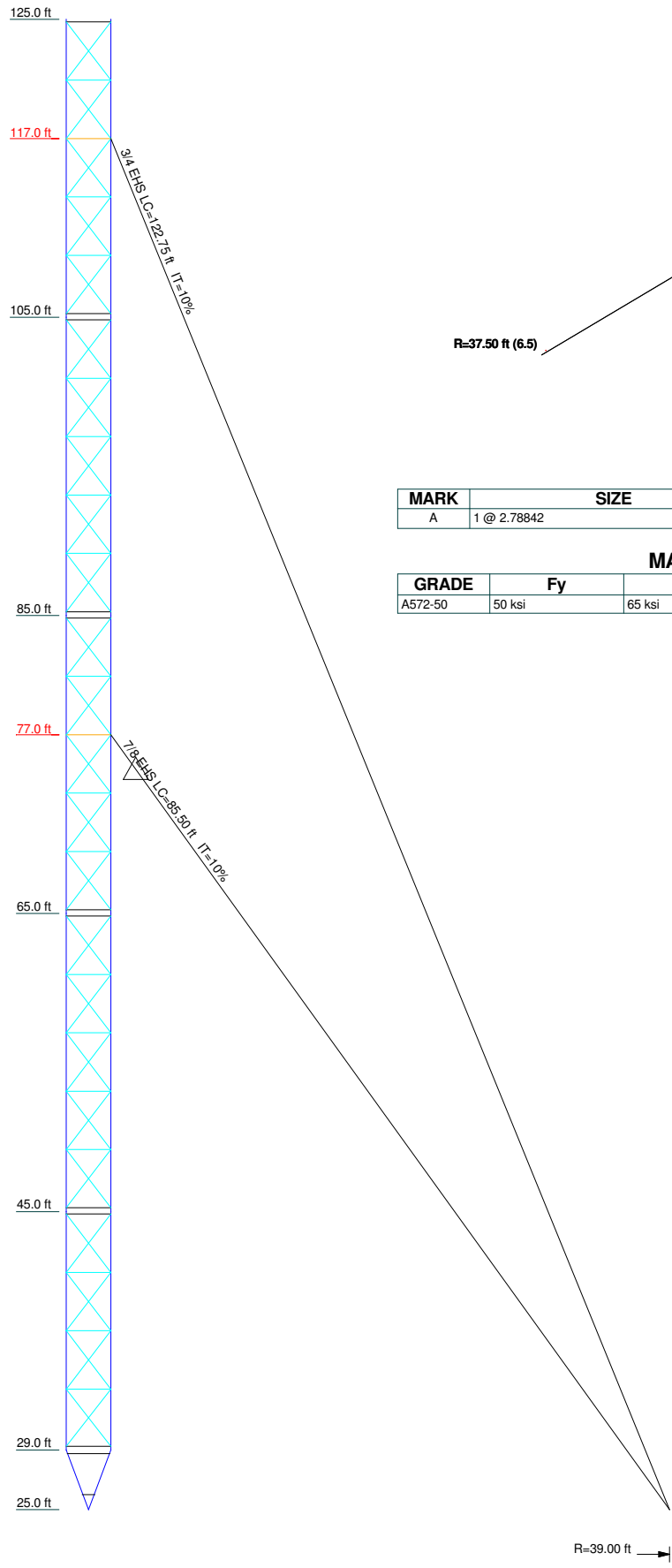
GPD Project #: 2012707.13

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- 1. Tower Elevation Drawing and Structural Information**
- 2. Equipment Summary Sheets**
- 3. Feedline Plan**
- 4. Photos**

TOWER ELEVATION DRAWING AND STRUCTURAL INFORMATION

Section	T6	T5	T4	T3	T2	T1
Legs		SR 2	SR 2 1/4	SR 2 1/4	SR 2	
Leg Grade			A572-50	A572-50	SR 7/8	
Diagonals	N.A.	SR 5/8				
Diagonal Grade	N.A.		A36	A36		
Top Chords	L3x3x3/8	L2x2x1/8	L2x2x1/8	L2x2x3/16	L2x2x3/16	
Bottom Chords	12"x3/8"	L2x2x1/8	L2x2x1/8	L2x2x3/16	L2x2x3/16	
Horizontals	N.A.					
Top Guy Pull-Offs		N.A.	L3x3x1/4	L3x3x1/4	L3x3x1/4	
Face Width (ft)		4 @ 3.89583				3.04167
# Panels @ (ft)	A	712.2	887.0	1271.9	1079.0	1101.5
Weight (lb)	5288.7					



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	1 @ 2.78842		

MATERIAL STRENGTH

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

GPD Group
 520 South Main Street, Suite 2531
 Akron, OH 44311
 Phone: (330) 572-2100
 FAX: (330) 572-2101

Job: HFC1539C Wireless Solutions – West Hartford
 Project: 2012707.13
 Client: Dewberry | Drawn by: jalexander | App'd:
 Code: TIA/EIA-222-F | Date: 07/09/12 | Scale: NTS
 Path: C:\2012\2012707\13\Inx\Wireless Solutions-West Hartford.eri | Dwg No. E-1

TOWER BOLT INFORMATION			
ELEVATION	QTY	SIZE	LOCATION
105'	3	3/4"	Leg
85'	3	3/4"	Leg
65'	3	3/4"	Leg
45'	3	3/4"	Leg
40'	3	3/4"	Leg
29'	3	3/4"	Leg

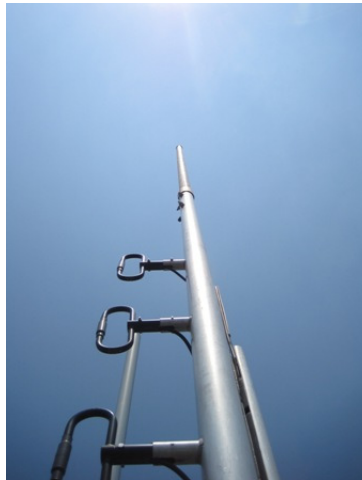
EQUIPMENT SUMMARY SHEETS

CARRIER: Unknown

MOUNT DESCRIPTION	CENTERLINE	FACE WIDTH	FACE HEIGHT	STANDOFF	MAIN FACE HORIZONTAL	ANTENNA PIPE
	122'	N/A	N/A	N/A	N/A	4'x2-3/8"

APPURTENANCE	CENTERLINE	MANUFACTURER	MODEL	QTY	DIMENSION LxWxD	POSITION	AZIMUTH
Omni	141'	Unknown	12' Omni	1	12'T	Leg B	N/A
Omni	130'	Unknown	10' 4-Bay Dipole	1	10'T	Leg B	N/A
Omni	130'	Unknown	10' Omni	1	10'T	Leg A	N/A
Omni	128'	Unknown	6' Omni	1	6'T	Leg C	N/A

FEEDLINE INFORMATION			
SIZE	QTY	LOCATION	NOTES
1-5/8	2	Face B	Coax for 10' Omni and 10' 4-Bay Dipole
1/2	1	Face B	Coax for 6' Whip



CARRIER: Clearwire & Nextel/Sprint

MOUNT DESCRIPTION	CENTERLINE	FACE WIDTH	FACE HEIGHT	STANDOFF	MAIN FACE HORIZONTAL	ANTENNA PIPE
	122'	13'	50"	52-3/4"	Tube	4'x2-3/8"

APPURTENANCE	CENTERLINE	MANUFACTURER	MODEL	QTY	DIMENSION LxWxD	POSITION	AZIMUTH
Panel	123.33'	Decibel	DB844H65E-XY	6	48"x6"x9"	Leg A/B	0/120
Panel	123.33'	Decibel	DB844H90E-XY	3	48"x6"x8"	Leg C	240
Panel	123.33'	Argus	LLPX310R-V1	3	42"x12"x4.5"	Leg A/B/C	0/120/240
RRH	123.33'	Samsung	SP1-22132825WB	3	12"x20"x5"	Leg A/B/C	0/120/240
Fiber Box	125'	Unknown	2'x2' Box	1	2'x2'x1'	Face B	N/A

FEEDLINE INFORMATION			
SIZE	QTY	LOCATION	NOTES
1-1/4"	9	Face C	Coax for Decibel Antennas
2-1/4"	1	Face	Coax for Argus Antennas



CARRIER: Clearwire

MOUNT DESCRIPTION	CENTERLINE	FACE WIDTH	FACE HEIGHT	STANDOFF	MAIN FACE HORIZONTAL	ANTENNA PIPE
	118'	N/A	N/A	N/A	N/A	4'x2-3/8"

APPURTENANCE	CENTERLINE	MANUFACTURER	MODEL	QTY	DIMENSION LxWxD	POSITION	AZIMUTH
Dish	118'	Dragonwave	1' HP Dish	2	12"ø	Leg B/C	190

FEEDLINE INFORMATION			
SIZE	QTY	LOCATION	NOTES
1/2"	2	Face B	



CARRIER: Verizon

MOUNT DESCRIPTION	CENTERLINE	FACE WIDTH	FACE HEIGHT	STANDOFF	MAIN FACE HORIZONTAL	ANTENNA PIPE
	106'	13'	32"	40-1/2"	Pipe	4'x2-3/8"

APPURTENANCE	CENTERLINE	MANUFACTURER	MODEL	QTY	DIMENSION LxWxD	POSITION	AZIMUTH
Panel	107.5'	Antel	LPA 80063/4CF	6	47.44"x15.2"x13.19"	Leg A/B/C	30/150/270
Panel	107.5'	Antel	LPA 185063/8CF	6	48.75"x6.06"x3.15"	Leg A/B/C	30/150/270

FEEDLINE INFORMATION			
SIZE	QTY	LOCATION	NOTES
1-5/8"	12	Face A	



CARRIER: Miscellaneous

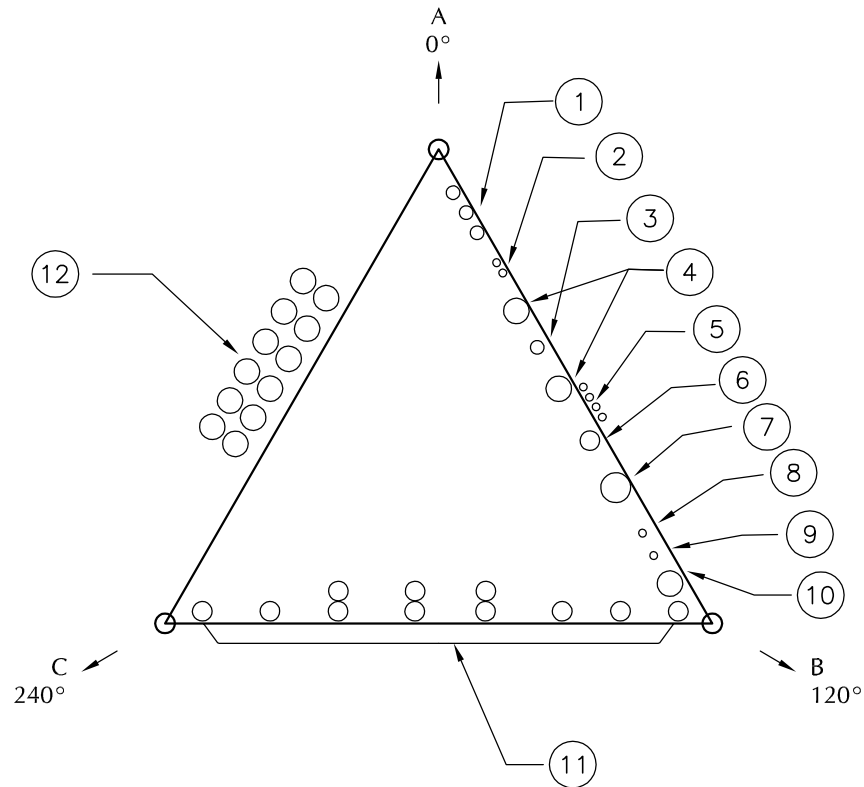
MOUNT DESCRIPTION	CENTERLINE	FACE WIDTH	FACE HEIGHT	STANDOFF	MAIN FACE HORIZONTAL	ANTENNA PIPE
	35'	N/A	N/A	6'	N/A	N/A

APPURTENANCE	CENTERLINE	MANUFACTURER	MODEL	QTY	DIMENSION LxWxD	POSITION	AZIMUTH
Yagi	68.83'	Unknown	4' Yagi	1	4'L	Leg A	N/A
Yagi	54.5'	Unknown	4' Yagi	1	4'L	Leg A	N/A
GPS	35'	Unknown	GPS	4	5"x6.12"x6.12"	Leg A/B	N/A
Fiber Box	32.5'	Unknown	2'x2' Box	1	2'x2'x1'	Face B	N/A

FEEDLINE INFORMATION			
SIZE	QTY	LOCATION	NOTES
1/2"	2	Face B	Coax for Yagi
1/2"	4	Face B	Coax for GPS



FEEDLINE PLAN



#	CARRIER	SIZE	QTY.	ELEVATION	NOTES
1	Unknown	7/8"	3	29' to 122'	Unused
2	Clearwire	1/2"	2	29' to 118'	
3	Unknown	7/8"	1	29' to 122'	
4	Unknown	1-5/8"	2	29' to 122'	
5	Unknown	1/2"	4	29' to 35'	
6	Unknown	1-1/4"	1	29' to 122'	
7	Clearwire	2-1/4"	1	29' to 122'	
8	Mike Gassner	1/2"	1	29' to 68.83'	
9	Mike Gassner	1/2"	1	29' to 54.5'	
10	Mike Gassner	1-5/8"	1	29' to 68.83'	
11	Nextel/Sprint	1-1/4"	11	29' to 122'	(2) Unused Coax
12	Verizon	1-5/8"	12	29' to 106'	

PHOTOS



Coax on Face A



Coax on Face B



Coax on Face C



Guy Wire



Tower view from bottom



Overall Tower



Step Pegs and Safety Climb on Leg C



GPS



Guy Wire (Typical)

Structural Analysis Report

*100-ft Existing Roof Top Mounted FWT
Guyed Lattice Tower*

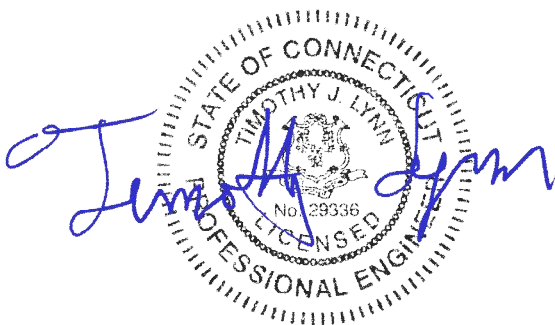
*Proposed Verizon Wireless
Antenna Upgrade*

Verizon Site Ref: West Hartford Center

*14-20 Isham Road
West Hartford, CT*

CEN TEK Project No. 16001.17

Date: July 22, 2016



Prepared for:
Verizon Wireless
99 East River Road, 9th Floor
East Hartford, CT 06108

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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation/modification proposed by Verizon Wireless on the existing roof top mounted guyed lattice tower located in West Hartford, CT.

The host tower is a 100-ft, six-section, three legged guyed lattice tower with pin base originally designed by Paul J Ford and Company job no; 19-636-97R dated November 10, 1997 and manufactured by FWT. The tower type, geometry and structure member sizes were taken from a previous structural report prepared by Centek Engineering job no; 12124.54 dated January 21, 2013. Guy anchorage to the existing host building roof top was taken from the original design documents prepared by Cianci & Cianci Structural Engineers job no; 97-113-01 dated October 22, 1997.

Antenna and appurtenance inventory were taken from the aforementioned Centek structural report and a Verizon RF data sheet.

The tower is made up of six (6) vertical sections consisting of A572-50 solid steel legs. Diagonal and horizontal bracing consists of A36 solid round and steel angle construction. The vertical tower legs are connected together with bolted flanges while bracing consists of fully welded connections. The width of the tower face is 3'-0-1/2".

Verizon proposes the removal of nine (9) panel antennas and six (6) remote radio heads and the installation of nine (9) panel antennas, nine (9) remote radio heads and one (1) main distribution boxes mounted to the existing three (3) T-frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- UNKNOWN (Existing):
Appurtenance: One (1) 18-ft Omni-directional whip antenna, one (1) 12-ft Omni-directional whip antenna, one (1) 6-ft Omni-directional whip antenna, one (1) 4-ft Omni-directional whip antenna and two (2) 4 Bay dipole antennas mounted to the top of the tower.
Coax Cables: Three (3) 1-5/8" \varnothing and four (4) 7/8" dia. coax cables running on the face of the existing tower as specified in Section 3 of this report.
- CLEARWIRE (Existing):
Antennas: One (1) Andrew VHLP2-18 microwave dish pipe mounted with a RAD center elevation of 127-ft above existing grade (102-ft above tower base).
Coax Cables: One (1) 1/2" \varnothing coax cable running on the face of the existing tower as specified in Section 3 of this report.
- NEXTEL / CLEARWIRE (Existing):
Antennas: Six (6) Decibel DB844H65E-XY panel antennas, three (3) Decibel DB844G65ZAXY panel antennas, three (3) Argus LLPX310R panel antennas and three (3) RRU's mounted to three (3) 12-ft boom gates with a RAD center elevation of 123-ft above existing grade (98-ft above tower base).
Coax Cables: Twelve (12) 1-1/4" \varnothing coax cables and one (1) 3" \varnothing flex conduit running on the face of the existing tower as specified in Section 3 of this report.

- CLEARWIRE (Existing):
Antennas: Two (2) Andrew VHLP1-23 microwave dishes pipe mounted with a RAD center elevation of 118-ft above existing grade (93-ft above tower base).
Coax Cables: Two (2) 1/2" Ø coax cables running on the face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
Antennas: One (1) ANT-150D6-9 yagi antenna leg mounted with an elevation of 69-ft above existing grade (44-ft above tower base).
Coax Cables: One (1) 1/2" Ø coax cables running on the face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
Antennas: One (1) ANT-150D6-9 yagi antenna leg mounted with an elevation of 55-ft above existing grade (30-ft above tower base).
Coax Cables: One (1) 1/2" Ø coax cables running on the face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
Antennas: Four (4) GPS antennas mounted on standoff arms with an elevation of 31-ft above existing grade (6-ft above tower base).
Coax Cables: Four (4) 1/2" Ø coax cables running on the face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remain):
Antennas: One (1) Antel BXA-80063-4CF and two (2) Swedcom SLCP 2X6014 panel antennas mounted to three (3) existing 12-ft T-Frames with a RAD center elevation of 105-ft above existing grade (80-ft above tower base).
Appurtenances: One (1) RFS DB-T1-6Z-8AB-0Z main distribution box flush mounted to a leg of the existing tower with a RAD center elevation of 109-ft above existing grade (84-ft above tower base).
Coax Cables: Twelve (12) 1-5/8" Ø coax cables and one (1) 1-5/8" Ø fiber cable running on the face of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing to Remove):
Antennas: One (1) Antel BXA-70063-6CF, two (2) Swedcom SLCP 2X6015, one (1) Antel BXA-171063-8BF, two (2) Swedcom SACP 2X5516, one (1) Antel BXA-171063-12CF panel antenna and two (2) Swedcom SACP 2X5516 panel antennas mounted to three (3) existing 12-ft T-Frames with a RAD center elevation of 105-ft above existing grade (80-ft above tower base).
Appurtenances: Three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads and three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads mounted to three (3) existing 12-ft T-Frames with a RAD center elevation of 105-ft above existing grade (80-ft above tower base).

▪ **VERIZON (PROPOSED):**

Antennas: Nine (9) Andrew SBNHH-1D65B panel antennas mounted to three (3) existing 12-ft T-Frames with a RAD center elevation of 105-ft above existing grade (80-ft above tower base).

Antennas: Three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution mounted to three (3) existing 12-ft T-Frames with a RAD center elevation of 105-ft above existing grade (80-ft above tower base).

Coax Cables: One (1) 1-5/8" \varnothing fiber cable running on the face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables to be installed as indicated in this report.

A n a l y s i s

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled “Structural Standards for Steel Antenna Towers and Antenna Supporting Structures”, the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC¹ and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

T o w e r L o a d i n g

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½” radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	West Hartford; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	<i>TIA/EIA wind speed controls.</i>	
Load Cases:	<u>Load Case 1</u> ; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 2</u> ; 69 mph wind speed w/ ½” radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type

¹ The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower “Section Capacity Table”, this tower was found to be at **71.7%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T4)	45'-65' AGL (20'-40' ATB)	71.7%	PASS
Diagonal (T3)	65'-85' AGL (40'-60' ATB)	61.4%	PASS
Guy A (T1)	117' AGL (92' ATB)	50.7%	PASS
Guy B (T1)	117' AGL (92' ATB)	54.6%	PASS
Guy C (T1)	117' AGL (92' ATB)	53.7%	PASS

Existing Guy Anchors and Tower Base

Guy forces are transferred to the existing building structure via three (3) 7/8" Ø and three (3) 3/4" Ø galvanized steel guy wires with turnbuckles. All guy anchorage posts are positively attached to the existing building structure. Connections to the existing building were originally designed by Cianci & Cianci Structural Engineers job no; 97-113-01 dated October 22, 1997.

Review of the guy anchor and tower base connections consisted of comparison of the proposed reactions and the design reactions obtained from the aforementioned design documents:

- The guy anchor bolts and tower base **were found** to be within allowable limits.

Tower Component	Original Design Reaction (kips)	Proposed Reaction (kips)	Stress Ratio (percentage of capacity)	Result
Tower Base	106 (Vert)	89 (Vert)	84.0%	PASS
	1.6 (Horz)	1 (Horz)	62.5%	PASS
Guy Anchor A @ 45'	40.3 (Vert)	32 (Vert)	79.4%	PASS
	28.1 (Horz)	21 (Horz)	74.7%	PASS
Guy Anchor B @ 39'	51.6 (Vert)	37 (Vert)	71.7%	PASS
	32.0 (Horz)	21 (Horz)	65.6%	PASS
Guy Anchor C @ 37.5'	43.7 (Vert)	35 (Vert)	80.1%	PASS
	28.6 (Horz)	21 (Horz)	73.4%	PASS

CENTEK Engineering, Inc.

Structural Analysis – 100-ft FWT Guyed Lattice Tower
Verizon Wireless Antenna Upgrade – West Hartford Center
West Hartford, CT
July 22, 2016

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

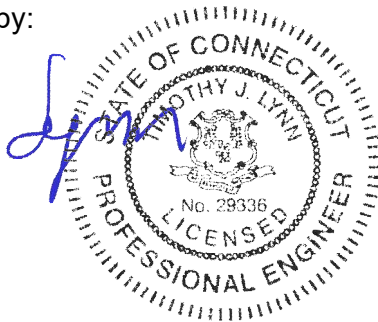
The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer



CENTEK Engineering, Inc.

Structural Analysis – 100-ft FWT Guyed Lattice Tower

Verizon Wireless Antenna Upgrade – West Hartford Center

West Hartford, CT

July 22, 2016

*Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures*

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

CENTEK Engineering, Inc.

Structural Analysis – 100-ft FWT Guyed Lattice Tower

Verizon Wireless Antenna Upgrade – West Hartford Center

West Hartford, CT

July 22, 2016

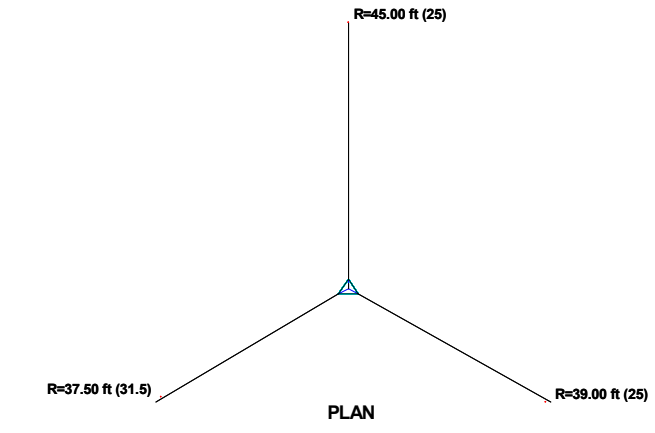
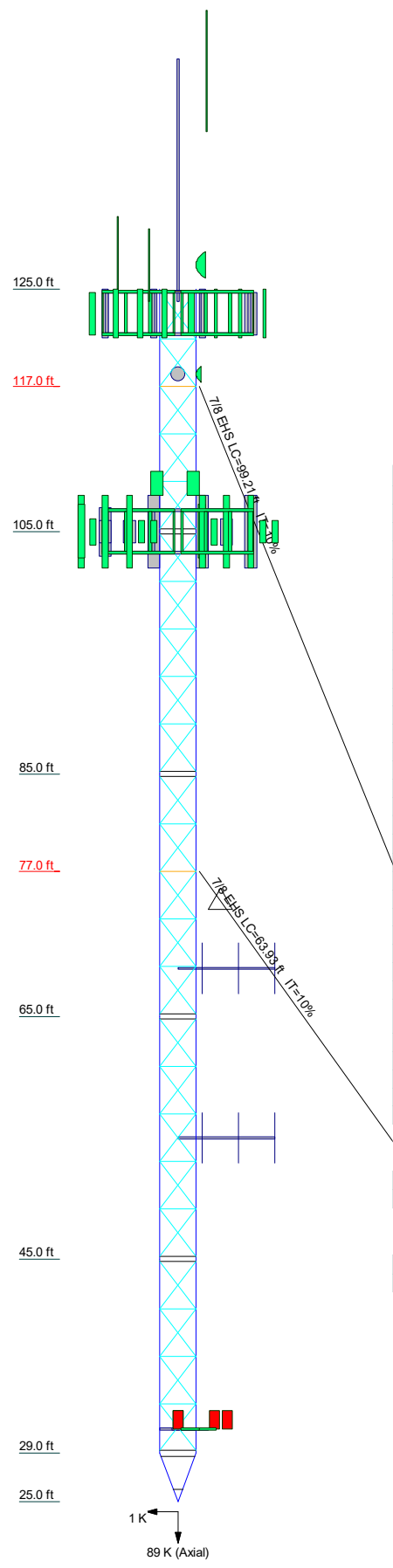
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	T1	T2	T3	T4	T5	T6
Legs	SR 2	SR 2 1/4	SR 2 1/4	SR 2	SR 2	SR 2
Leg Grade		A572-50	A572-50			
Diagonals		SR 7/8	SR 7/8			
Diagonal Grade		A36	A36			
Top Girts		L2x2x3/16	L2x2x3/16	L2x2x1/8	L2x2x1/8	L2x2x1/8
Bottom Girts		L2x2x3/16	L2x2x3/16	L2x2x1/8	L2x2x1/8	L2x2x1/8
Horizontalis		L3x3x1/4	L3x3x1/4	N.A.	N.A.	N.A.
Top Guy Pull-Offs						
Face Width (ft)	3.042					
# Panels @ (ft)		20 @ 3.91667			4 @ 3.89563	
Weight (K)					5.3	0.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' x 3" Dia Omni	137	SLCP 2x6014 (Verizon - Existing)	105
4-Bay Dipole	129	RRH4x30-B13 (Verizon - Proposed)	105
4-Bay Dipole	129	RRH4x30-B13 (Verizon - Proposed)	105
6' x 3" Dia Omni	128	RRH4x30-B13 (Verizon - Proposed)	105
4' x 3" DIA Omni	127	RRH4x45/2x90-AWS (Verizon - Proposed)	105
VHLP2-18 (Clearwire)	127		
18' x 3" Dia Omni	125	RRH4x45/2x90-AWS (Verizon - Proposed)	105
DB844H65E-XY (Nextel)	123	RRH4x45/2x90-AWS (Verizon - Proposed)	105
DB844H65E-XY (Nextel)	123	RRH4x45/2x90-AWS (Verizon - Proposed)	105
DB844H65E-XY (Nextel)	123	RRH2x60-PCS (Verizon - Proposed)	105
LLPX310R (Clearwire)	123	RRH2x60-PCS (Verizon - Proposed)	105
DB844G65ZAXY (Nextel)	123	RRH2x60-PCS (Verizon - Proposed)	105
DB844G65ZAXY (Nextel)	123	Pirot 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
DB844G65ZAXY (Nextel)	123	Pirot 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
LLPX310R (Clearwire)	123	Pirot 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
RRU (Clearwire)	123	Pirot 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
RRU (Clearwire)	123	Pirot 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
RRU (Clearwire)	123	Pirot 12' T-Frame Sector Mount (1) (Verizon - Existing)	105
LLPX310R (Clearwire)	123	SBNHH-1D65B (Verizon - Proposed)	105
Rohn 6' x 12' Boom Gate (1) (Nextel)	123	SBNHH-1D65B (Verizon - Proposed)	105
DB844H65E-XY (Nextel)	123	SBNHH-1D65B (Verizon - Proposed)	105
DB844H65E-XY (Nextel)	123	SBNHH-1D65B (Verizon - Proposed)	105
Rohn 6' x 12' Boom Gate (1) (Nextel)	123	SBNHH-1D65B (Verizon - Proposed)	105
Rohn 6' x 12' Boom Gate (1) (Nextel)	123	BXA-80063-4CF (Verizon - Existing)	105
DB844H65E-XY (Nextel)	123	ANT150D6-9	69
VHLP1-23 (Clearwire)	118	ANT150D6-9	55
VHLP1-23 (Clearwire)	118	GPS	31
DB-T1-6Z-8AB-0Z (Verizon - Existing)	109	3' Pipe Mount Side Arm	31
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	109	3' Pipe Mount Side Arm	31
SBNHH-1D65B (Verizon - Proposed)	105	3' Pipe Mount Side Arm	31
SBNHH-1D65B (Verizon - Proposed)	105	GPS	31
SBNHH-1D65B (Verizon - Proposed)	105	GPS	31
SLCP 2x6014 (Verizon - Existing)	105	GPS	31
SBNHH-1D65B (Verizon - Proposed)	105	GPS	31

SYMBOL LIST

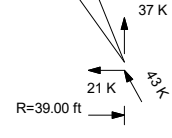
MARK	SIZE	MARK	SIZE
A	L3x3x1/8	B	1 @ 2.78842

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Tower is located on the roof of a building approximately 25'-0" above grade level.
5. TOWER RATING: 71.7%

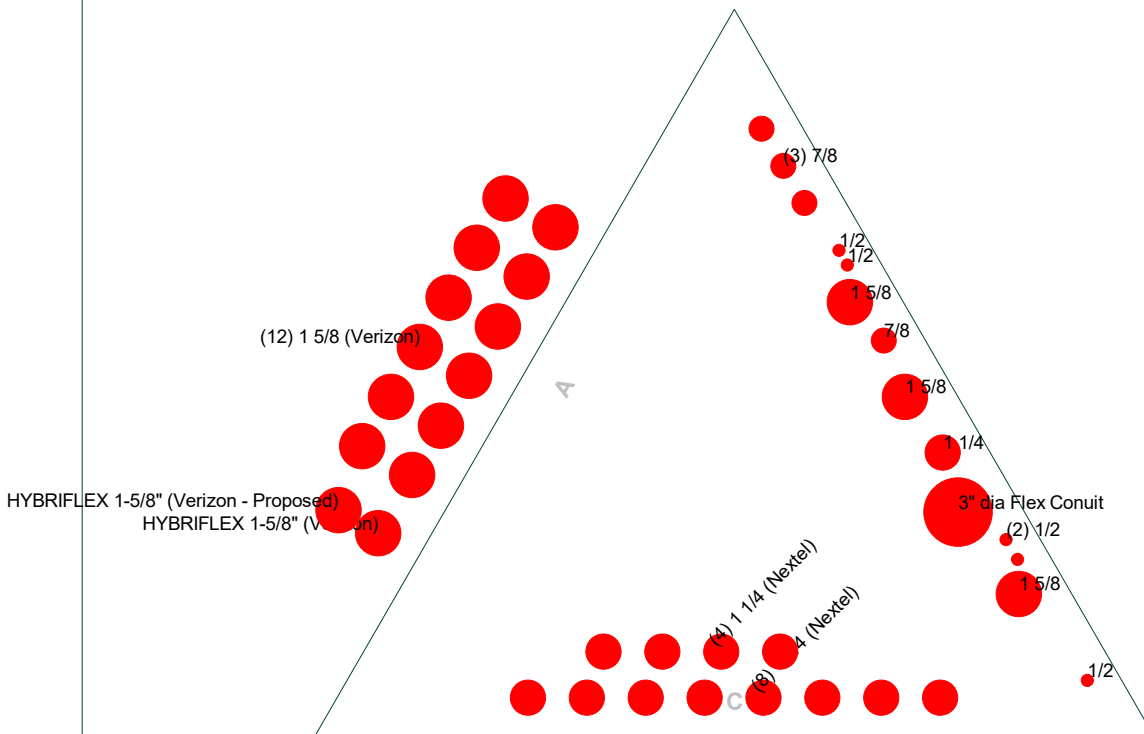


Centek Engineering Inc. Job: **16001.17 - West Hartford Center**
 63-2 North Branford Rd. Project: **100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT**
 Branford, CT 06405 Client: Verizon Wireless Drawn by: T.JL App'd:
 Phone: (203) 488-0580 Code: TIA/EIA-222-F Date: 07/22/16 Scale: NTS
 FAX: (203) 488-8587 Path: Date: 07/22/16 Scale: NTS Dwg No. E-1

Feed Line Plan 45'

— Round
 — Flat
 — App In Face
 — App Out Face

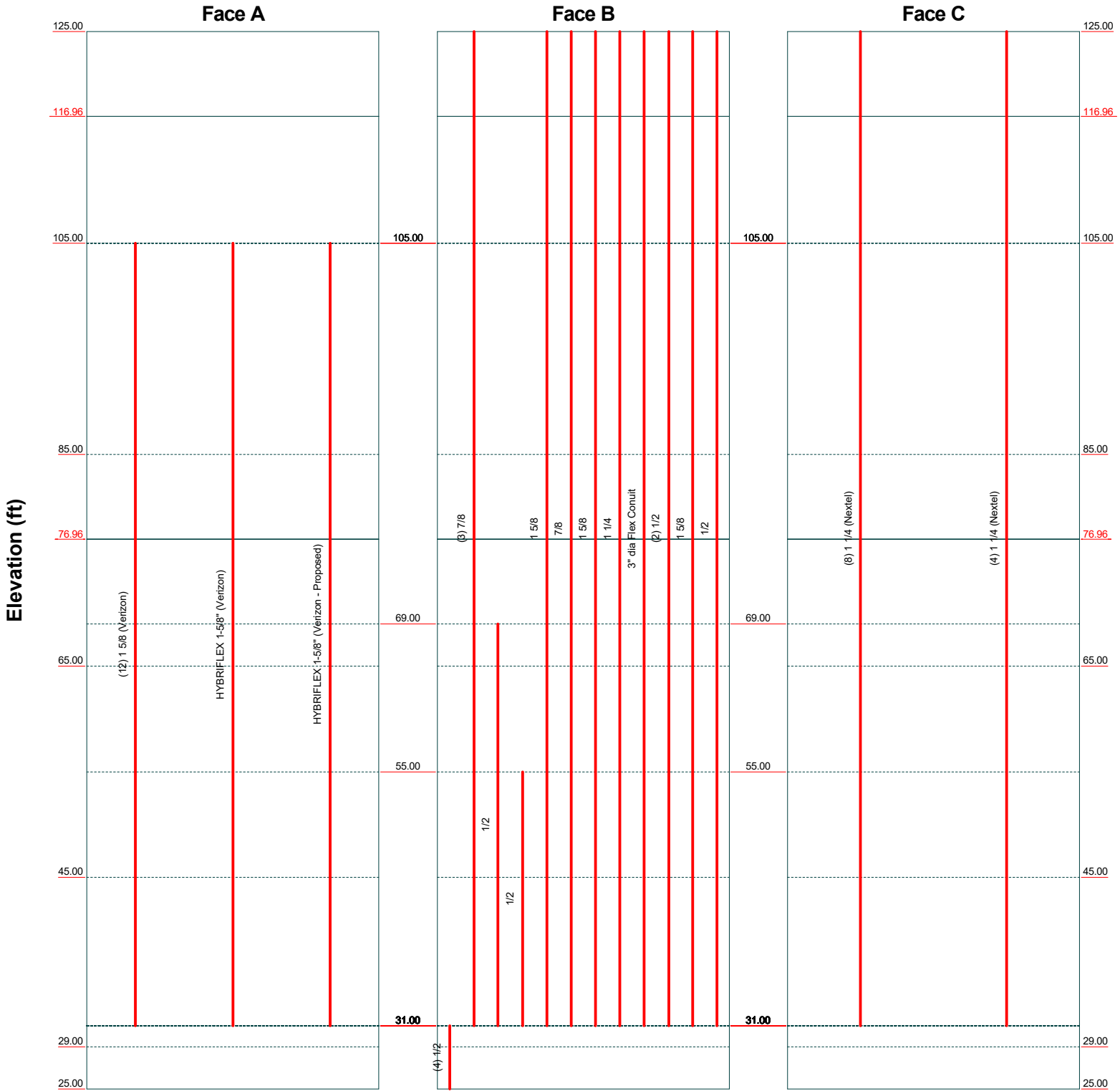
Section @ 45'



Centek Engineering Inc.		Job: 16001.17 - West Hartford Center	
63-2 North Branford Rd. Branford, CT 06405		Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	
Phone: (203) 488-0580	FAX: (203) 488-8587	Client: Verizon Wireless	Drawn by: T.JL
		Code: TIA/EIA-222-F	Date: 07/22/16
		Path:	App'd:
			Scale: NTS
			Dwg No. E-7

Feed Line Distribution Chart 25' - 125'

— Round
 — Flat
 — App In Face
 — App Out Face
 — Truss Leg

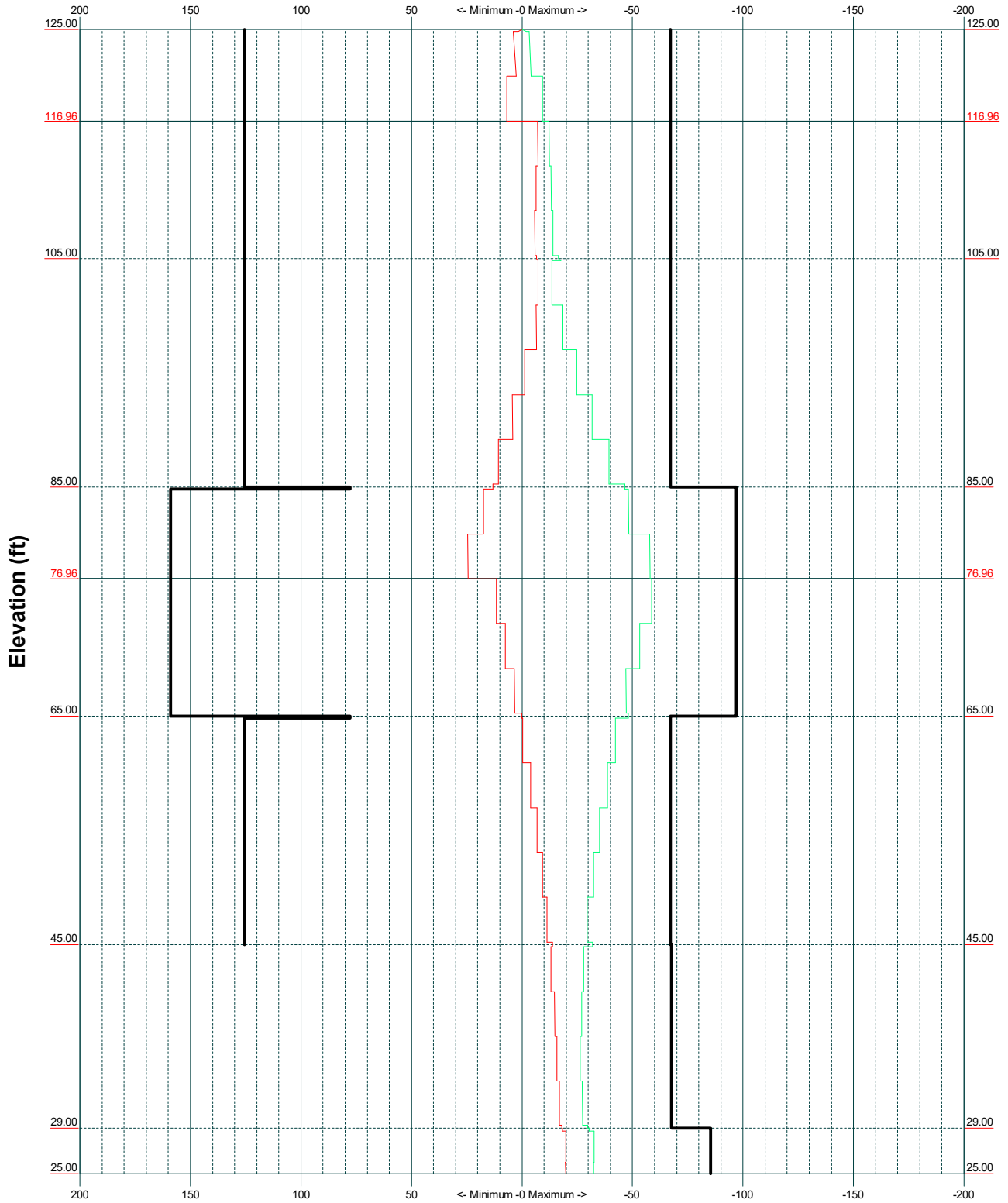


Centek Engineering Inc.		
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		
Job: 16001.17 - West Hartford Center	Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Client: Verizon Wireless
Code: TIA/EIA-222-F	Date: 07/22/16	App'd:
Path:		Scale: NTS
		Dwg No. E-7

TIA/EIA-222-F - 80 mph/69 mph 0.500 in Ice

Leg Capacity ———

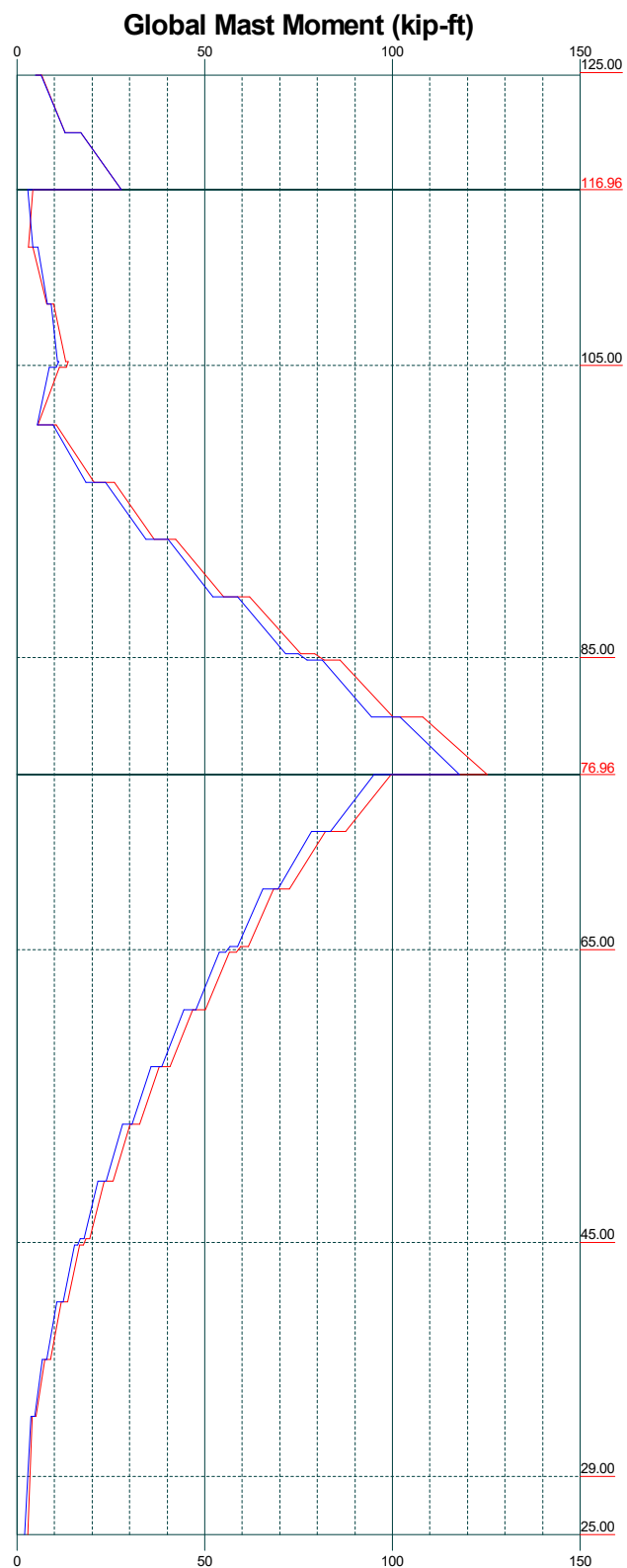
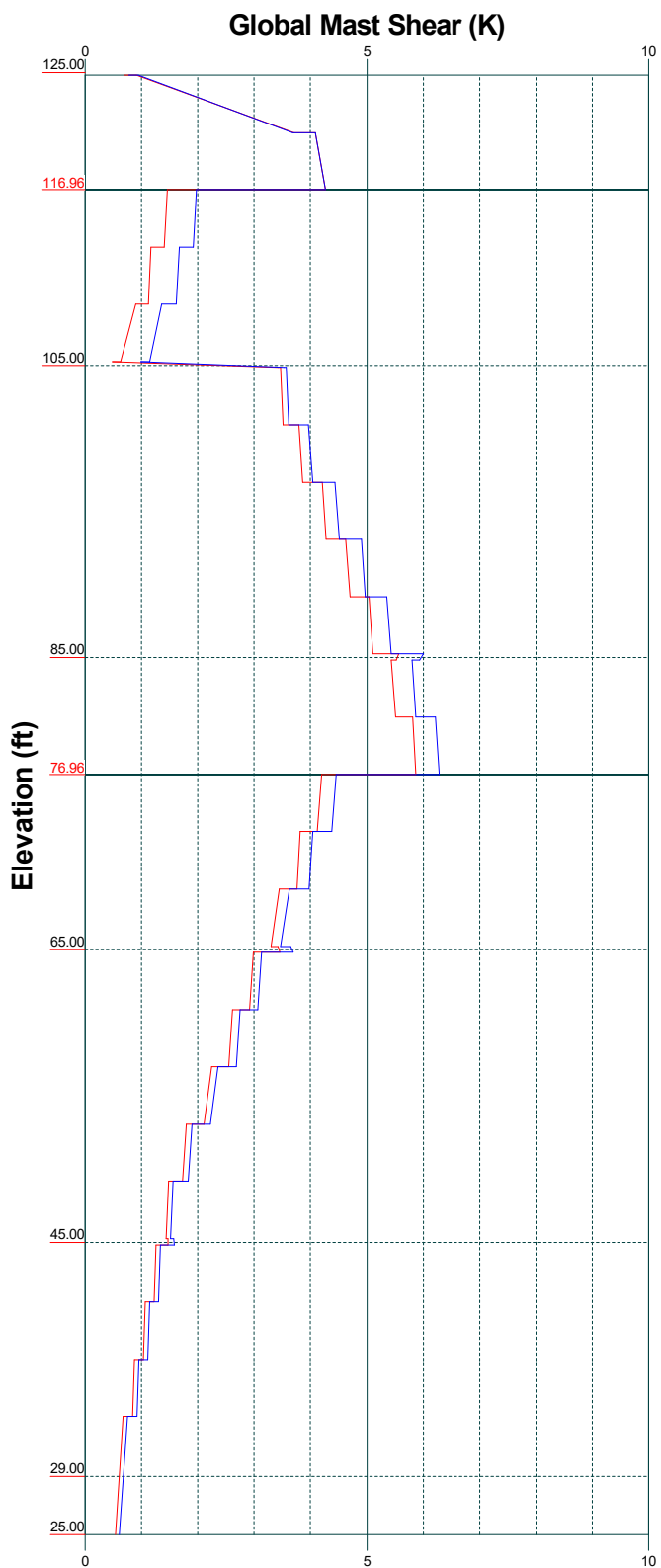
Leg Compression (K) <- Minimum -0 Maximum ->



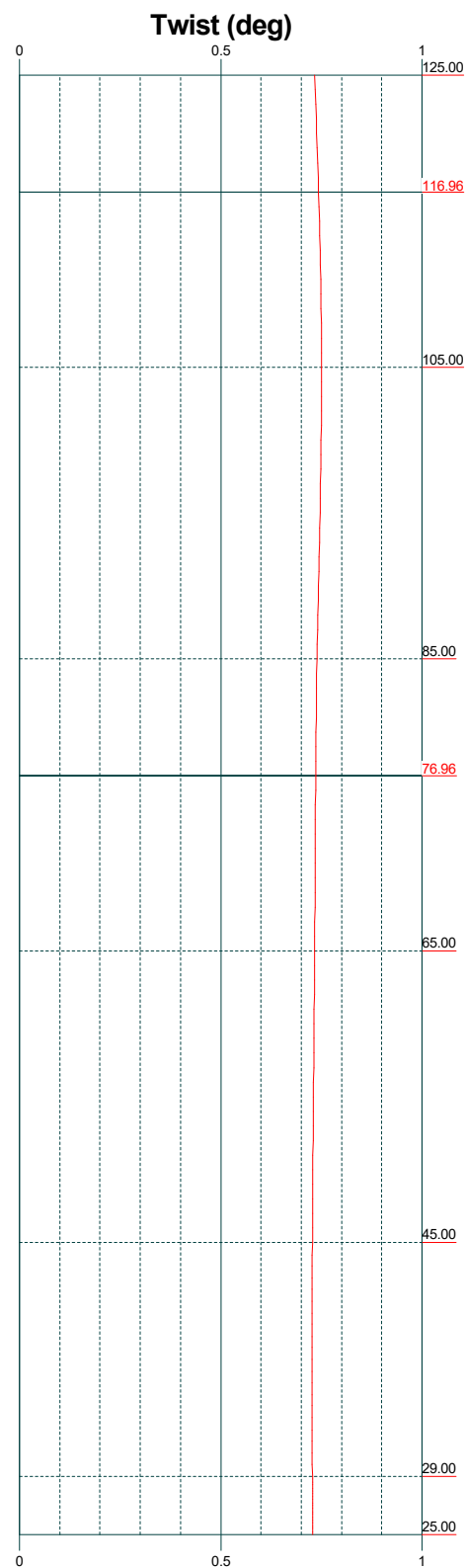
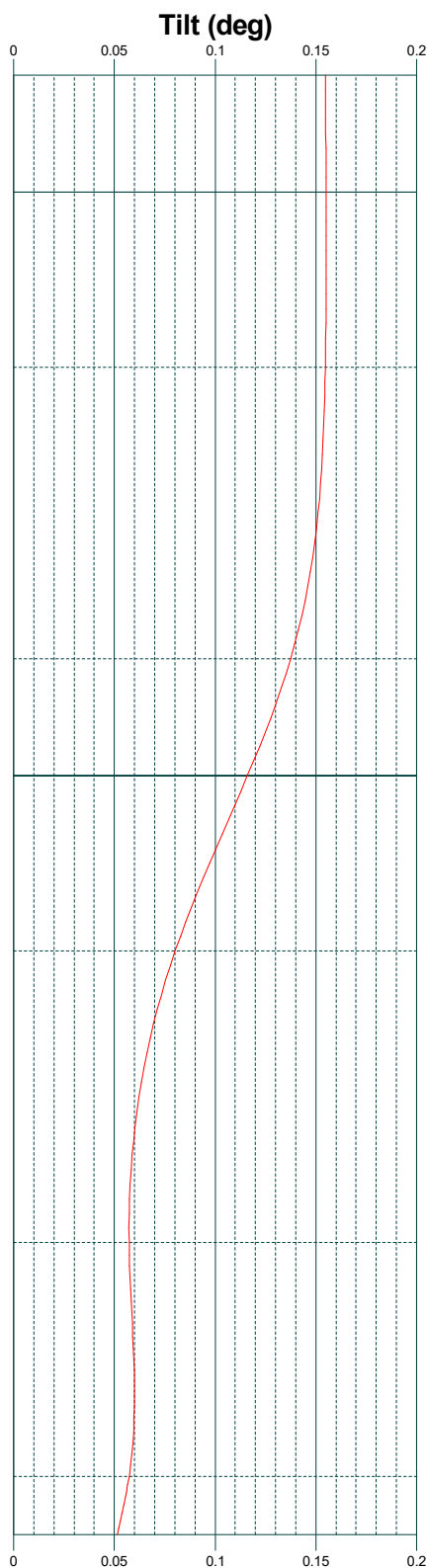
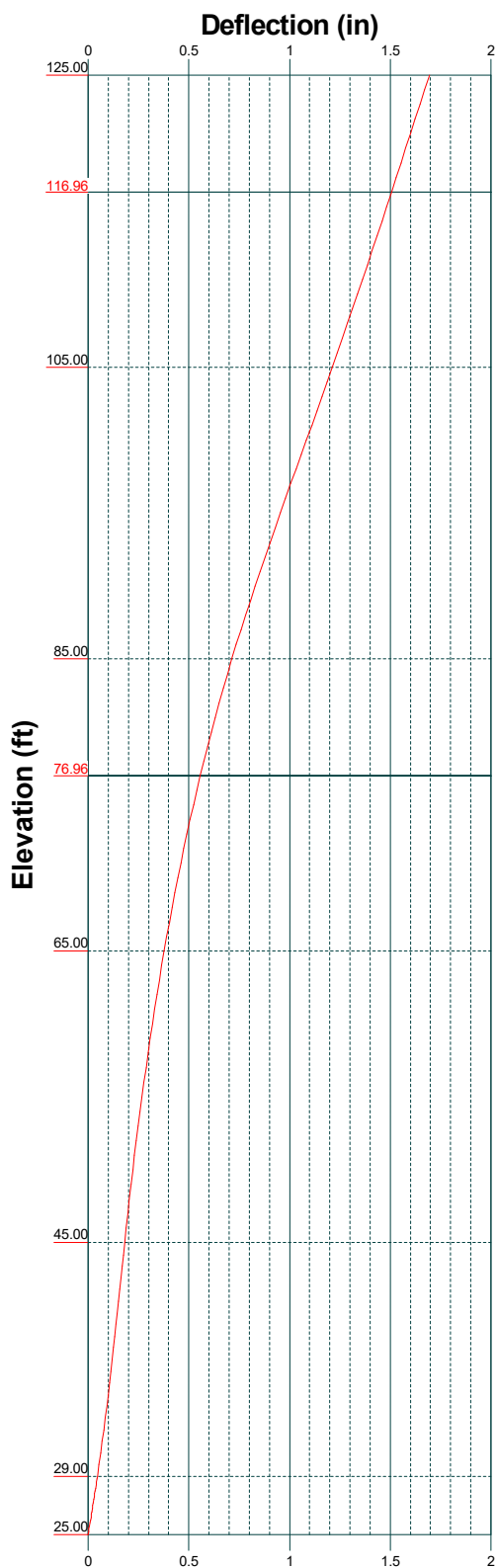
Centek Engineering Inc.		
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		
Job: 16001.17 - West Hartford Center	Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	
Client: Verizon Wireless	Drawn by: T.JL	App'd:
Code: TIA/EIA-222-F	Date: 07/22/16	Scale: NTS
Path:		Dwg No. E-3

Vx Vz

Mx Mz



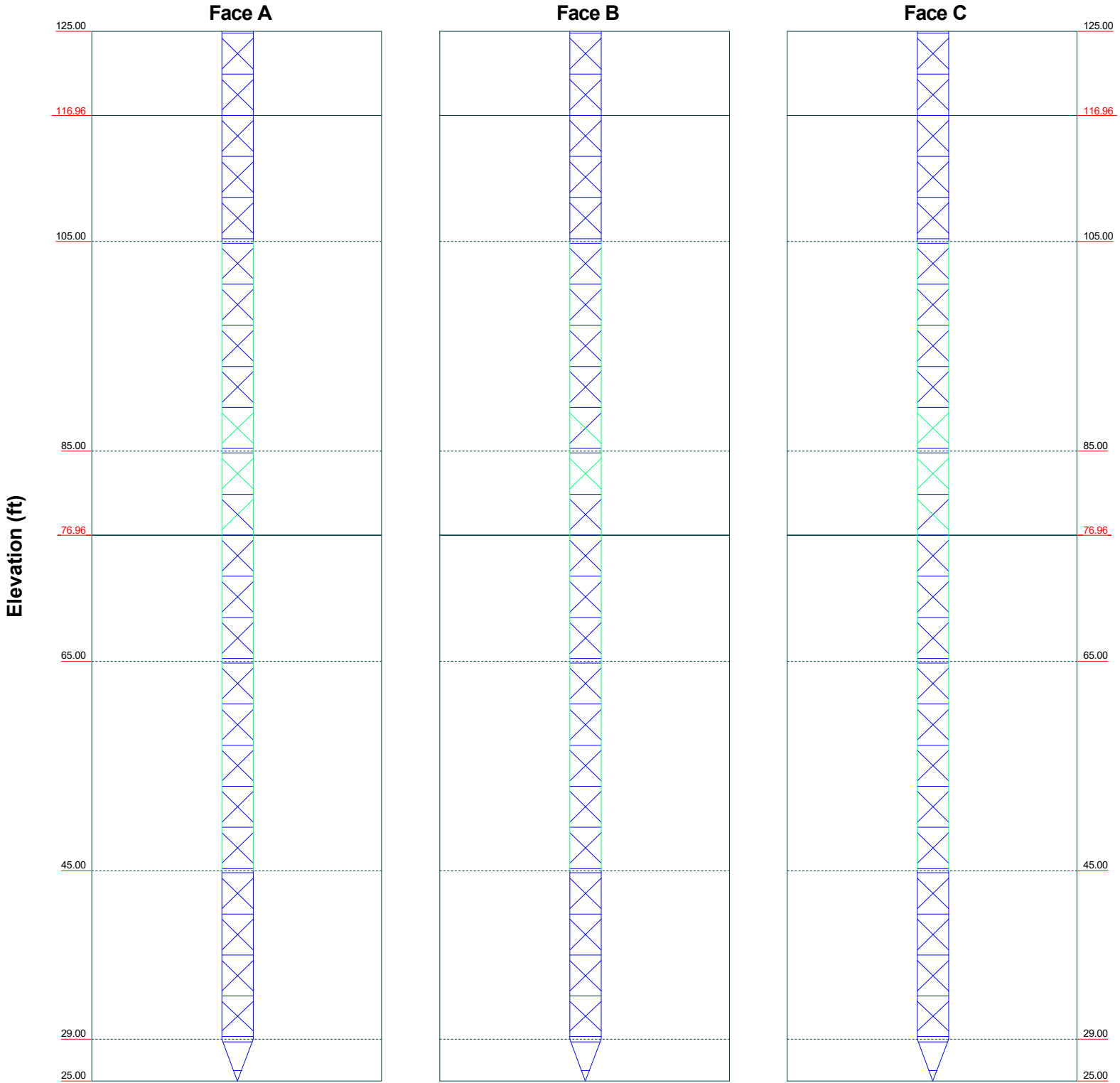
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: 16001.17 - West Hartford Center		
	Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT		
	Client: Verizon Wireless	Drawn by: T.JL	App'd:
	Code: TIA/EIA-222-F	Date: 07/22/16	Scale: NTS
	Path:		Dwg No. E-4



Centek Engineering Inc.		
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		
Job: 16001.17 - West Hartford Center	Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	
Client: Verizon Wireless	Drawn by: T.JL	App'd:
Code: TIA/EIA-222-F	Date: 07/22/16	Scale: NTS
Path:	Dwg No. E-5	

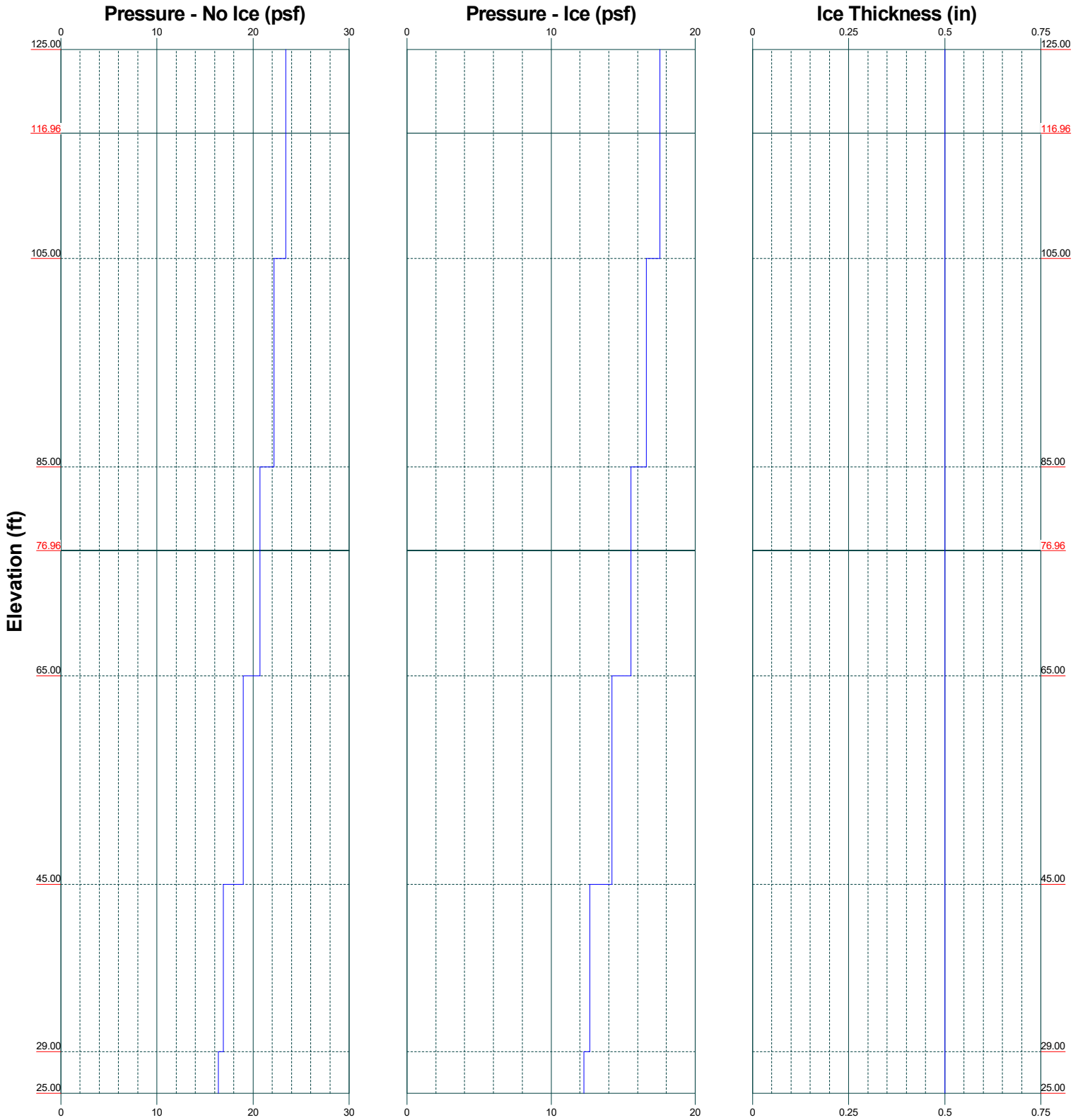
Stress Distribution Chart 25' - 125'

■ > 100%
 ■ 90%-100%
 ■ 75%-90%
 ■ 50%-75%
 ■ < 50% Overstress



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		Job: 16001.17 - West Hartford Center	
		Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	
Client: Verizon Wireless	Drawn by: T.JL	App'd:	
Code: TIA/EIA-222-F	Date: 07/22/16	Scale: NTS	
Path:	Dwg No. E-8		

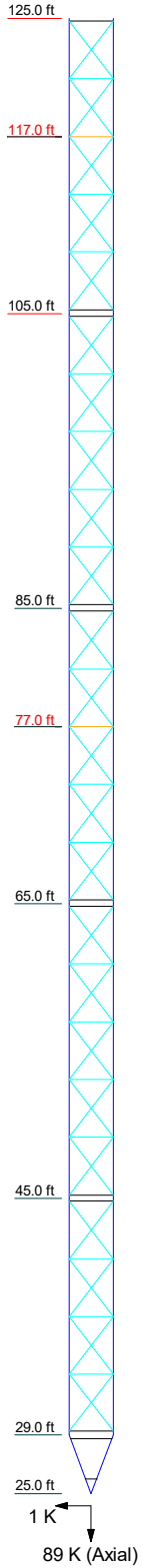
Wind Pressures and Ice Thickness
TIA/EIA-222-F - 80 mph/69 mph 0.500 in Ice



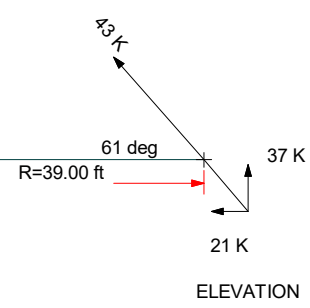
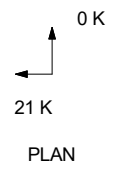
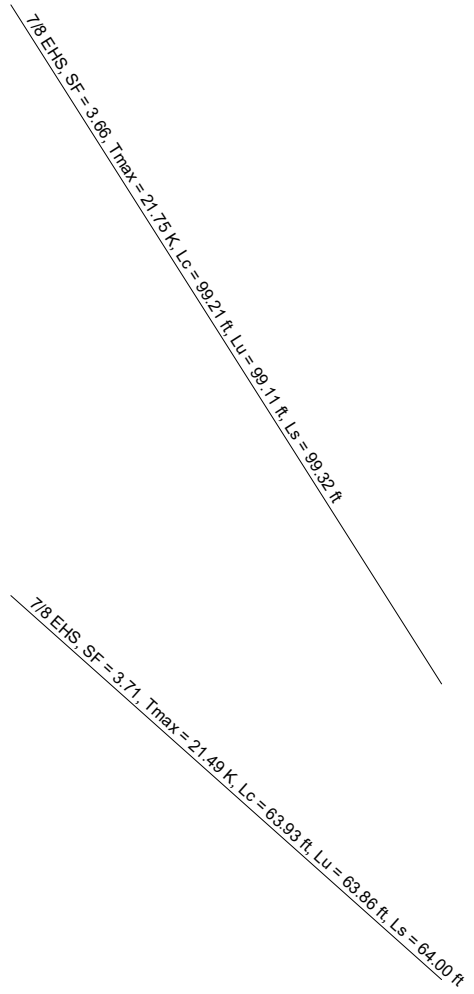
Centek Engineering Inc.		
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		
Job: 16001.17 - West Hartford Center	Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	
Client: Verizon Wireless	Drawn by: T.JL	App'd:
Code: TIA/EIA-222-F	Date: 07/22/16	Scale: NTS
Path:	Dwg No. E-9	

Guy Tensions and Tower Reactions
 TIA/EIA-222-F - 80 mph/69 mph 0.500 in Ice

Maximum Values
 Anchor 'B' @ 39 ft Azimuth 120 deg Elev 25 ft
 Plane through centroid of tower



116'11-1/2"
 76'11-1/2"



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: 16001.17 - West Hartford Center		
	Project: 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT		
	Client: Verizon Wireless	Drawn by: T.JL	App'd:
	Code: TIA/EIA-222-F	Date: 07/22/16	Scale: NTS
	Path:		Dwg No. E-6

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 16001.17 - West Hartford Center	Page 1 of 41
	Project 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date 10:29:57 07/22/16
	Client Verizon Wireless	Designed by TJJ

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 125.00 ft above the ground line.

The base of the tower is set at an elevation of 25.00 ft above the ground line.

The face width of the tower is 3.04 ft at the top and tapered at the base.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.500 in.

Ice density of 56 pcf.

A wind speed of 69 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Tower is located on the roof of a building approximately 25'-0" above grade level..

Pressures are calculated at each section.

Safety factor used in guy design is 2.

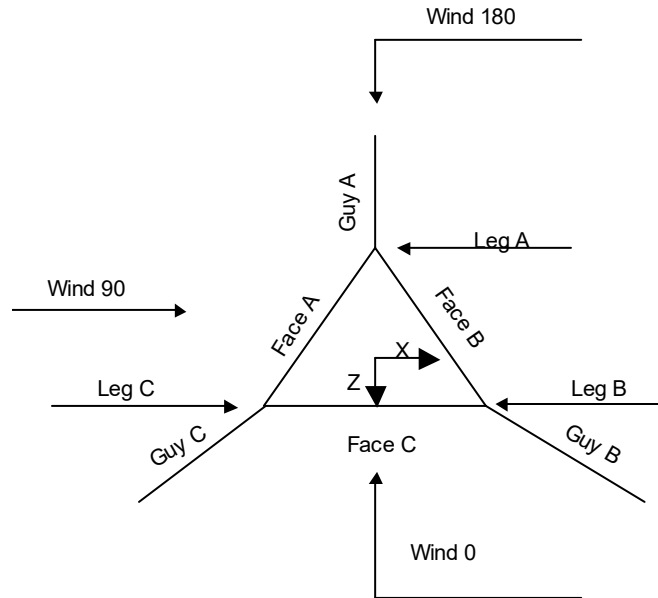
Stress ratio used in tower member design is 1.333.

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

Options

<ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile √ Include Bolts In Member Capacity √ Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) √ SR Members Have Cut Ends SR Members Are Concentric 	<ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area √ Use Clear Spans For KL/r √ Retension Guys To Initial Tension Bypass Mast Stability Checks Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. √ Autocalc Torque Arm Areas Add IBC .6D+W Combination √ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder 	<ul style="list-style-type: none"> Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression √ All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <li style="text-align: center;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 16001.17 - West Hartford Center	Page 2 of 41
	Project 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date 10:29:57 07/22/16
	Client Verizon Wireless	Designed by TJJ



Corner & Starmount Guyed Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	125.00-105.00			3.04	1	20.00
T2	105.00-85.00			3.04	1	20.00
T3	85.00-65.00			3.04	1	20.00
T4	65.00-45.00			3.04	1	20.00
T5	45.00-29.00			3.04	1	16.00
T6	29.00-25.00			3.04	1	4.00

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
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T1	125.00-105.00	3.92	X Brace	No	Yes	2.500	2.500
T2	105.00-85.00	3.92	X Brace	No	Yes	2.500	2.500
T3	85.00-65.00	3.92	X Brace	No	Yes	2.500	2.500
T4	65.00-45.00	3.92	X Brace	No	Yes	2.500	2.500

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	16001.17 - West Hartford Center	Page	3 of 41
	Project	100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date	10:29:57 07/22/16
	Client	Verizon Wireless	Designed by	TJL

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T5	45.00-29.00	3.90	X Brace	No	Yes	2.500	2.500
T6	29.00-25.00	2.79	X Brace	No	Yes	2.539	12.000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 125.00-105.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T2 105.00-85.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T3 85.00-65.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T4 65.00-45.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T5 45.00-29.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T6 29.00-25.00	Solid Round	2	A572-50 (50 ksi)	Flat Bar		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 125.00-105.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T2 105.00-85.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T3 85.00-65.00	Single Angle	L2x2x3/16	A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)
T4 65.00-45.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T5 45.00-29.00	Single Angle	L2x2x1/8	A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T6 29.00-25.00	Single Angle	L3x3x1/8	A36 (36 ksi)	Flat Bar	12x3/8	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 125.00-105.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2x2x3/16	A36 (36 ksi)

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	16001.17 - West Hartford Center	Page	5 of 41
	Project	100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date	10:29:57 07/22/16
	Client	Verizon Wireless	Designed by	TJL

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

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 125.00-105.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T2 105.00-85.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T3 85.00-65.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T4 65.00-45.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T5 45.00-29.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75
T6 29.00-25.00	0.000	1	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75	0.000	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
in	in	in	in	in	in	in	in	
T1 125.00-105.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
T2 105.00-85.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
T3 85.00-65.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
T4 65.00-45.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
T5 45.00-29.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000
T6 29.00-25.00	6.000	0.000	6.000	0.000	0.000	0.000	0.000	0.000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Bolt Size in	No.	Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
				Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 125.00-105.00	Flange	0.750	0	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
T2 105.00-85.00	Flange	0.750	0	0.000	0	0.000	0	0.000	0	0.625	0	0.000	0	0.625	0
T3 85.00-65.00	Flange	0.750	3	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 16001.17 - West Hartford Center	Page 6 of 41
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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T4 65.00-45.00	Flange	0.750	3	0.000	0	0.500	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 45.00-29.00	Flange	0.750	3	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 29.00-25.00	Flange	0.750	3	0.000	0	0.625	0	0.000	0	0.625	0	0.000	0	0.625	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L _u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
116.958	EHS	A 7/8	7.97	10%	19000	1.581	101.53	45.00	0.0000	25.00	100%
		B 7/8	7.97	10%	19000	1.581	99.12	39.00	0.0000	25.00	100%
		C 7/8	7.97	10%	19000	1.581	92.55	37.50	0.0000	31.50	100%
76.9583	EHS	A 7/8	7.97	10%	19000	1.581	67.54	45.00	0.0000	25.00	100%
		B 7/8	7.97	10%	19000	1.581	63.87	39.00	0.0000	25.00	100%
		C 7/8	7.97	10%	19000	1.581	57.78	37.50	0.0000	31.50	100%

Guy Data(cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
116.958	Corner						
76.9583	Corner						

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
116.96	A36 (36 ksi)	Solid Round			No	A36 (36 ksi)	Single Angle	L3x3x1/4
76.96	A36 (36 ksi)	Solid Round			No	A36 (36 ksi)	Single Angle	L3x3x1/4

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
116.958	0.16	0.16	0.15		1.01	0.97	0.84	
76.9583	0.11	0.10	0.09		1.7 sec/pulse	1.7 sec/pulse	1.6 sec/pulse	
					0.45	0.40	0.33	
					1.2 sec/pulse	1.1 sec/pulse	1.0 sec/pulse	

Guy Data (cont'd)

Guy Elevation	Calc K Single Angles	Calc K Solid Rounds	Torque Arm		Pull Off		Diagonal	
			K _x	K _y	K _x	K _y	K _x	K _y
116.958	Yes	Yes			1	1	1	1
76.9583	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		Deduct		in		Deduct	
116.958	0.000	0	0.000	1	0.625	0	0.000	0.75	0.625	0	0.000	0.75
	A325N				A325N				A325N			
76.9583	0.000	0	0.000	1	0.625	0	0.000	0.75	0.625	0	0.000	0.75
	A325N				A325N				A325N			

Guy Pressures

Guy Elevation	Guy Location	z	q _z	q _z	Ice Thickness
ft		ft	psf	Ice psf	in
116.958	A	70.98	20	15	0.500
	B	70.98	20	15	0.500
	C	74.23	21	15	0.500
76.9583	A	50.98	19	14	0.500
	B	50.98	19	14	0.500
	C	54.23	19	14	0.500

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom	F _x	F _y	F _z	M _x	M _y	M _z
ft		°	K	K	K	kip-ft	kip-ft	kip-ft	
116.958	A	64.8146	8.12	0.00	7.36	-3.42	-12.92	0.00	0.00

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F _x	F _y	F _z	M _x	M _y	M _z	
ft		°		K	K	K	kip-ft	kip-ft	kip-ft	
76.9583	B	67.9517	7.97	2.61	7.53	1.51	6.61	0.00	-11.46	
			8.12							
	C	67.3025	7.97	-2.69	7.49	1.55	6.58	-0.00	11.39	
			8.10							
	A	50.2302	7.97	Sum:	-0.07	22.38	-0.36	0.27	0.00	-0.07
			8.05							
	B	54.3671	7.97	8.05	4.04	6.56	2.33	5.76	0.00	-9.98
			8.05							
	C	51.8222	7.97	8.04	-4.29	6.34	2.47	5.57	-0.00	9.64
			8.04							
				Sum:	-0.24	19.11	-0.32	0.42	0.00	-0.34

Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
116.958	A	64.8146	11.00	0.00	9.98	-4.63	-17.52	0.00	0.00
			10.78						
	B	67.9517	11.00	3.54	10.21	2.04	8.97	0.00	-15.53
10.77									
C	67.3025	10.98	-3.64	10.15	2.10	8.91	-0.00	15.44	
		10.78							
76.9583	A	50.2302	Sum:	-0.10	30.34	-0.49	0.36	0.00	-0.09
			10.92						
B	54.3671	10.79	10.92	5.48	8.90	3.16	7.81	0.00	-13.53
		10.79							
C	51.8222	10.90	10.90	-5.81	8.60	3.35	7.55	-0.00	13.08
		10.79							
			Sum:	-0.33	25.92	-0.43	0.57	0.00	-0.46

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
116.958	A	64.8146	8.12	0.00	7.36	-3.42	-12.92	0.00	0.00
			7.97						
	B	67.9517	8.12	2.61	7.53	1.51	6.61	0.00	-11.46
7.97									
C	67.3025	8.10	-2.69	7.49	1.55	6.58	-0.00	11.39	
		7.97							

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F _x K	F _y K	F _z K	M _x kip-ft	M _y kip-ft	M _z kip-ft
76.9583	A	50.2302	Sum: 8.05 7.97	-0.07 0.00	22.38 6.21	-0.36 -5.12	0.27 -10.91	0.00 0.00	-0.07 0.00
	B	54.3671	8.05 7.97	4.04	6.56	2.33	5.76	0.00	-9.98
	C	51.8222	8.04 7.97	-4.29	6.34	2.47	5.57	-0.00	9.64
			Sum: 7.97	-0.24	19.11	-0.32	0.42	0.00	-0.34

Guy-Tensioning Information

Temperature At Time Of Tensioning																	
Guy Elevation	H	V	0 F		20 F		40 F		60 F		80 F		100 F		120 F		
			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	
116.958	A	43.24	91.96	8.583	0.94	8.379	0.96	8.174	0.99	7.970	1.01	7.766	1.04	7.562	1.07	7.358	1.10
	B	37.24	91.96	8.448	0.91	8.288	0.93	8.129	0.95	7.970	0.97	7.811	0.99	7.652	1.01	7.493	1.03
	C	35.74	85.46	8.475	0.79	8.307	0.81	8.138	0.83	7.970	0.84	7.802	0.86	7.634	0.88	7.466	0.90
76.9583	A	43.24	51.96	9.357	0.38	8.894	0.40	8.432	0.43	7.970	0.45	7.509	0.48	7.049	0.51	6.590	0.54
	B	37.24	51.96	9.121	0.35	8.737	0.37	8.353	0.38	7.970	0.40	7.587	0.42	7.204	0.45	6.822	0.47
	C	35.74	45.46	9.267	0.28	8.834	0.30	8.402	0.31	7.970	0.33	7.539	0.35	7.108	0.37	6.678	0.39

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 (Verizon)	A	Yes	Ar (CfAe)	105.00 - 31.00	1.000	0	12	6	0.500	1.980		1.04
1 1/4 (Nextel)	C	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0	8	8	1.000	1.550		0.66
1 1/4 (Nextel)	C	Yes	Ar (CfAe)	125.00 - 31.00	-3.000	0.05	4	4	1.000	1.550		0.66
1/2	B	Yes	Ar (CfAe)	31.00 - 25.00	0.000	0	4	4	0.580	0.580		0.25
7/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	-0.31	3	3	0.750	1.110		0.54
1/2	B	Yes	Ar (CfAe)	69.00 - 31.00	-1.000	-0.19	1	1	0.580	0.580		0.25
1/2	B	Yes	Ar (CfAe)	55.00 - 31.00	-1.000	-0.17	1	1	0.580	0.580		0.25
1 5/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	-0.13	1	1	1.980	1.980		1.04
7/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	-0.07	1	1	1.110	1.110		0.54
1 5/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0	1	1	1.980	1.980		1.04
1 1/4	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.08	1	1	1.550	1.550		0.66
3" dia Flex Conuit	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.15	1	1	3.000	3.000		5.00
1/2	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.22	2	2	0.400	0.580		0.25
1 5/8	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.27	1	1	1.980	1.980		1.04
HYBRIFLEX 1-5/8" (Verizon)	A	Yes	Ar (CfAe)	105.00 - 31.00	1.000	-0.25	1	1	1.980	1.980		1.90
1/2	B	Yes	Ar (CfAe)	125.00 - 31.00	-1.000	0.4	1	1	0.580	0.580		0.25
HYBRIFLEX	A	Yes	Ar (CfAe)	105.00 - 31.00	3.000	-0.25	1	1	1.980	1.980		1.90

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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
1-5/8" (Verizon - Proposed)												

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
T1	125.00-105.00	A	0.000	0.000	0.000	0.000	0.00
		B	27.783	0.000	0.000	0.000	0.23
		C	31.000	0.000	0.000	0.000	0.16
T2	105.00-85.00	A	26.400	0.000	0.000	0.000	0.33
		B	27.783	0.000	0.000	0.000	0.23
		C	31.000	0.000	0.000	0.000	0.16
T3	85.00-65.00	A	26.400	0.000	0.000	0.000	0.33
		B	27.977	0.000	0.000	0.000	0.23
		C	31.000	0.000	0.000	0.000	0.16
T4	65.00-45.00	A	26.400	0.000	0.000	0.000	0.33
		B	29.233	0.000	0.000	0.000	0.24
		C	31.000	0.000	0.000	0.000	0.16
T5	45.00-29.00	A	18.480	0.000	0.000	0.000	0.23
		B	21.188	0.000	0.000	0.000	0.17
		C	21.700	0.000	0.000	0.000	0.11
T6	29.00-25.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.773	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²	Weight K
T1	125.00-105.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		38.117	7.833	0.000	0.000	0.51
		C		8.500	42.500	0.000	0.000	0.57
T2	105.00-85.00	A	0.500	14.900	20.667	0.000	0.000	0.74
		B		38.117	7.833	0.000	0.000	0.51
		C		8.500	42.500	0.000	0.000	0.57
T3	85.00-65.00	A	0.500	14.900	20.667	0.000	0.000	0.74
		B		38.643	7.833	0.000	0.000	0.52
		C		8.500	42.500	0.000	0.000	0.57
T4	65.00-45.00	A	0.500	14.900	20.667	0.000	0.000	0.74
		B		42.067	7.833	0.000	0.000	0.54
		C		8.500	42.500	0.000	0.000	0.57
T5	45.00-29.00	A	0.500	10.430	14.467	0.000	0.000	0.52
		B		30.632	6.063	0.000	0.000	0.39
		C		5.950	29.750	0.000	0.000	0.40
T6	29.00-25.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.527	1.160	0.000	0.000	0.01
		C		0.000	0.000	0.000	0.000	0.00

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Feed Line Shielding

Section	Elevation <i>ft</i>	Face	A_R	A_R	A_F	A_F
			ft^2	Ice ft^2	ft^2	Ice ft^2
T1	125.00-105.00	A	0.000	0.000	0.000	0.000
		B	1.651	7.001	1.505	2.489
		C	1.843	7.771	1.679	2.763
T2	105.00-85.00	A	1.569	5.419	1.320	1.778
		B	1.651	7.001	1.389	2.297
		C	1.843	7.771	1.550	2.550
T3	85.00-65.00	A	1.569	5.419	1.430	1.927
		B	1.663	7.081	1.515	2.517
		C	1.843	7.771	1.679	2.763
T4	65.00-45.00	A	1.569	5.419	1.320	1.778
		B	1.738	7.603	1.462	2.495
		C	1.843	7.771	1.550	2.550
T5	45.00-29.00	A	1.095	3.809	0.962	1.297
		B	1.255	5.614	1.104	1.911
		C	1.285	5.462	1.130	1.859
T6	29.00-25.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.066	0.149	0.356
		C	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation <i>ft</i>	CP_x	CP_z	CP_x	CP_z
		<i>in</i>	<i>in</i>	Ice <i>in</i>	Ice <i>in</i>
T1	125.00-105.00	1.922	1.395	1.643	1.183
T2	105.00-85.00	-1.151	0.109	-0.484	0.413
T3	85.00-65.00	-1.110	0.090	-0.461	0.378
T4	65.00-45.00	-1.086	-0.010	-0.390	0.214
T5	45.00-29.00	-0.970	-0.066	-0.306	0.126
T6	29.00-25.00	0.607	-0.350	0.507	-0.293

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	$C_A A_A$ Front	$C_A A_A$ Side	Weight
			Horz Lateral	Vert					
			<i>ft</i>	<i>ft</i>	$^\circ$	<i>ft</i>	ft^2	ft^2	K
Rohn 6' x 12' Boom Gate (1) (Nextel)	A	From Leg	2.00	0.0000	123.00	No Ice	16.60	16.60	0.70
			0.00			1/2" Ice	25.00	25.00	1.10
Rohn 6' x 12' Boom Gate (1) (Nextel)	B	From Leg	2.00	0.0000	123.00	No Ice	16.60	16.60	0.70
			0.00			1/2" Ice	25.00	25.00	1.10
Rohn 6' x 12' Boom Gate (1) (Nextel)	C	From Leg	2.00	0.0000	123.00	No Ice	16.60	16.60	0.70
			0.00			1/2" Ice	25.00	25.00	1.10

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
DB844H65E-XY (Nextel)	A	From Leg	0.00	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
			-6.00	0.00			1/2" Ice	3.18	4.57	0.04
DB844H65E-XY (Nextel)	A	From Leg	0.00	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
			-2.00	0.00			1/2" Ice	3.18	4.57	0.04
DB844H65E-XY (Nextel)	A	From Leg	0.00	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
			2.00	0.00			1/2" Ice	3.18	4.57	0.04
LLPX310R (Clearwire)	A	From Leg	0.00	3.00	0.0000	123.00	No Ice	4.83	1.95	0.03
			6.00	0.00			1/2" Ice	5.18	2.21	0.05
DB844H65E-XY (Nextel)	B	From Leg	0.00	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
			-6.00	0.00			1/2" Ice	3.18	4.57	0.04
DB844H65E-XY (Nextel)	B	From Leg	0.00	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
			-2.00	0.00			1/2" Ice	3.18	4.57	0.04
DB844H65E-XY (Nextel)	B	From Leg	0.00	3.00	0.0000	123.00	No Ice	2.87	4.20	0.01
			2.00	0.00			1/2" Ice	3.18	4.57	0.04
LLPX310R (Clearwire)	B	From Leg	0.00	3.00	0.0000	123.00	No Ice	4.83	1.95	0.03
			6.00	0.00			1/2" Ice	5.18	2.21	0.05
DB844G65ZAXY (Nextel)	C	From Leg	0.00	3.00	0.0000	123.00	No Ice	4.67	3.73	0.02
			-6.00	0.00			1/2" Ice	5.05	4.10	0.05
DB844G65ZAXY (Nextel)	C	From Leg	0.00	3.00	0.0000	123.00	No Ice	4.67	3.73	0.02
			-2.00	0.00			1/2" Ice	5.05	4.10	0.05
DB844G65ZAXY (Nextel)	C	From Leg	0.00	3.00	0.0000	123.00	No Ice	4.67	3.73	0.02
			2.00	0.00			1/2" Ice	5.05	4.10	0.05
LLPX310R (Clearwire)	C	From Leg	0.00	3.00	0.0000	123.00	No Ice	4.83	1.95	0.03
			6.00	0.00			1/2" Ice	5.18	2.21	0.05
RRU (Clearwire)	A	From Leg	0.00	0.00	0.0000	123.00	No Ice	1.80	0.78	0.03
			0.00	0.00			1/2" Ice	2.00	0.92	0.04
RRU (Clearwire)	B	From Leg	0.00	0.00	0.0000	123.00	No Ice	1.80	0.78	0.03
			0.00	0.00			1/2" Ice	2.00	0.92	0.04
RRU (Clearwire)	C	From Leg	0.00	0.00	0.0000	123.00	No Ice	1.80	0.78	0.03
			0.00	0.00			1/2" Ice	2.00	0.92	0.04
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	A	From Leg	0.00	2.00	0.0000	105.00	No Ice	13.60	13.60	0.47
			0.00	0.00			1/2" Ice	18.40	18.40	0.60
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	B	From Leg	0.00	2.00	0.0000	105.00	No Ice	13.60	13.60	0.47
			0.00	0.00			1/2" Ice	18.40	18.40	0.60
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	C	From Leg	0.00	2.00	0.0000	105.00	No Ice	13.60	13.60	0.47
			0.00	0.00			1/2" Ice	18.40	18.40	0.60
SBNHH-1D65B (Verizon - Proposed)	A	From Leg	0.00	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			0.00	6.00			1/2" Ice	8.88	5.79	0.09

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	Project	100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date	10:29:57 07/22/16
	Client	Verizon Wireless	Designed by	TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	K
SBNHH-1D65B (Verizon - Proposed)	A	From Leg	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			2.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B (Verizon - Proposed)	A	From Leg	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			-2.00			1/2" Ice	8.88	5.79	0.09
			0.00						
BXA-80063-4CF (Verizon - Existing)	A	From Leg	4.00	0.0000	105.00	No Ice	5.16	2.52	0.01
			-6.00			1/2" Ice	5.55	2.82	0.04
			0.00						
SBNHH-1D65B (Verizon - Proposed)	B	From Leg	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			6.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B (Verizon - Proposed)	B	From Leg	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			2.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B (Verizon - Proposed)	B	From Leg	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			-2.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SLCP 2x6014 (Verizon - Existing)	B	From Leg	4.00	0.0000	105.00	No Ice	7.21	5.67	0.02
			6.00			1/2" Ice	7.65	6.09	0.07
			0.00						
SBNHH-1D65B (Verizon - Proposed)	C	From Leg	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			6.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B (Verizon - Proposed)	C	From Leg	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			2.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B (Verizon - Proposed)	C	From Leg	4.00	0.0000	105.00	No Ice	8.33	5.34	0.04
			-2.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SLCP 2x6014 (Verizon - Existing)	C	From Leg	4.00	0.0000	105.00	No Ice	7.21	5.67	0.02
			6.00			1/2" Ice	7.65	6.09	0.07
			0.00						
DB-T1-6Z-8AB-0Z (Verizon - Existing)	C	From Leg	0.00	0.0000	109.00	No Ice	5.60	2.33	0.04
			0.50			1/2" Ice	5.92	2.56	0.08
			0.00						
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	B	From Leg	0.00	0.0000	109.00	No Ice	5.60	2.33	0.04
			0.50			1/2" Ice	5.92	2.56	0.08
			0.00						
RRH4x30-B13 (Verizon - Proposed)	A	From Leg	4.00	0.0000	105.00	No Ice	2.52	1.89	0.06
			-4.00			1/2" Ice	2.74	2.09	0.08
			0.00						
RRH4x30-B13 (Verizon - Proposed)	B	From Leg	4.00	0.0000	105.00	No Ice	2.52	1.89	0.06
			-4.00			1/2" Ice	2.74	2.09	0.08
			0.00						
RRH4x30-B13 (Verizon - Proposed)	C	From Leg	4.00	0.0000	105.00	No Ice	2.52	1.89	0.06
			-4.00			1/2" Ice	2.74	2.09	0.08
			0.00						
RRH4x45/2x90-AWS (Verizon - Proposed)	A	From Leg	4.00	0.0000	105.00	No Ice	3.01	1.91	0.08
			4.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH4x45/2x90-AWS (Verizon - Proposed)	B	From Leg	4.00	0.0000	105.00	No Ice	3.01	1.91	0.08
			4.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH4x45/2x90-AWS (Verizon - Proposed)	C	From Leg	4.00	0.0000	105.00	No Ice	3.01	1.91	0.08
			4.00			1/2" Ice	3.26	2.13	0.10

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	Project	100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date	10:29:57 07/22/16
	Client	Verizon Wireless	Designed by	TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						
			ft	ft	°	ft	ft ²	ft ²	K	
RRH2x60-PCS (Verizon - Proposed)	A	From Leg	0.00	4.00	0.0000	105.00	No Ice	2.51	1.55	0.06
			-6.00				1/2" Ice	2.73	1.74	0.07
			0.00							
RRH2x60-PCS (Verizon - Proposed)	B	From Leg	4.00	4.00	0.0000	105.00	No Ice	2.51	1.55	0.06
			-6.00				1/2" Ice	2.73	1.74	0.07
			0.00							
RRH2x60-PCS (Verizon - Proposed)	C	From Leg	4.00	4.00	0.0000	105.00	No Ice	2.51	1.55	0.06
			-6.00				1/2" Ice	2.73	1.74	0.07
			0.00							
18' x 3" Dia Omni	A	From Leg	1.00	4.00	0.0000	125.00	No Ice	5.40	5.40	0.05
			0.00				1/2" Ice	7.23	7.23	0.09
			9.00							
12' x 3" Dia Omni	B	From Leg	1.00	4.00	0.0000	137.00	No Ice	3.60	3.60	0.04
			0.00				1/2" Ice	4.83	4.83	0.06
			6.00							
6' x 3" Dia Omni	C	From Leg	4.00	4.00	0.0000	128.00	No Ice	1.77	1.77	0.02
			0.00				1/2" Ice	2.13	2.13	0.03
			0.00							
4' x 3" DIA Omni	C	From Leg	1.00	4.00	0.0000	127.00	No Ice	1.00	1.00	0.02
			0.00				1/2" Ice	1.25	1.25	0.02
			0.00							
4-Bay Dipole	A	From Leg	1.00	4.00	0.0000	129.00	No Ice	3.15	3.15	0.03
			0.00				1/2" Ice	5.67	5.67	0.04
			0.00							
4-Bay Dipole	A	From Leg	1.00	4.00	0.0000	129.00	No Ice	3.15	3.15	0.03
			0.00				1/2" Ice	5.67	5.67	0.04
			0.00							
ANT150D6-9	A	From Leg	1.00	4.00	0.0000	69.00	No Ice	4.00	4.00	0.03
			0.00				1/2" Ice	4.60	4.60	0.03
			0.00							
ANT150D6-9	A	From Leg	1.00	4.00	0.0000	55.00	No Ice	4.00	4.00	0.03
			0.00				1/2" Ice	4.60	4.60	0.03
			0.00							
GPS	A	From Leg	3.00	4.00	0.0000	31.00	No Ice	1.00	1.00	0.01
			0.00				1/2" Ice	1.50	1.50	0.01
			0.00							
GPS	A	From Leg	0.00	4.00	0.0000	31.00	No Ice	1.00	1.00	0.01
			3.00				1/2" Ice	1.50	1.50	0.01
			0.00							
GPS	B	From Leg	3.00	4.00	0.0000	31.00	No Ice	1.00	1.00	0.01
			0.00				1/2" Ice	1.50	1.50	0.01
			0.00							
GPS	B	From Leg	0.00	4.00	0.0000	31.00	No Ice	1.00	1.00	0.01
			3.00				1/2" Ice	1.50	1.50	0.01
			0.00							
3' Pipe Mount Side Arm	A	From Leg	1.00	4.00	0.0000	31.00	No Ice	0.47	0.47	0.01
			0.00				1/2" Ice	0.69	0.69	0.05
			0.00							
3' Pipe Mount Side Arm	A	From Leg	0.00	4.00	0.0000	31.00	No Ice	0.47	0.47	0.01
			1.00				1/2" Ice	0.69	0.69	0.05
			0.00							
3' Pipe Mount Side Arm	B	From Leg	1.00	4.00	0.0000	31.00	No Ice	0.47	0.47	0.01
			0.00				1/2" Ice	0.69	0.69	0.05
			0.00							
3' Pipe Mount Side Arm	B	From Leg	0.00	4.00	0.0000	31.00	No Ice	0.47	0.47	0.01
			1.00				1/2" Ice	0.69	0.69	0.05
			0.00							

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	Client Verizon Wireless	Designed by TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			ft	°	ft	ft ²	ft ²	K
			ft					
			ft					
			0.00					

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight
				ft	°	°	ft	ft	ft ²	K
VHLP1-23 (Clearwire)	A	Paraboloid w/o Radome	From Leg	0.00 0.00 0.00	Worst		118.00	1.27	No Ice 1/2" Ice	1.28 1.45 0.01
VHLP1-23 (Clearwire)	B	Paraboloid w/o Radome	From Leg	0.00 0.00 0.00	Worst		118.00	1.27	No Ice 1/2" Ice	1.28 1.45 0.01
VHLP2-18 (Clearwire)	B	Paraboloid w/o Radome	From Leg	0.00 0.00 0.00	Worst		127.00	2.17	No Ice 1/2" Ice	3.72 4.01 0.03 0.04

Tower Pressures - No Ice

$G_H = 1.162$

Section Elevation	z	K _Z	q _z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _{AA} In Face	C _{AA} Out Face
ft	ft		psf	ft ²	c	ft ²	ft ²	ft ²		ft ²	ft ²
T1 125.00-105.00	115.00	1.429	23	64.173	A	3.115	9.740	6.667	51.86	0.000	0.000
					B	1.610	35.872		17.79	0.000	0.000
					C	1.436	38.897		16.53	0.000	0.000
T2 105.00-85.00	95.00	1.353	22	64.173	A	1.555	34.571	6.667	18.45	0.000	0.000
					B	1.486	35.872		17.85	0.000	0.000
					C	1.325	38.897		16.57	0.000	0.000
T3 85.00-65.00	75.00	1.264	21	64.590	A	1.662	35.404	7.500	20.23	0.000	0.000
					B	1.577	36.887		19.50	0.000	0.000
					C	1.413	39.730		18.23	0.000	0.000
T4 65.00-45.00	55.00	1.157	19	64.173	A	1.555	34.571	6.667	18.45	0.000	0.000
					B	1.414	37.235		17.25	0.000	0.000
					C	1.325	38.897		16.57	0.000	0.000
T5 45.00-29.00	37.00	1.033	17	51.339	A	1.434	25.169	5.333	20.05	0.000	0.000
					B	1.293	27.716		18.39	0.000	0.000
					C	1.266	28.198		18.10	0.000	0.000
T6 29.00-25.00	27.00	1	16	6.797	A	1.272	1.456	1.456	53.37	0.000	0.000
					B	1.123	2.230		43.43	0.000	0.000
					C	1.272	1.456		53.37	0.000	0.000

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	Client	Verizon Wireless	Designed by	TJL

Tower Pressure - With Ice

$G_H = 1.162$

Section Elevation <i>ft</i>	<i>z</i> <i>ft</i>	K_Z	q_z <i>psf</i>	t_z <i>in</i>	A_G <i>ft</i> ²	<i>F</i> <i>a</i> <i>c</i> <i>e</i>	A_F <i>ft</i> ²	A_R <i>ft</i> ²	A_{leg} <i>ft</i> ²	<i>Leg</i> <i>%</i>	C_{AA} <i>In</i> <i>Face</i> <i>ft</i> ²	C_{AA} <i>Out</i> <i>Face</i> <i>ft</i> ²
T1 125.00-105.00	115.00	1.429	18	0.500	65.840	A	3.115	18.023	10.000	47.31	0.000	0.000
						B	8.459	49.138		17.36	0.000	0.000
						C	42.852	18.752		16.23	0.000	0.000
T2 105.00-85.00	95.00	1.353	17	0.500	65.840	A	21.764	27.504	10.000	20.30	0.000	0.000
						B	8.411	49.138		17.38	0.000	0.000
						C	42.825	18.752		16.24	0.000	0.000
T3 85.00-65.00	75.00	1.264	16	0.500	66.257	A	21.833	28.326	10.833	21.60	0.000	0.000
						B	8.408	50.407		18.42	0.000	0.000
						C	42.830	19.575		17.36	0.000	0.000
T4 65.00-45.00	55.00	1.157	14	0.500	65.840	A	21.764	27.504	10.000	20.30	0.000	0.000
						B	8.214	52.486		16.47	0.000	0.000
						C	42.825	18.752		16.24	0.000	0.000
T5 45.00-29.00	37.00	1.033	13	0.500	52.672	A	15.566	21.069	8.000	21.84	0.000	0.000
						B	6.548	39.466		17.39	0.000	0.000
						C	30.287	14.936		17.69	0.000	0.000
T6 29.00-25.00	27.00	1	12	0.500	7.154	A	1.272	2.460	2.184	58.52	0.000	0.000
						B	2.077	2.921		43.71	0.000	0.000
						C	1.272	2.460		58.52	0.000	0.000

Tower Pressure - Service

$G_H = 1.162$

Section Elevation <i>ft</i>	<i>z</i> <i>ft</i>	K_Z	q_z <i>psf</i>	A_G <i>ft</i> ²	<i>F</i> <i>a</i> <i>c</i> <i>e</i>	A_F <i>ft</i> ²	A_R <i>ft</i> ²	A_{leg} <i>ft</i> ²	<i>Leg</i> <i>%</i>	C_{AA} <i>In</i> <i>Face</i> <i>ft</i> ²	C_{AA} <i>Out</i> <i>Face</i> <i>ft</i> ²
T1 125.00-105.00	115.00	1.429	9	64.173	A	3.115	9.740	6.667	51.86	0.000	0.000
					B	1.610	35.872		17.79	0.000	0.000
					C	1.436	38.897		16.53	0.000	0.000
T2 105.00-85.00	95.00	1.353	9	64.173	A	1.555	34.571	6.667	18.45	0.000	0.000
					B	1.486	35.872		17.85	0.000	0.000
					C	1.325	38.897		16.57	0.000	0.000
T3 85.00-65.00	75.00	1.264	8	64.590	A	1.662	35.404	7.500	20.23	0.000	0.000
					B	1.577	36.887		19.50	0.000	0.000
					C	1.413	39.730		18.23	0.000	0.000
T4 65.00-45.00	55.00	1.157	7	64.173	A	1.555	34.571	6.667	18.45	0.000	0.000
					B	1.414	37.235		17.25	0.000	0.000
					C	1.325	38.897		16.57	0.000	0.000
T5 45.00-29.00	37.00	1.033	7	51.339	A	1.434	25.169	5.333	20.05	0.000	0.000
					B	1.293	27.716		18.39	0.000	0.000
					C	1.266	28.198		18.10	0.000	0.000
T6 29.00-25.00	27.00	1	6	6.797	A	1.272	1.456	1.456	53.37	0.000	0.000
					B	1.123	2.230		43.43	0.000	0.000
					C	1.272	1.456		53.37	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

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	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	0.39	1.06	A	0.2	2.595	0.59	1	1	8.866	1.53	76.51	C
			B	0.584	1.815	0.744	1	1	28.298			
			C	0.628	1.789	0.771	1	1	31.443			
T2 105.00-85.00	0.72	1.03	A	0.563	1.832	0.732	1	1	26.848	1.44	72.12	C
			B	0.582	1.816	0.743	1	1	28.133			
			C	0.627	1.79	0.77	1	1	31.290			
T3 85.00-65.00	0.72	1.23	A	0.574	1.823	0.738	1	1	27.789	1.39	69.39	C
			B	0.596	1.807	0.751	1	1	29.274			
			C	0.637	1.786	0.777	1	1	32.281			
T4 65.00-45.00	0.73	0.99	A	0.563	1.832	0.732	1	1	26.848	1.23	61.69	C
			B	0.602	1.803	0.755	1	1	29.526			
			C	0.627	1.79	0.77	1	1	31.290			
T5 45.00-29.00	0.51	0.79	A	0.518	1.878	0.707	1	1	19.226	0.79	49.47	C
			B	0.565	1.83	0.733	1	1	21.604			
			C	0.574	1.822	0.738	1	1	22.075			
T6 29.00-25.00	0.00	0.20	A	0.401	2.061	0.652	1	1	2.222	0.10	24.27	B
			B	0.493	1.909	0.694	1	1	2.671			
			C	0.401	2.061	0.652	1	1	2.222			
Sum Weight:	3.07	5.30								6.48		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	0.39	1.06	A	0.2	2.595	0.59	0.825	1	8.321	1.52	75.90	C
			B	0.584	1.815	0.744	0.825	1	28.016			
			C	0.628	1.789	0.771	0.825	1	31.192			
T2 105.00-85.00	0.72	1.03	A	0.563	1.832	0.732	0.825	1	26.576	1.43	71.59	C
			B	0.582	1.816	0.743	0.825	1	27.873			
			C	0.627	1.79	0.77	0.825	1	31.058			
T3 85.00-65.00	0.72	1.23	A	0.574	1.823	0.738	0.825	1	27.498	1.38	68.85	C
			B	0.596	1.807	0.751	0.825	1	28.998			
			C	0.637	1.786	0.777	0.825	1	32.034			
T4 65.00-45.00	0.73	0.99	A	0.563	1.832	0.732	0.825	1	26.576	1.22	61.24	C
			B	0.602	1.803	0.755	0.825	1	29.279			
			C	0.627	1.79	0.77	0.825	1	31.058			
T5 45.00-29.00	0.51	0.79	A	0.518	1.878	0.707	0.825	1	18.975	0.78	48.97	C
			B	0.565	1.83	0.733	0.825	1	21.378			
			C	0.574	1.822	0.738	0.825	1	21.854			
T6 29.00-25.00	0.00	0.20	A	0.401	2.061	0.652	0.825	1	1.999	0.09	22.48	B
			B	0.493	1.909	0.694	0.825	1	2.474			
			C	0.401	2.061	0.652	0.825	1	1.999			
Sum Weight:	3.07	5.30								6.42		

Tower Forces - No Ice - Wind 60 To Face

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 16001.17 - West Hartford Center	Page 18 of 41
	Project 100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date 10:29:57 07/22/16
	Client Verizon Wireless	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T1 125.00-105.00	0.39	1.06	A	0.2	2.595	0.59	0.8	1	8.243	1.52	75.81	C
			B	0.584	1.815	0.744	0.8	1	27.976			
			C	0.628	1.789	0.771	0.8	1	31.156			
T2 105.00-85.00	0.72	1.03	A	0.563	1.832	0.732	0.8	1	26.537	1.43	71.51	C
			B	0.582	1.816	0.743	0.8	1	27.836			
			C	0.627	1.79	0.77	0.8	1	31.025			
T3 85.00-65.00	0.72	1.23	A	0.574	1.823	0.738	0.8	1	27.456	1.38	68.78	C
			B	0.596	1.807	0.751	0.8	1	28.958			
			C	0.637	1.786	0.777	0.8	1	31.999			
T4 65.00-45.00	0.73	0.99	A	0.563	1.832	0.732	0.8	1	26.537	1.22	61.17	C
			B	0.602	1.803	0.755	0.8	1	29.243			
			C	0.627	1.79	0.77	0.8	1	31.025			
T5 45.00-29.00	0.51	0.79	A	0.518	1.878	0.707	0.8	1	18.939	0.78	48.90	C
			B	0.565	1.83	0.733	0.8	1	21.346			
			C	0.574	1.822	0.738	0.8	1	21.822			
T6 29.00-25.00	0.00	0.20	A	0.401	2.061	0.652	0.8	1	1.968	0.09	22.23	B
			B	0.493	1.909	0.694	0.8	1	2.446			
			C	0.401	2.061	0.652	0.8	1	1.968			
Sum Weight:	3.07	5.30								6.42		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	R _R	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T1 125.00-105.00	0.39	1.06	A	0.2	2.595	0.59	0.85	1	8.399	1.52	75.98	C
			B	0.584	1.815	0.744	0.85	1	28.056			
			C	0.628	1.789	0.771	0.85	1	31.228			
T2 105.00-85.00	0.72	1.03	A	0.563	1.832	0.732	0.85	1	26.615	1.43	71.66	C
			B	0.582	1.816	0.743	0.85	1	27.910			
			C	0.627	1.79	0.77	0.85	1	31.091			
T3 85.00-65.00	0.72	1.23	A	0.574	1.823	0.738	0.85	1	27.540	1.38	68.93	C
			B	0.596	1.807	0.751	0.85	1	29.037			
			C	0.637	1.786	0.777	0.85	1	32.069			
T4 65.00-45.00	0.73	0.99	A	0.563	1.832	0.732	0.85	1	26.615	1.23	61.30	C
			B	0.602	1.803	0.755	0.85	1	29.314			
			C	0.627	1.79	0.77	0.85	1	31.091			
T5 45.00-29.00	0.51	0.79	A	0.518	1.878	0.707	0.85	1	19.011	0.78	49.04	C
			B	0.565	1.83	0.733	0.85	1	21.410			
			C	0.574	1.822	0.738	0.85	1	21.885			
T6 29.00-25.00	0.00	0.20	A	0.401	2.061	0.652	0.85	1	2.031	0.09	22.74	B
			B	0.493	1.909	0.694	0.85	1	2.502			
			C	0.401	2.061	0.652	0.85	1	2.031			
Sum Weight:	3.07	5.30								6.43		

Tower Forces - With Ice - Wind Normal To Face

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	16001.17 - West Hartford Center	Page	19 of 41
	Project	100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date	10:29:57 07/22/16
	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	1.08	1.37	A	0.321	2.242	0.623	1	1	14.335	2.49	124.35	C
			B	0.875	1.89	0.96	1	1	55.647			
			C	0.936	1.979	1	1	1	61.604			
T2 105.00-85.00	1.82	1.34	A	0.748	1.787	0.856	1	1	45.295	2.35	117.66	C
			B	0.874	1.889	0.96	1	1	55.566			
			C	0.935	1.978	1	1	1	61.577			
T3 85.00-65.00	1.82	1.55	A	0.757	1.79	0.862	1	1	46.258	2.24	112.08	C
			B	0.888	1.907	0.972	1	1	57.398			
			C	0.942	1.989	1	1	1	62.405			
T4 65.00-45.00	1.85	1.29	A	0.748	1.787	0.856	1	1	45.295	2.01	100.65	C
			B	0.922	1.957	1	1	1	60.700			
			C	0.935	1.978	1	1	1	61.577			
T5 45.00-29.00	1.31	1.04	A	0.696	1.776	0.817	1	1	32.774	1.24	77.35	B
			B	0.874	1.889	0.959	1	1	44.405			
			C	0.859	1.871	0.946	1	1	44.416			
T6 29.00-25.00	0.01	0.25	A	0.522	1.873	0.709	1	1	3.016	0.11	28.33	B
			B	0.699	1.776	0.819	1	1	4.468			
			C	0.522	1.873	0.709	1	1	3.016			
Sum Weight:	7.89	6.84								10.45		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	1.08	1.37	A	0.321	2.242	0.623	0.825	1	13.790	2.18	109.22	C
			B	0.875	1.89	0.96	0.825	1	54.166			
			C	0.936	1.979	1	0.825	1	54.105			
T2 105.00-85.00	1.82	1.34	A	0.748	1.787	0.856	0.825	1	41.486	2.07	103.34	C
			B	0.874	1.889	0.96	0.825	1	54.094			
			C	0.935	1.978	1	0.825	1	54.083			
T3 85.00-65.00	1.82	1.55	A	0.757	1.79	0.862	0.825	1	42.437	1.97	98.61	C
			B	0.888	1.907	0.972	0.825	1	55.927			
			C	0.942	1.989	1	0.825	1	54.910			
T4 65.00-45.00	1.85	1.29	A	0.748	1.787	0.856	0.825	1	41.486	1.92	95.81	B
			B	0.922	1.957	1	0.825	1	59.263			
			C	0.935	1.978	1	0.825	1	54.083			
T5 45.00-29.00	1.31	1.04	A	0.696	1.776	0.817	0.825	1	30.050	1.21	75.35	B
			B	0.874	1.889	0.959	0.825	1	43.259			
			C	0.859	1.871	0.946	0.825	1	39.116			
T6 29.00-25.00	0.01	0.25	A	0.522	1.873	0.709	0.825	1	2.793	0.10	26.03	B
			B	0.699	1.776	0.819	0.825	1	4.105			
			C	0.522	1.873	0.709	0.825	1	2.793			
Sum Weight:	7.89	6.84								9.45		

Tower Forces - With Ice - Wind 60 To Face

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	16001.17 - West Hartford Center	Page	20 of 41
	Project	100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date	10:29:57 07/22/16
	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	1.08	1.37	A	0.321	2.242	0.623	0.8	1	13.712	2.14	107.05	C
			B	0.875	1.89	0.96	0.8	1	53.955			
			C	0.936	1.979	1	0.8	1	53.034			
T2 105.00-85.00	1.82	1.34	A	0.748	1.787	0.856	0.8	1	40.942	2.03	101.29	C
			B	0.874	1.889	0.96	0.8	1	53.884			
			C	0.935	1.978	1	0.8	1	53.012			
T3 85.00-65.00	1.82	1.55	A	0.757	1.79	0.862	0.8	1	41.891	1.93	96.69	C
			B	0.888	1.907	0.972	0.8	1	55.717			
			C	0.942	1.989	1	0.8	1	53.839			
T4 65.00-45.00	1.85	1.29	A	0.748	1.787	0.856	0.8	1	40.942	1.91	95.48	B
			B	0.922	1.957	1	0.8	1	59.057			
			C	0.935	1.978	1	0.8	1	53.012			
T5 45.00-29.00	1.31	1.04	A	0.696	1.776	0.817	0.8	1	29.661	1.20	75.07	B
			B	0.874	1.889	0.959	0.8	1	43.095			
			C	0.859	1.871	0.946	0.8	1	38.359			
T6 29.00-25.00	0.01	0.25	A	0.522	1.873	0.709	0.8	1	2.762	0.10	25.70	B
			B	0.699	1.776	0.819	0.8	1	4.053			
			C	0.522	1.873	0.709	0.8	1	2.762			
Sum Weight:	7.89	6.84								9.31		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	1.08	1.37	A	0.321	2.242	0.623	0.85	1	13.868	2.23	111.38	C
			B	0.875	1.89	0.96	0.85	1	54.378			
			C	0.936	1.979	1	0.85	1	55.177			
T2 105.00-85.00	1.82	1.34	A	0.748	1.787	0.856	0.85	1	42.030	2.11	105.38	C
			B	0.874	1.889	0.96	0.85	1	54.305			
			C	0.935	1.978	1	0.85	1	55.154			
T3 85.00-65.00	1.82	1.55	A	0.757	1.79	0.862	0.85	1	42.983	2.01	100.54	C
			B	0.888	1.907	0.972	0.85	1	56.137			
			C	0.942	1.989	1	0.85	1	55.980			
T4 65.00-45.00	1.85	1.29	A	0.748	1.787	0.856	0.85	1	42.030	1.92	96.14	B
			B	0.922	1.957	1	0.85	1	59.468			
			C	0.935	1.978	1	0.85	1	55.154			
T5 45.00-29.00	1.31	1.04	A	0.696	1.776	0.817	0.85	1	30.439	1.21	75.64	B
			B	0.874	1.889	0.959	0.85	1	43.422			
			C	0.859	1.871	0.946	0.85	1	39.873			
T6 29.00-25.00	0.01	0.25	A	0.522	1.873	0.709	0.85	1	2.825	0.11	26.35	B
			B	0.699	1.776	0.819	0.85	1	4.157			
			C	0.522	1.873	0.709	0.85	1	2.825			
Sum Weight:	7.89	6.84								9.58		

Tower Forces - Service - Wind Normal To Face

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	16001.17 - West Hartford Center	Page	21 of 41
	Project	100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date	10:29:57 07/22/16
	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	0.39	1.06	A	0.2	2.595	0.59	1	1	8.866	0.60	29.89	C
			B	0.584	1.815	0.744	1	1	28.298			
			C	0.628	1.789	0.771	1	1	31.443			
T2 105.00-85.00	0.72	1.03	A	0.563	1.832	0.732	1	1	26.848	0.56	28.17	C
			B	0.582	1.816	0.743	1	1	28.133			
			C	0.627	1.79	0.77	1	1	31.290			
T3 85.00-65.00	0.72	1.23	A	0.574	1.823	0.738	1	1	27.789	0.54	27.10	C
			B	0.596	1.807	0.751	1	1	29.274			
			C	0.637	1.786	0.777	1	1	32.281			
T4 65.00-45.00	0.73	0.99	A	0.563	1.832	0.732	1	1	26.848	0.48	24.10	C
			B	0.602	1.803	0.755	1	1	29.526			
			C	0.627	1.79	0.77	1	1	31.290			
T5 45.00-29.00	0.51	0.79	A	0.518	1.878	0.707	1	1	19.226	0.31	19.32	C
			B	0.565	1.83	0.733	1	1	21.604			
			C	0.574	1.822	0.738	1	1	22.075			
T6 29.00-25.00	0.00	0.20	A	0.401	2.061	0.652	1	1	2.222	0.04	9.48	B
			B	0.493	1.909	0.694	1	1	2.671			
			C	0.401	2.061	0.652	1	1	2.222			
Sum Weight:	3.07	5.30								2.53		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	0.39	1.06	A	0.2	2.595	0.59	0.825	1	8.321	0.59	29.65	C
			B	0.584	1.815	0.744	0.825	1	28.016			
			C	0.628	1.789	0.771	0.825	1	31.192			
T2 105.00-85.00	0.72	1.03	A	0.563	1.832	0.732	0.825	1	26.576	0.56	27.96	C
			B	0.582	1.816	0.743	0.825	1	27.873			
			C	0.627	1.79	0.77	0.825	1	31.058			
T3 85.00-65.00	0.72	1.23	A	0.574	1.823	0.738	0.825	1	27.498	0.54	26.90	C
			B	0.596	1.807	0.751	0.825	1	28.998			
			C	0.637	1.786	0.777	0.825	1	32.034			
T4 65.00-45.00	0.73	0.99	A	0.563	1.832	0.732	0.825	1	26.576	0.48	23.92	C
			B	0.602	1.803	0.755	0.825	1	29.279			
			C	0.627	1.79	0.77	0.825	1	31.058			
T5 45.00-29.00	0.51	0.79	A	0.518	1.878	0.707	0.825	1	18.975	0.31	19.13	C
			B	0.565	1.83	0.733	0.825	1	21.378			
			C	0.574	1.822	0.738	0.825	1	21.854			
T6 29.00-25.00	0.00	0.20	A	0.401	2.061	0.652	0.825	1	1.999	0.04	8.78	B
			B	0.493	1.909	0.694	0.825	1	2.474			
			C	0.401	2.061	0.652	0.825	1	1.999			
Sum Weight:	3.07	5.30								2.51		

Tower Forces - Service - Wind 60 To Face

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	16001.17 - West Hartford Center	Page	22 of 41
	Project	100-ft FWT Guyed Tower - 20 Isham Rd., West Hartford, CT	Date	10:29:57 07/22/16
	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	0.39	1.06	A	0.2	2.595	0.59	0.8	1	8.243	0.59	29.61	C
			B	0.584	1.815	0.744	0.8	1	27.976			
			C	0.628	1.789	0.771	0.8	1	31.156			
T2 105.00-85.00	0.72	1.03	A	0.563	1.832	0.732	0.8	1	26.537	0.56	27.93	C
			B	0.582	1.816	0.743	0.8	1	27.836			
			C	0.627	1.79	0.77	0.8	1	31.025			
T3 85.00-65.00	0.72	1.23	A	0.574	1.823	0.738	0.8	1	27.456	0.54	26.87	C
			B	0.596	1.807	0.751	0.8	1	28.958			
			C	0.637	1.786	0.777	0.8	1	31.999			
T4 65.00-45.00	0.73	0.99	A	0.563	1.832	0.732	0.8	1	26.537	0.48	23.89	C
			B	0.602	1.803	0.755	0.8	1	29.243			
			C	0.627	1.79	0.77	0.8	1	31.025			
T5 45.00-29.00	0.51	0.79	A	0.518	1.878	0.707	0.8	1	18.939	0.31	19.10	C
			B	0.565	1.83	0.733	0.8	1	21.346			
			C	0.574	1.822	0.738	0.8	1	21.822			
T6 29.00-25.00	0.00	0.20	A	0.401	2.061	0.652	0.8	1	1.968	0.03	8.68	B
			B	0.493	1.909	0.694	0.8	1	2.446			
			C	0.401	2.061	0.652	0.8	1	1.968			
Sum Weight:	3.07	5.30								2.51		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 125.00-105.00	0.39	1.06	A	0.2	2.595	0.59	0.85	1	8.399	0.59	29.68	C
			B	0.584	1.815	0.744	0.85	1	28.056			
			C	0.628	1.789	0.771	0.85	1	31.228			
T2 105.00-85.00	0.72	1.03	A	0.563	1.832	0.732	0.85	1	26.615	0.56	27.99	C
			B	0.582	1.816	0.743	0.85	1	27.910			
			C	0.627	1.79	0.77	0.85	1	31.091			
T3 85.00-65.00	0.72	1.23	A	0.574	1.823	0.738	0.85	1	27.540	0.54	26.93	C
			B	0.596	1.807	0.751	0.85	1	29.037			
			C	0.637	1.786	0.777	0.85	1	32.069			
T4 65.00-45.00	0.73	0.99	A	0.563	1.832	0.732	0.85	1	26.615	0.48	23.95	C
			B	0.602	1.803	0.755	0.85	1	29.314			
			C	0.627	1.79	0.77	0.85	1	31.091			
T5 45.00-29.00	0.51	0.79	A	0.518	1.878	0.707	0.85	1	19.011	0.31	19.16	C
			B	0.565	1.83	0.733	0.85	1	21.410			
			C	0.574	1.822	0.738	0.85	1	21.885			
T6 29.00-25.00	0.00	0.20	A	0.401	2.061	0.652	0.85	1	2.031	0.04	8.88	B
			B	0.493	1.909	0.694	0.85	1	2.502			
			C	0.401	2.061	0.652	0.85	1	2.031			
Sum Weight:	3.07	5.30								2.51		

Force Totals (Does not include forces on guys)

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	Client	Verizon Wireless	Designed by	TJL

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Torques kip-ft
Leg Weight	3.39			
Bracing Weight	1.91			
Total Member Self-Weight	5.30			
Guy Weight	0.76			
Total Weight	14.40			
Wind 0 deg - No Ice		0.08	-14.11	-1.46
Wind 30 deg - No Ice		7.18	-12.22	-1.30
Wind 45 deg - No Ice		10.10	-9.99	-1.08
Wind 60 deg - No Ice		12.34	-7.09	-0.79
Wind 90 deg - No Ice		14.21	-0.08	-0.06
Wind 120 deg - No Ice		12.31	6.98	0.68
Wind 135 deg - No Ice		9.99	9.88	0.99
Wind 150 deg - No Ice		7.04	12.14	1.23
Wind 180 deg - No Ice		-0.08	14.04	1.46
Wind 210 deg - No Ice		-7.18	12.22	1.30
Wind 225 deg - No Ice		-10.10	9.99	1.08
Wind 240 deg - No Ice		-12.39	7.13	0.78
Wind 270 deg - No Ice		-14.21	0.08	0.06
Wind 300 deg - No Ice		-12.25	-6.95	-0.68
Wind 315 deg - No Ice		-9.99	-9.88	-0.99
Wind 330 deg - No Ice		-7.04	-12.14	-1.23
Member Ice	1.54			
Guy Ice	0.41			
Total Weight Ice	24.24			
Wind 0 deg - Ice		0.06	-17.50	-0.88
Wind 30 deg - Ice		8.43	-14.44	-0.85
Wind 45 deg - Ice		11.80	-11.72	-0.75
Wind 60 deg - Ice		14.31	-8.24	-0.60
Wind 90 deg - Ice		16.76	-0.06	-0.16
Wind 120 deg - Ice		15.23	8.70	0.34
Wind 135 deg - Ice		11.71	11.63	0.51
Wind 150 deg - Ice		8.32	14.38	0.69
Wind 180 deg - Ice		-0.06	16.37	0.90
Wind 210 deg - Ice		-8.43	14.44	0.85
Wind 225 deg - Ice		-11.80	11.72	0.75
Wind 240 deg - Ice		-15.29	8.81	0.54
Wind 270 deg - Ice		-16.76	0.06	0.16
Wind 300 deg - Ice		-14.25	-8.13	-0.30
Wind 315 deg - Ice		-11.71	-11.63	-0.51
Wind 330 deg - Ice		-8.32	-14.38	-0.69
Total Weight	14.40			
Wind 0 deg - Service		0.03	-5.51	-0.57
Wind 30 deg - Service		2.80	-4.77	-0.51
Wind 45 deg - Service		3.95	-3.90	-0.42
Wind 60 deg - Service		4.82	-2.77	-0.31
Wind 90 deg - Service		5.55	-0.03	-0.02
Wind 120 deg - Service		4.81	2.73	0.26
Wind 135 deg - Service		3.90	3.86	0.39
Wind 150 deg - Service		2.75	4.74	0.48
Wind 180 deg - Service		-0.03	5.49	0.57
Wind 210 deg - Service		-2.80	4.77	0.51
Wind 225 deg - Service		-3.95	3.90	0.42
Wind 240 deg - Service		-4.84	2.78	0.31
Wind 270 deg - Service		-5.55	0.03	0.02
Wind 300 deg - Service		-4.79	-2.72	-0.26
Wind 315 deg - Service		-3.90	-3.86	-0.39
Wind 330 deg - Service		-2.75	-4.74	-0.48

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Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice+Guy
3	Dead+Wind 30 deg - No Ice+Guy
4	Dead+Wind 45 deg - No Ice+Guy
5	Dead+Wind 60 deg - No Ice+Guy
6	Dead+Wind 90 deg - No Ice+Guy
7	Dead+Wind 120 deg - No Ice+Guy
8	Dead+Wind 135 deg - No Ice+Guy
9	Dead+Wind 150 deg - No Ice+Guy
10	Dead+Wind 180 deg - No Ice+Guy
11	Dead+Wind 210 deg - No Ice+Guy
12	Dead+Wind 225 deg - No Ice+Guy
13	Dead+Wind 240 deg - No Ice+Guy
14	Dead+Wind 270 deg - No Ice+Guy
15	Dead+Wind 300 deg - No Ice+Guy
16	Dead+Wind 315 deg - No Ice+Guy
17	Dead+Wind 330 deg - No Ice+Guy
18	Dead+Ice+Temp+Guy
19	Dead+Wind 0 deg+Ice+Temp+Guy
20	Dead+Wind 30 deg+Ice+Temp+Guy
21	Dead+Wind 45 deg+Ice+Temp+Guy
22	Dead+Wind 60 deg+Ice+Temp+Guy
23	Dead+Wind 90 deg+Ice+Temp+Guy
24	Dead+Wind 120 deg+Ice+Temp+Guy
25	Dead+Wind 135 deg+Ice+Temp+Guy
26	Dead+Wind 150 deg+Ice+Temp+Guy
27	Dead+Wind 180 deg+Ice+Temp+Guy
28	Dead+Wind 210 deg+Ice+Temp+Guy
29	Dead+Wind 225 deg+Ice+Temp+Guy
30	Dead+Wind 240 deg+Ice+Temp+Guy
31	Dead+Wind 270 deg+Ice+Temp+Guy
32	Dead+Wind 300 deg+Ice+Temp+Guy
33	Dead+Wind 315 deg+Ice+Temp+Guy
34	Dead+Wind 330 deg+Ice+Temp+Guy
35	Dead+Wind 0 deg - Service+Guy
36	Dead+Wind 30 deg - Service+Guy
37	Dead+Wind 45 deg - Service+Guy
38	Dead+Wind 60 deg - Service+Guy
39	Dead+Wind 90 deg - Service+Guy
40	Dead+Wind 120 deg - Service+Guy
41	Dead+Wind 135 deg - Service+Guy
42	Dead+Wind 150 deg - Service+Guy
43	Dead+Wind 180 deg - Service+Guy
44	Dead+Wind 210 deg - Service+Guy
45	Dead+Wind 225 deg - Service+Guy
46	Dead+Wind 240 deg - Service+Guy
47	Dead+Wind 270 deg - Service+Guy
48	Dead+Wind 300 deg - Service+Guy
49	Dead+Wind 315 deg - Service+Guy
50	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft	
T1	125 - 105	Leg	Max Tension	22	6.89	-1.14	0.66	
			Max. Compression	34	-16.48	-1.00	-0.58	
			Max. Mx	30	-9.17	1.32	-0.75	
			Max. My	19	-9.07	0.09	1.51	
			Max. Vy	23	-0.85	-0.88	0.45	
		Diagonal	Max. Vx	27	-0.93	-0.04	-1.11	
			Max Tension	17	2.70	0.00	0.00	
			Max. Compression	25	-3.11	0.00	0.00	
			Max. Mx	10	0.22	-0.00	-0.00	
			Max. My	10	-2.08	0.00	-0.00	
			Max. Vy	27	0.00	-0.00	-0.00	
			Max. Vx	10	-0.00	0.00	0.00	
			Horizontal	Max Tension	30	2.40	0.00	0.00
		Max. Compression		13	-0.36	0.00	0.00	
		Max. Mx		32	1.01	-0.01	0.00	
		Max. My		20	2.03	0.00	-0.00	
		Max. Vy		32	0.01	0.00	0.00	
		Max. Vx		20	0.00	0.00	0.00	
		Top Girt		Max Tension	19	0.70	0.00	0.00
				Max. Compression	15	-0.26	0.00	0.00
			Max. Mx	32	0.05	-0.01	0.00	
			Max. My	20	0.38	0.00	-0.00	
			Max. Vy	32	0.01	0.00	0.00	
		Bottom Girt	Max. Vx	20	0.00	0.00	0.00	
			Max Tension	24	1.19	0.00	0.00	
			Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	32	0.90	-0.01	0.00	
			Max. My	20	1.07	0.00	-0.00	
		Guy A	Max. Vy	18	0.01	0.00	0.00	
			Max. Vx	20	0.00	0.00	0.00	
			Bottom Tension	27	19.96			
			Top Tension	27	20.19			
			Top Cable Vert	27	18.32			
			Top Cable Norm	27	8.47			
			Top Cable Tan	27	0.00			
			Bot Cable Vert	27	-17.96			
			Bot Cable Norm	27	8.72			
			Bot Cable Tan	27	0.00			
		Guy B	Bottom Tension	31	21.53			
			Top Tension	31	21.75			
			Top Cable Vert	31	20.19			
			Top Cable Norm	31	8.08			
			Top Cable Tan	31	0.02			
			Bot Cable Vert	31	-19.86			
			Bot Cable Norm	31	8.31			
			Bot Cable Tan	31	0.13			
		Guy C	Bottom Tension	22	21.21			
			Top Tension	22	21.42			
			Top Cable Vert	22	19.80			
			Top Cable Norm	22	8.17			
Top Cable Tan	22		0.01					
Bot Cable Vert	22		-19.47					
Bot Cable Norm	22		8.42					
Bot Cable Tan	22		0.01					
Top Guy Pull-Off	Max Tension	30	5.02	0.00	0.00			
	Max. Compression	1	0.00	0.00	0.00			
	Max. Mx	32	2.32	-0.01	0.00			
	Max. My	2	2.22	0.00	0.00			
	Max. Vy	32	-0.01	0.00	0.00			
T2	105 - 85	Leg	Max. Vx	2	0.00	0.00	0.00	
			Max Tension	5	13.23	0.16	-0.10	

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	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T3	85 - 65	Diagonal	Max. Compression	19	-46.47	-0.01	1.46
			Max. Mx	24	-37.90	1.71	0.85
			Max. My	19	-39.36	0.09	-1.95
			Max. Vy	23	2.41	0.07	0.85
			Max. Vx	19	-2.47	0.54	-0.34
			Max Tension	15	2.25	0.00	0.00
			Max. Compression	19	-5.27	0.00	0.00
			Max. Mx	19	0.66	-0.01	0.00
			Max. My	19	-5.25	-0.00	-0.00
			Max. Vy	19	0.00	-0.01	0.00
			Max. Vx	19	0.00	-0.00	-0.00
			Max Tension	23	2.96	0.00	0.00
		Horizontal	Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	2.04	-0.01	0.00
			Max. My	20	2.24	0.00	-0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
			Max Tension	19	2.03	0.00	0.00
		Top Girt	Max. Compression	15	-0.26	0.00	0.00
			Max. Mx	32	0.29	-0.01	0.00
			Max. My	20	1.11	0.00	-0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
			Max Tension	22	3.36	0.00	0.00
		Bottom Girt	Max. Compression	2	-1.55	0.00	0.00
			Max. Mx	18	1.07	-0.01	0.00
			Max. My	19	2.63	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
			Max Tension	22	24.47	-1.17	0.68
		Leg	Max. Compression	19	-58.63	0.02	1.07
			Max. Mx	23	14.64	-2.26	0.41
			Max. My	19	-48.30	0.09	-2.49
			Max. Vy	23	2.41	-0.43	0.81
			Max. Vx	19	-2.47	0.62	0.18
			Max Tension	15	2.96	0.00	0.00
			Max. Compression	19	-5.97	0.00	0.00
			Max. Mx	19	0.81	-0.01	0.00
			Max. My	19	-5.95	-0.00	-0.00
			Max. Vy	19	0.01	-0.01	0.00
			Max. Vx	19	0.00	-0.00	-0.00
			Max Tension	20	3.86	0.00	0.00
Horizontal	Max. Compression	2	-1.25	0.00	0.00		
	Max. Mx	18	2.52	-0.01	0.00		
	Max. My	19	3.10	0.00	0.00		
	Max. Vy	18	0.01	0.00	0.00		
	Max. Vx	19	-0.00	0.00	0.00		
	Max Tension	19	2.15	0.00	0.00		
Top Girt	Max. Compression	15	-0.45	0.00	0.00		
	Max. Mx	18	0.91	-0.01	0.00		
	Max. My	19	0.42	0.00	0.00		
	Max. Vy	18	0.01	0.00	0.00		
	Max. Vx	19	-0.00	0.00	0.00		
	Max Tension	19	1.99	0.00	0.00		
Bottom Girt	Max. Compression	1	0.00	0.00	0.00		
	Max. Mx	18	1.28	-0.01	0.00		
	Max. My	19	1.31	0.00	0.00		
	Max. Vy	18	0.01	0.00	0.00		
	Max. Vx	19	-0.00	0.00	0.00		
	Max Tension	19	18.81	0.00	0.00		
Guy A	Bottom Tension	26	18.81	0.00	0.00		
	Top Tension	26	18.94	0.00	0.00		

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Top Cable Vert	26	14.61		
			Top Cable Norm	26	12.05		
			Top Cable Tan	26	0.02		
			Bot Cable Vert	26	-14.37		
			Bot Cable Norm	26	12.14		
			Bot Cable Tan	26	0.06		
		Guy B	Bottom Tension	31	21.37		
			Top Tension	31	21.49		
			Top Cable Vert	31	17.50		
			Top Cable Norm	31	12.47		
			Top Cable Tan	31	0.01		
			Bot Cable Vert	31	-17.28		
			Bot Cable Norm	31	12.57		
			Bot Cable Tan	31	0.07		
		Guy C	Bottom Tension	23	20.56		
			Top Tension	23	20.67		
			Top Cable Vert	23	16.28		
			Top Cable Norm	23	12.73		
			Top Cable Tan	23	0.01		
			Bot Cable Vert	23	-16.08		
			Bot Cable Norm	23	12.81		
			Bot Cable Tan	23	0.07		
		Top Guy Pull-Off	Max Tension	19	6.76	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	18	5.04	-0.01	0.00
			Max. My	2	4.47	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
T4	65 - 45	Leg	Max Tension	5	0.19	0.33	-0.18
			Max. Compression	19	-48.20	0.01	1.41
			Max. Mx	30	-46.78	1.36	-0.80
			Max. My	19	-48.20	0.01	1.61
			Max. Vy	23	-1.44	0.06	1.13
			Max. Vx	19	1.40	-0.94	-0.59
		Diagonal	Max Tension	5	0.41	0.00	0.00
			Max. Compression	19	-4.36	0.00	0.00
			Max. Mx	19	-3.65	-0.01	-0.00
			Max. My	34	-4.14	-0.01	-0.00
			Max. Vy	19	0.00	-0.01	-0.00
			Max. Vx	34	0.00	-0.01	-0.00
		Horizontal	Max Tension	19	3.47	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	2.86	-0.00	0.00
			Max. My	19	3.47	0.00	0.00
			Max. Vy	24	0.01	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	20	2.64	0.00	0.00
			Max. Compression	7	-0.15	0.00	0.00
			Max. Mx	18	1.32	-0.00	0.00
			Max. My	19	2.43	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Bottom Girt	Max Tension	19	2.00	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	1.91	-0.00	0.00
			Max. My	19	1.60	0.00	0.00
			Max. Vy	24	0.01	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T5	45 - 29	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-32.01	0.00	1.25
			Max. Mx	30	-26.02	-1.20	-0.56

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T6	29 - 25	Diagonal	Max. My	19	-32.01	0.00	1.35
			Max. Vy	19	-6.51	0.69	0.34
			Max. Vx	19	7.45	0.00	0.67
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-3.17	0.00	0.00
			Max. Mx	19	-2.54	-0.00	-0.00
			Max. My	19	-2.07	-0.00	-0.00
			Max. Vy	19	0.00	-0.00	-0.00
			Max. Vx	19	0.00	-0.00	-0.00
			Max Tension	19	3.32	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	24	3.21	-0.00	0.00
		Max. My	19	3.28	0.00	0.00	
		Max. Vy	24	0.01	0.00	0.00	
		Max. Vx	19	-0.00	0.00	0.00	
		Max Tension	24	1.89	0.00	0.00	
		Max. Compression	1	0.00	0.00	0.00	
		Max. Mx	24	1.28	-0.00	0.00	
		Max. My	19	1.88	0.00	0.00	
		Max. Vy	24	0.01	0.00	0.00	
		Max. Vx	19	-0.00	0.00	0.00	
		Max Tension	19	5.45	0.00	0.00	
		Max. Compression	1	0.00	0.00	0.00	
		Max. Mx	24	5.21	-0.00	0.00	
		Max. My	19	5.44	0.00	0.00	
		Max. Vy	24	0.01	0.00	0.00	
		Max. Vx	19	-0.00	0.00	0.00	
		Max Tension	1	0.00	0.00	0.00	
		Max. Compression	19	-32.63	0.04	-0.01	
		Max. Mx	19	-29.68	0.88	0.00	
		Max. My	19	-30.09	0.76	0.08	
		Max. Vy	19	5.06	-0.40	-0.05	
		Max. Vx	27	-0.11	-0.30	0.02	
		Max Tension	19	3.29	0.10	-0.04	
		Max. Compression	1	0.00	0.00	0.00	
		Max. Mx	19	3.14	0.15	-0.06	
Max. My	19	3.17	0.14	-0.06			
Max. Vy	2	0.05	0.14	-0.05			
Max. Vx	2	0.02	0.01	-0.00			
Max Tension	1	0.00	0.00	0.00			
Max. Compression	2	-0.29	-0.13	0.00			
Max. Mx	10	-0.29	-0.16	-0.00			
Max. My	2	-0.25	-0.14	-0.00			
Max. Vy	2	-0.11	-0.14	-0.00			
Max. Vx	2	-0.01	-0.14	-0.00			

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Mast	Max. Vert	19	88.73	0.03	-0.13
	Max. H _x	7	65.67	0.49	0.14
	Max. H _z	13	67.28	-0.52	0.19
	Max. M _x	1	0.00	0.01	-0.03
	Max. M _z	1	0.00	0.01	-0.03
	Max. Torsion	1	0.00	0.01	-0.03

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Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Guy C @ 37.5 ft Elev 31.5 ft Azimuth 240 deg	Min. Vert	46	54.60	-0.04	-0.02
	Min. H _x	13	67.28	-0.52	0.19
	Min. H _z	2	68.47	0.03	-0.59
	Min. M _x	1	0.00	0.01	-0.03
	Min. M _z	1	0.00	0.01	-0.03
	Min. Torsion	1	0.00	0.01	-0.03
	Max. Vert	13	-0.61	-0.18	0.10
	Max. H _x	13	-0.61	-0.18	0.10
	Max. H _z	20	-35.19	-18.10	10.71
	Min. Vert	21	-35.46	-18.26	10.68
Guy B @ 39 ft Elev 25 ft Azimuth 120 deg	Min. H _x	23	-35.42	-18.41	10.41
	Min. H _z	13	-0.61	-0.18	0.10
	Max. Vert	7	-0.87	0.27	0.16
	Max. H _x	31	-37.14	18.19	10.26
	Max. H _z	34	-36.90	17.89	10.57
	Min. Vert	31	-37.14	18.19	10.26
Guy A @ 45 ft Elev 25 ft Azimuth 0 deg	Min. H _x	7	-0.87	0.27	0.16
	Min. H _z	7	-0.87	0.27	0.16
	Max. Vert	2	-0.55	-0.00	-0.20
	Max. H _x	30	-28.67	0.37	-18.56
	Max. H _z	2	-0.55	-0.00	-0.20
	Min. Vert	27	-32.17	0.01	-20.73
	Min. H _x	24	-28.50	-0.34	-18.48
	Min. H _z	26	-32.14	-0.19	-20.75

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overtuning Moment, M _x kip-ft	Overtuning Moment, M _z kip-ft	Torque kip-ft
Dead Only	55.07	-0.01	0.03	0.00	0.00	0.00
Dead+Wind 0 deg - No Ice+Guy	68.47	-0.03	0.59	0.00	0.00	0.00
Dead+Wind 30 deg - No Ice+Guy	63.49	-0.12	0.46	0.00	0.00	0.00
Dead+Wind 45 deg - No Ice+Guy	59.86	-0.17	0.30	0.00	0.00	0.00
Dead+Wind 60 deg - No Ice+Guy	58.52	-0.23	0.13	0.00	0.00	0.00
Dead+Wind 90 deg - No Ice+Guy	62.09	-0.45	-0.07	0.00	0.00	0.00
Dead+Wind 120 deg - No Ice+Guy	65.67	-0.49	-0.14	0.00	0.00	0.00
Dead+Wind 135 deg - No Ice+Guy	64.00	-0.42	-0.15	0.00	0.00	0.00
Dead+Wind 150 deg - No Ice+Guy	60.63	-0.30	-0.12	0.00	0.00	0.00
Dead+Wind 180 deg - No Ice+Guy	56.49	0.02	-0.05	0.00	0.00	0.00
Dead+Wind 210 deg - No Ice+Guy	61.14	0.35	-0.15	0.00	0.00	0.00

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Wind 225 deg - No Ice+Guy	65.30	0.47	-0.19	0.00	0.00	0.00
Dead+Wind 240 deg - No Ice+Guy	67.28	0.52	-0.19	0.00	0.00	0.00
Dead+Wind 270 deg - No Ice+Guy	62.85	0.46	-0.13	0.00	0.00	0.00
Dead+Wind 300 deg - No Ice+Guy	56.64	0.20	0.08	0.00	0.00	0.00
Dead+Wind 315 deg - No Ice+Guy	58.92	0.12	0.27	0.00	0.00	0.00
Dead+Wind 330 deg - No Ice+Guy	63.57	0.08	0.43	0.00	0.00	0.00
Dead+Ice+Temp+Guy	67.55	-0.01	0.03	0.00	0.00	0.00
Dead+Wind 0 deg+Ice+Temp+Guy	88.73	-0.03	0.13	0.00	0.00	0.00
Dead+Wind 30 deg+Ice+Temp+Guy	80.48	0.16	0.05	0.00	0.00	0.00
Dead+Wind 45 deg+Ice+Temp+Guy	75.33	0.23	-0.03	0.00	0.00	0.00
Dead+Wind 60 deg+Ice+Temp+Guy	73.17	0.24	-0.12	0.00	0.00	0.00
Dead+Wind 90 deg+Ice+Temp+Guy	78.69	0.06	-0.09	0.00	0.00	0.00
Dead+Wind 120 deg+Ice+Temp+Guy	85.22	-0.07	0.13	0.00	0.00	0.00
Dead+Wind 135 deg+Ice+Temp+Guy	80.78	-0.08	0.24	0.00	0.00	0.00
Dead+Wind 150 deg+Ice+Temp+Guy	77.07	-0.07	0.36	0.00	0.00	0.00
Dead+Wind 180 deg+Ice+Temp+Guy	70.51	0.02	0.50	0.00	0.00	0.00
Dead+Wind 210 deg+Ice+Temp+Guy	77.69	0.12	0.33	0.00	0.00	0.00
Dead+Wind 225 deg+Ice+Temp+Guy	82.08	0.13	0.19	0.00	0.00	0.00
Dead+Wind 240 deg+Ice+Temp+Guy	87.05	0.11	0.07	0.00	0.00	0.00
Dead+Wind 270 deg+Ice+Temp+Guy	79.73	-0.05	-0.15	0.00	0.00	0.00
Dead+Wind 300 deg+Ice+Temp+Guy	71.44	-0.26	-0.17	0.00	0.00	0.00
Dead+Wind 315 deg+Ice+Temp+Guy	74.87	-0.27	-0.06	0.00	0.00	0.00
Dead+Wind 330 deg+Ice+Temp+Guy	80.81	-0.21	0.03	0.00	0.00	0.00
Dead+Wind 0 deg - Service+Guy	55.27	-0.02	0.03	0.00	0.00	0.00
Dead+Wind 30 deg - Service+Guy	55.54	-0.05	0.04	0.00	0.00	0.00
Dead+Wind 45 deg - Service+Guy	55.63	-0.06	0.05	0.00	0.00	0.00
Dead+Wind 60 deg - Service+Guy	55.69	-0.07	0.05	0.00	0.00	0.00
Dead+Wind 90 deg - Service+Guy	55.66	-0.08	0.04	0.00	0.00	0.00
Dead+Wind 120 deg - Service+Guy	55.51	-0.06	0.04	0.00	0.00	0.00
Dead+Wind 135 deg - Service+Guy	55.41	-0.05	0.03	0.00	0.00	0.00
Dead+Wind 150 deg - Service+Guy	55.30	-0.03	0.02	0.00	0.00	0.00

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Wind 180 deg - Service+Guy	55.04	-0.00	0.02	0.00	0.00	0.00
Dead+Wind 210 deg - Service+Guy	54.78	0.03	0.02	0.00	0.00	0.00
Dead+Wind 225 deg - Service+Guy	54.67	0.04	0.02	0.00	0.00	0.00
Dead+Wind 240 deg - Service+Guy	54.60	0.04	0.02	0.00	0.00	0.00
Dead+Wind 270 deg - Service+Guy	54.61	0.05	0.02	0.00	0.00	0.00
Dead+Wind 300 deg - Service+Guy	54.77	0.04	0.03	0.00	0.00	0.00
Dead+Wind 315 deg - Service+Guy	54.88	0.03	0.03	0.00	0.00	0.00
Dead+Wind 330 deg - Service+Guy	55.01	0.02	0.03	0.00	0.00	0.00

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-14.40	0.00	-0.00	14.40	-0.00	0.001%
2	0.08	-14.40	-14.90	-0.08	14.40	14.90	0.002%
3	7.58	-14.38	-12.91	-7.58	14.38	12.91	0.001%
4	10.68	-14.37	-10.56	-10.68	14.37	10.56	0.001%
5	13.04	-14.37	-7.49	-13.04	14.37	7.49	0.003%
6	15.03	-14.39	-0.08	-15.03	14.39	0.08	0.001%
7	13.02	-14.41	7.38	-13.02	14.41	-7.38	0.001%
8	10.56	-14.41	10.44	-10.56	14.41	-10.44	0.001%
9	7.44	-14.41	12.82	-7.44	14.41	-12.82	0.000%
10	-0.08	-14.40	14.84	0.08	14.40	-14.84	0.001%
11	-7.58	-14.41	12.91	7.58	14.41	-12.91	0.001%
12	-10.68	-14.42	10.56	10.68	14.42	-10.56	0.001%
13	-13.10	-14.42	7.52	13.10	14.42	-7.52	0.001%
14	-15.03	-14.40	0.08	15.03	14.40	-0.08	0.002%
15	-12.96	-14.38	-7.35	12.96	14.38	7.35	0.003%
16	-10.56	-14.38	-10.44	10.56	14.38	10.44	0.002%
17	-7.44	-14.39	-12.82	7.44	14.39	12.82	0.001%
18	0.00	-24.24	0.00	-0.00	24.24	0.00	0.000%
19	0.06	-24.24	-18.78	-0.06	24.24	18.78	0.002%
20	9.08	-24.22	-15.55	-9.09	24.22	15.55	0.005%
21	12.72	-24.21	-12.62	-12.72	24.21	12.62	0.002%
22	15.45	-24.20	-8.88	-15.45	24.20	8.88	0.002%
23	18.07	-24.24	-0.06	-18.07	24.23	0.06	0.003%
24	16.36	-24.27	9.34	-16.36	24.27	-9.34	0.009%
25	12.63	-24.27	12.53	-12.63	24.27	-12.53	0.006%
26	8.98	-24.26	15.49	-8.98	24.26	-15.49	0.003%
27	-0.06	-24.24	17.65	0.06	24.24	-17.65	0.002%
28	-9.08	-24.27	15.55	9.08	24.27	-15.55	0.006%
29	-12.72	-24.28	12.62	12.72	24.28	-12.62	0.008%
30	-16.43	-24.28	9.45	16.42	24.28	-9.45	0.007%
31	-18.07	-24.25	0.06	18.07	24.25	-0.06	0.006%
32	-15.38	-24.22	-8.77	15.38	24.22	8.77	0.001%
33	-12.63	-24.22	-12.53	12.63	24.22	12.53	0.001%
34	-8.98	-24.23	-15.49	8.98	24.23	15.49	0.005%
35	0.03	-14.40	-5.82	-0.03	14.40	5.82	0.001%
36	2.96	-14.39	-5.04	-2.96	14.39	5.04	0.002%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
37	4.17	-14.39	-4.12	-4.17	14.39	4.12	0.003%
38	5.09	-14.39	-2.93	-5.09	14.39	2.93	0.002%
39	5.87	-14.40	-0.03	-5.87	14.39	0.03	0.001%
40	5.09	-14.40	2.88	-5.09	14.40	-2.88	0.001%
41	4.13	-14.40	4.08	-4.13	14.40	-4.08	0.002%
42	2.91	-14.40	5.01	-2.91	14.40	-5.01	0.003%
43	-0.03	-14.40	5.80	0.03	14.40	-5.80	0.004%
44	-2.96	-14.40	5.04	2.96	14.40	-5.04	0.003%
45	-4.17	-14.41	4.12	4.17	14.41	-4.12	0.003%
46	-5.12	-14.41	2.94	5.12	14.41	-2.94	0.000%
47	-5.87	-14.40	0.03	5.87	14.40	-0.03	0.001%
48	-5.06	-14.39	-2.87	5.06	14.39	2.87	0.002%
49	-4.13	-14.39	-4.08	4.13	14.39	4.08	0.002%
50	-2.91	-14.39	-5.01	2.91	14.39	5.01	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	17	0.00000001	0.00000000
2	Yes	37	0.00000001	0.00019064
3	Yes	38	0.00000001	0.00019435
4	Yes	37	0.00000001	0.00018316
5	Yes	32	0.00000001	0.00017717
6	Yes	26	0.00000001	0.00011481
7	Yes	36	0.00000001	0.00019745
8	Yes	37	0.00000001	0.00019535
9	Yes	38	0.00000001	0.00019815
10	Yes	40	0.00000001	0.00019117
11	Yes	38	0.00000001	0.00019944
12	Yes	37	0.00000001	0.00019816
13	Yes	39	0.00000001	0.00018595
14	Yes	27	0.00000001	0.00011369
15	Yes	34	0.00000001	0.00010554
16	Yes	35	0.00000001	0.00019171
17	Yes	38	0.00000001	0.00019108
18	Yes	15	0.00000001	0.00000000
19	Yes	33	0.00000001	0.00019451
20	Yes	28	0.00000001	0.00017196
21	Yes	28	0.00000001	0.00016991
22	Yes	28	0.00000001	0.00016169
23	Yes	24	0.00000001	0.00019544
24	Yes	25	0.00000001	0.00018887
25	Yes	26	0.00000001	0.00019248
26	Yes	27	0.00000001	0.00018792
27	Yes	29	0.00000001	0.00017072
28	Yes	28	0.00000001	0.00017793
29	Yes	28	0.00000001	0.00017657
30	Yes	29	0.00000001	0.00018563
31	Yes	25	0.00000001	0.00019093
32	Yes	28	0.00000001	0.00013340
33	Yes	29	0.00000001	0.00013909
34	Yes	28	0.00000001	0.00017190
35	Yes	41	0.00000001	0.00019439
36	Yes	36	0.00000001	0.00018480
37	Yes	33	0.00000001	0.00013425

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38	Yes	33	0.00000001	0.00008611
39	Yes	27	0.00000001	0.00009498
40	Yes	37	0.00000001	0.00018803
41	Yes	33	0.00000001	0.00016887
42	Yes	33	0.00000001	0.00017520
43	Yes	33	0.00000001	0.00019506
44	Yes	34	0.00000001	0.00018312
45	Yes	34	0.00000001	0.00019033
46	Yes	41	0.00000001	0.00018882
47	Yes	28	0.00000001	0.00008975
48	Yes	33	0.00000001	0.00008055
49	Yes	34	0.00000001	0.00009880
50	Yes	34	0.00000001	0.00019659

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	125 - 105	1.694	48	0.1568	0.7326
T2	105 - 85	1.213	48	0.1567	0.7484
T3	85 - 65	0.714	49	0.1361	0.7373
T4	65 - 45	0.378	49	0.0822	0.7311
T5	45 - 29	0.181	49	0.0579	0.7299
T6	29 - 25	0.046	49	0.0548	0.7281

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.00	12' x 3" Dia Omni	48	1.694	0.1568	0.7326	205558
129.00	4-Bay Dipole	48	1.694	0.1568	0.7326	205558
128.00	6' x 3" Dia Omni	48	1.694	0.1568	0.7326	205558
127.00	VHLP2-18	48	1.694	0.1568	0.7326	205558
125.00	18' x 3" Dia Omni	48	1.694	0.1568	0.7326	205558
123.00	Rohn 6' x 12' Boom Gate (1)	48	1.647	0.1571	0.7349	205558
118.00	VHLP1-23	48	1.530	0.1576	0.7404	146827
116.96	Guy	48	1.506	0.1577	0.7415	127808
109.00	DB-T1-6Z-8AB-0Z	48	1.313	0.1575	0.7474	64356
105.00	Pirod 12' T-Frame Sector Mount (1)	48	1.213	0.1567	0.7484	63116
76.96	Guy	49	0.556	0.1153	0.7335	22878
69.00	ANT150D6-9	49	0.431	0.0923	0.7316	27227
55.00	ANT150D6-9	49	0.267	0.0654	0.7304	46092
31.00	GPS	49	0.066	0.0551	0.7283	30221

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	125 - 105	7.521	19	0.6591	1.7500
T2	105 - 85	5.488	19	0.6507	1.7917
T3	85 - 65	3.453	19	0.5654	1.7652
T4	65 - 45	1.996	19	0.3822	1.7501
T5	45 - 29	0.999	19	0.3071	1.7469
T6	29 - 25	0.254	19	0.3025	1.7424

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
137.00	12' x 3" Dia Omni	19	7.521	0.6591	1.7500	86452
129.00	4-Bay Dipole	19	7.521	0.6591	1.7500	86452
128.00	6' x 3" Dia Omni	19	7.521	0.6591	1.7500	86452
127.00	VHLP2-18	19	7.521	0.6591	1.7500	86452
125.00	18' x 3" Dia Omni	19	7.521	0.6591	1.7500	86452
123.00	Rohn 6' x 12' Boom Gate (1)	19	7.321	0.6594	1.7560	86452
118.00	VHLP1-23	19	6.820	0.6598	1.7704	61752
116.96	Guy	19	6.716	0.6597	1.7731	53753
109.00	DB-T1-6Z-8AB-0Z	19	5.905	0.6558	1.7888	27074
105.00	Pirod 12' T-Frame Sector Mount (1)	19	5.488	0.6507	1.7917	27386
76.96	Guy	19	2.791	0.4924	1.7559	7302
69.00	ANT150D6-9	19	2.241	0.4154	1.7513	9043
55.00	ANT150D6-9	19	1.455	0.3285	1.7484	13320
31.00	GPS	19	0.368	0.3028	1.7430	5474

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
T3	85	Leg	A325N	0.750	3	4.41	19.43	0.227	1.333	Bolt Tension
T4	65	Leg	A325N	0.750	3	0.06	19.43	0.003	1.333	Bolt Tension
T5	45	Leg	A325N	0.750	3	0.00	19.44	0.000	1.333	Bolt Tension
T6	29	Leg	A325N	0.750	3	0.00	19.18	0.000	1.333	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T K	Allowable T _a K	Required S.F.	Actual S.F.
T1	116.96 (A) (258)	7/8 EHS	7.97	79.70	20.19	39.85	2.000	3.948

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Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T K	Allowable T_a K	Required S.F.	Actual S.F.
T3	116.96 (B) (257)	7/8 EHS	7.97	79.70	21.75	39.85	2.000	3.665 ✓
	116.96 (C) (256)	7/8 EHS	7.97	79.70	21.42	39.85	2.000	3.721 ✓
	76.96 (A) (261)	7/8 EHS	7.97	79.70	18.94	39.85	2.000	4.208 ✓
	76.96 (B) (260)	7/8 EHS	7.97	79.70	21.49	39.85	2.000	3.708 ✓
	76.96 (C) (259)	7/8 EHS	7.97	79.70	20.67	39.85	2.000	3.856 ✓

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	Mast Stability Index	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	125 - 105	2	20.00	3.92	94.0 K=1.00	1.00	16.065	3.142	-16.48	50.47	0.326 ✓
T2	105 - 85	2	20.00	3.92	94.0 K=1.00	1.00	16.065	3.142	-46.47	50.47	0.921 ✓
T3	85 - 65	2 1/4	20.00	3.92	83.6 K=1.00	1.00	18.292	3.976	-58.63	72.73	0.806 ✓
T4	65 - 45	2	20.00	3.92	94.0 K=1.00	1.00	16.065	3.142	-48.20	50.47	0.955 ✓
T5	45 - 29	2	16.00	3.90	93.5 K=1.00	1.00	16.175	3.142	-32.01	50.82	0.630 ✓
T6	29 - 25	2	4.37	3.05	73.1 K=1.00	1.00	20.359	3.142	-24.62	63.96	0.385* ✓

* DL controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	125 - 105	7/8	4.21	2.11	106.6 K=0.92	12.128	0.601	-3.11	7.29	0.426 ✓
T2	105 - 85	7/8	4.21	2.11	106.6 K=0.92	12.128	0.601	-5.27	7.29	0.723 ✓
T3	85 - 65	7/8	4.21	2.11	106.6 K=0.92	12.128	0.601	-5.97	7.29	0.818 ✓
T4	65 - 45	7/8	4.21	2.11	106.6 K=0.92	12.128	0.601	-4.36	7.29	0.597 ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T5	45 - 29	7/8	4.20	2.10	106.4 K=0.92	12.146	0.601	-3.17	7.30	0.434 ✓ ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-0.36	8.93	0.041 ✓
T3	85 - 65	L2x2x3/16	3.04	2.85	103.5 K=1.19	12.534	0.715	-1.25	8.96	0.140 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-0.26	8.93	0.029 ✓
T2	105 - 85	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-0.26	8.93	0.029 ✓
T3	85 - 65	L2x2x3/16	3.04	2.85	103.5 K=1.19	12.534	0.715	-0.45	8.96	0.050 ✓
T4	65 - 45	L2x2x1/8	3.04	2.88	103.4 K=1.19	12.338	0.484	-0.15	5.98	0.024 ✓

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T2	105 - 85	L2x2x3/16	3.04	2.88	103.8 K=1.19	12.493	0.715	-1.55	8.93	0.174 ✓
T6	29 - 25	12x3/8	0.76	0.59	65.8 K=1.00	16.857	4.500	-0.29	75.86	0.004 ✓

Top Guy Pull-Off Design Data (Compression)

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	L3x3x1/4	3.04	2.88	37.1 K=1.53	21.600	1.440	0.00	20.60	0.000*
T3	85 - 65	L3x3x1/4	3.04	2.85	36.8 K=1.00	21.600	1.440	0.00	25.39	0.000*

* DL controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
T1	125 - 105	L3x3x1/4	-0.01	-0.077	21.600	0.004	-0.01	-0.152	21.600	0.007
T3	85 - 65	L3x3x1/4	-0.01	-0.077	21.600	0.004	-0.01	-0.152	21.600	0.007

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio P P _a	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T1	125 - 105	L3x3x1/4	0.000	0.004	0.007	0.011* ✓	1.000	H1-3 ✓
T3	85 - 65	L3x3x1/4	0.000	0.004	0.007	0.011* ✓	1.000	H1-3 ✓

* DL controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	2	20.00	3.92	94.0	30.000	3.142	6.89	94.25	0.073
T2	105 - 85	2	20.00	3.92	94.0	30.000	3.142	13.23	94.25	0.140 ✓
T3	85 - 65	2 1/4	20.00	3.92	83.6	30.000	3.976	24.47	119.28	0.205 ✓
T4	65 - 45	2	20.00	3.92	94.0	30.000	3.142	0.19	94.25	0.002 ✓

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Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _a ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	7/8	4.21	2.11	115.6	21.600	0.601	2.70	12.99	0.208
T2	105 - 85	7/8	4.21	2.11	115.6	21.600	0.601	2.25	12.99	0.173
T3	85 - 65	7/8	4.21	2.11	115.6	21.600	0.601	2.96	12.99	0.228
T4	65 - 45	7/8	4.21	2.11	115.6	21.600	0.601	0.41	12.99	0.031

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _a ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	1.86	15.44	0.121*
T2	105 - 85	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	2.96	15.44	0.192
T3	85 - 65	L2x2x3/16	3.04	2.85	55.5	21.600	0.715	3.86	15.44	0.250
T4	65 - 45	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	2.65	10.46	0.254*
T5	45 - 29	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	2.66	10.46	0.254*

* DL controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _a ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	0.70	15.44	0.045
T2	105 - 85	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	2.03	15.44	0.131
T3	85 - 65	L2x2x3/16	3.04	2.85	55.5	21.600	0.715	2.15	15.44	0.139
T4	65 - 45	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	2.64	10.46	0.252
T5	45 - 29	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	1.89	10.46	0.181
T6	29 - 25	L3x3x1/8	2.88	2.71	34.3	21.600	0.734	3.29	15.86	0.208

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
										✓

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	0.91	15.44	0.059*
T2	105 - 85	L2x2x3/16	3.04	2.88	55.9	21.600	0.715	3.36	15.44	0.217
T3	85 - 65	L2x2x3/16	3.04	2.85	55.5	21.600	0.715	1.99	15.44	0.129
T4	65 - 45	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	2.00	10.46	0.191
T5	45 - 29	L2x2x1/8	3.04	2.88	55.1	21.600	0.484	4.26	10.46	0.408*

* DL controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	125 - 105	L3x3x1/4	3.04	2.88	37.1	21.600	1.440	5.02	31.10	0.161
T3	85 - 65	L3x3x1/4	3.04	2.85	36.8	21.600	1.440	5.05	31.10	0.162*

* DL controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
T1	125 - 105	L3x3x1/4	-0.01	0.077	23.760	0.003	-0.01	0.149	23.760	0.006
T3	85 - 65	L3x3x1/4	-0.01	0.077	23.760	0.003	-0.01	0.149	23.760	0.006

Top Guy Pull-Off Interaction Design Data

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Section No.	Elevation ft	Size	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
			$\frac{P}{P_a}$	$\frac{f_{bx}}{F_{bx}}$	$\frac{f_{by}}{F_{by}}$			
T1	125 - 105	L3x3x1/4	0.161	0.003	0.006	0.171	1.333	H2-1 ✓
T3	85 - 65	L3x3x1/4	0.162	0.003	0.006	0.172* ✓	1.000	H2-1 ✓

* DL controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
T1	125 - 105	Leg	2	2	-16.48	67.27	24.5	Pass
T2	105 - 85	Leg	2	54	-46.47	67.27	69.1	Pass
T3	85 - 65	Leg	2 1/4	105	-58.63	96.95	60.5	Pass
T4	65 - 45	Leg	2	156	-48.20	67.27	71.7	Pass
T5	45 - 29	Leg	2	207	-32.01	67.74	47.3	Pass
T6	29 - 25	Leg	2	249	-24.62	63.96	38.5	Pass
T1	125 - 105	Diagonal	7/8	39	-3.11	9.72	32.0	Pass
T2	105 - 85	Diagonal	7/8	65	-5.27	9.72	54.2	Pass
T3	85 - 65	Diagonal	7/8	152	-5.97	9.72	61.4	Pass
T4	65 - 45	Diagonal	7/8	201	-4.36	9.72	44.8	Pass
T5	45 - 29	Diagonal	7/8	243	-3.17	9.74	32.6	Pass
T1	125 - 105	Horizontal	L2x2x3/16	16	1.86	15.44	12.1	Pass
T2	105 - 85	Horizontal	L2x2x3/16	68	2.96	20.59	14.4	Pass
T3	85 - 65	Horizontal	L2x2x3/16	119	3.86	20.59	18.7	Pass
T4	65 - 45	Horizontal	L2x2x1/8	170	2.65	10.46	25.4	Pass
T5	45 - 29	Horizontal	L2x2x1/8	239	2.66	10.46	25.4	Pass
T1	125 - 105	Top Girt	L2x2x3/16	4	0.70	20.59	3.4	Pass
T2	105 - 85	Top Girt	L2x2x3/16	55	2.03	20.59	9.9	Pass
T3	85 - 65	Top Girt	L2x2x3/16	106	2.15	20.59	10.4	Pass
T4	65 - 45	Top Girt	L2x2x1/8	158	2.64	13.95	18.9	Pass
T5	45 - 29	Top Girt	L2x2x1/8	209	1.89	13.95	13.5	Pass
T6	29 - 25	Top Girt	L3x3x1/8	250	3.29	21.14	15.6	Pass
T1	125 - 105	Bottom Girt	L2x2x3/16	8	0.91	15.44	5.9	Pass
T2	105 - 85	Bottom Girt	L2x2x3/16	59	3.36	20.59	16.3	Pass
T3	85 - 65	Bottom Girt	L2x2x3/16	109	1.99	20.59	9.7	Pass
T4	65 - 45	Bottom Girt	L2x2x1/8	160	2.00	13.95	14.4	Pass
T5	45 - 29	Bottom Girt	L2x2x1/8	213	4.26	10.46	40.8	Pass
T6	29 - 25	Bottom Girt	L2x3/8	254	-0.29	101.12	0.3	Pass
T1	125 - 105	Guy A@116.958	7/8	258	20.19	39.85	50.7	Pass
T3	85 - 65	Guy A@76.9583	7/8	261	18.94	39.85	47.5	Pass
T1	125 - 105	Guy B@116.958	7/8	257	21.75	39.85	54.6	Pass
T3	85 - 65	Guy B@76.9583	7/8	260	21.49	39.85	53.9	Pass
T1	125 - 105	Guy C@116.958	7/8	256	21.42	39.85	53.7	Pass
T3	85 - 65	Guy C@76.9583	7/8	259	20.67	39.85	51.9	Pass
T1	125 - 105	Top Guy	L3x3x1/4	35	5.02	41.46	12.8	Pass
T3	85 - 65	Pull-Off@116.958 Top Guy Pull-Off@76.9583	L3x3x1/4	137	5.05	31.10	17.2	Pass
Summary								
Leg (T4)							71.7	Pass
Diagonal (T3)							61.4	Pass
Horizontal (T5)							25.4	Pass
Top Girt							18.9	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
						(T4)		
						Bottom Girt (T5)	40.8	Pass
						Guy A (T1)	50.7	Pass
						Guy B (T1)	54.6	Pass
						Guy C (T1)	53.7	Pass
						Top Guy Pull-Off (T3)	17.2	Pass
						Bolt Checks	17.0	Pass
						RATING =	71.7	Pass

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SITE NAME	WEST HARTFORD CENTER CT		ECP - CELL #	AWS1	8	290
LATITUDE	41-45-41.60 N		LONGITUDE	72-44-25.35 W		
700 tilt change plus RET antenna swap outs and 40W to 60W RRH upgrades. The 60W 4 port 700 RRH will be connected to the low band ports on the 700 and AWS antenna.			SAVE BUTTON			
			STRUCTURE TYPE	LATTICE		
700 Mhz - LTE Current Config			ALPHA	BETA	GAMMA	
EQUIPMENT TYPE	700 eNodeB		700 eNodeB		700 eNodeB	
ANTENNA TYPE	BXA-70063-6CF-2-750MHZ		SLCP 2X6015		SLCP 2X6015	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		4		4	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X40-700	1	ALU RH_2X40-700	1	ALU RH_2X40-700
700 Mhz - LTE Future Config			ALPHA	BETA	GAMMA	
EQUIPMENT TYPE	700 eNodeB		700 eNodeB		700 eNodeB	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	3 electrical		5 electrical		5 electrical	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-700	1	ALU RH_2X60-700	1	ALU RH_2X60-700
850 Cellular - Current Config			ALPHA	BETA	GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	BXA-80063/4		SLCP 2X6014		SLCP 2X6014	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		4		4	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	0		0		0	
850 Cellular - Future Config			ALPHA	BETA	GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	BXA-80063/4		SLCP 2X6014		SLCP 2X6014	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		4		4	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	0		0		0	
DIPLEX WITH LTE CABLE						
1900 PCS - Current Config			ALPHA	BETA	GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	BXA-171063-8BF-EDIN-2		SACP 2X5516		SACP 2X5516	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	0		2		2	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
1900 PCS - Future Config			ALPHA	BETA	GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	60		180		290	
DOWN TILT (MECH/DEG)	2 electrical		3 electrical		3 electrical	
RAD CTR (FT AGL)	100		100		100	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	REMOVE DIPLEXERS		REMOVE DIPLEXERS		REMOVE DIPLEXERS	
RRH - QTY/MODEL	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						

AWS - LTE Current Config				ALPHA				BETA				GAMMA			
EQUIPMENT TYPE				2100 MHz eNodeB				2100 MHz eNodeB				2100 MHz eNodeB			
ANTENNA TYPE				BXA-171063-12CF-EDIN-2				SACP 2X5516				SACP 2X5516			
QTY OF ANTENNAS PER FACE				1				1				1			
ORIENTATION (DEG)				60				180				290			
DOWN TILT (MECH/DEG)				0				0				0			
RAD CTR (FT AGL)				100				100				100			
TMA - QTY / MODEL															
DIPLEXER - QTY / MODEL															
RRH - QTY/MODEL				1 ALU RH_2X40-AWS				1 ALU RH_2X40-AWS				1 ALU RH_2X40-AWS			
SECTOR DISTRIBUTION BOX															
MAIN DISTRIBUTION BOX				1								DB-T1-6Z-8AB-0Z			
AWS - LTE Future Config				ALPHA				BETA				GAMMA			
EQUIPMENT TYPE				2100 MHz eNodeB				2100 MHz eNodeB				2100 MHz eNodeB			
ANTENNA TYPE				SBNHH-1D65B				SBNHH-1D65B				SBNHH-1D65B			
QTY OF ANTENNAS PER FACE				1				1				1			
ORIENTATION (DEG)				60				180				290			
DOWN TILT (MECH/DEG)				2 electrical				3 electrical				3 electrical			
RAD CTR (FT AGL)				100				100				100			
TMA - QTY / MODEL															
DIPLEXER - QTY / MODEL															
RRH - QTY/MODEL				1 ALU RH_2X60-AWS				1 ALU RH_2X60-AWS				1 ALU RH_2X60-AWS			
SECTOR DISTRIBUTION BOX															
MAIN DISTRIBUTION BOX				1								DB-T1-6Z-8AB-0Z			
NUMBER OF CABLE'S NEEDED								Fiber Lines Model number							
TOTAL # FIBER LINES				2				TOTAL # OF MAINLINES				12			
TOTAL # TOP JUMPERS				12				TOTAL # OF TOP JUMPERS				36			
Equipment Cable Ordering				MAIN CABLE				12				+			
								0				TOP JUMPER #			
												24			
												+			
												12			
TX / RX FREQUENCIES								TX POWER OUTPUT							
Cellular A-Band				PCS F / AWS-Band				700 Mhz C - E				Cellular (Watts)			
TX - 869-880,890-891.5 MHz				TX - 1970-1975 / 2145-21				TX - 746-757				PCS (Watts)			
RX - 824-835,845-846.5 MHz				RX - 1890-1895 / 1745-17				RX - 776-787				LTE/ AWS (Watts)			
												40			
ALPHA				BETA				GAMMA							
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code				
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN				
A1-B	1900	Tx1/Rx0	RED/WHITE	A5-B	1900	Tx2/Rx0	BLUE/WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE				
A2	700	Tx1/Rx0	RED/ORANGE	A6	700	Tx2/Rx0	BLUE/ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE				
A3	700	Tx4/Rx1	RED/RED/ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ORANGE				
A4-B	1900	Tx4/Rx1	RED/RED/WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/WHITE				
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN				
F1-A	1700	Tx/Rx	RED/BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN				
F1-D	1700	Tx/Rx	RED/RED/BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN				
RF ENGINEER				RF MANAGER				INITIALS				DATE			
Prepared By: Mark Brauer				Alex Restrepo				MB				7/10/2015			

EAST > North East > New England > New England West > WEST HARTFORD CENTER CT

- Brauer, Mark - mark.brauer2@verizonwireless.com - 06/25/2018 10:30:40

Project Detail		Location Information	
Site Type	Macro	Siterra Site ID#	325091
Carrier Aggregation	false	Site Name	WEST HARTFORD CENTER CT
MPT Id		Siterra SR#	
eCIP-0	false	E-NodeB ID#	068960
Project Name	850 ADD	PSLC#	467475
RFDS Project ID	1343985	Switch Name	Windsor 2
Project ID	15244807	Tower Owner	
Site Traker Project ID		Tower Type	Building Side-Mounted
RFDS Project Scope	850 LTE add Samsung Dual band RRHs Keep existing SBNHH antennas	Street Address	14-20 Isham Road
		City	West Hartford
		State	CT
		Zip Code	06107
		County	Hartford
		Latitude	41.761556 / 41 45' 41.6" N
		Longitude	-72.740375 / 72 44' 25.35" W

Antenna Summary

Added Antennas														
700 LTE	850 CDM A	850 LTE	1900 CDM A	1900 LTE	2100 LTE	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	QTY
Removed Antennas														
700 LTE	850 CDM A	850 LTE	1900 CDM A	1900 LTE	2100 LTE	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	QTY
Retained Antennas														
700 LTE	850 CDM A	850 LTE	1900 CDM A	1900 LTE	2100 LTE	Make	Model	Centerline	Tip Height	Azimuth	RET	4xRx	Inst. Type	QTY
YES		YES		YES		ANDREW	SBNHH-1D65B_PORT 2 - 45_01DT_1950 (329413)	100	103	60(D1)	false	false	PHYSICAL	1
YES		YES			YES	ANDREW	SBNHH-1D65B_PORT 2 - 45_01DT_2130 (329414)	100	103	60(D1)	false	false	PHYSICAL	1
YES		YES		YES		ANDREW	SBNHH-1D65B_PORT 2 - 45_03DT_1950 (329417)	100	103	290(D3),180(D2)	false	false	PHYSICAL	2
YES		YES			YES	ANDREW	SBNHH-1D65B_PORT 2 - 45_03DT_2130 (329418)	100	103	290(D3),180(D2)	false	false	PHYSICAL	2
	YES					ANTEL INTERNATIONAL, INC.	BXA-80063/4 (97250)	100	102.1	60(D1)	false	false	PHYSICAL	2
	YES					SWEDCOM	SLCP 2X6014 (242852)	100	102.2	290(D3),180(D2)	false	false	PHYSICAL	4

Added: 0

Removed: 0

Retained: 12

Equipment Summary

Added Non Antennas													
Equipment Type	700 LTE	850 CDMA	850 LTE	1900 CDMA	1900 LTE	2100 LTE	Location	Make	Model	Cable Length	Cable Size	Inst. Type	Quantity
RRU	YES		YES				Tower	Samsung	B5/B13 RRH-BR04C			PHYSICAL	3
RRU					YES	YES	Tower	Samsung	B2/B66A RRH-BR049			PHYSICAL	3

Removed Non Antennas													
Equipment Type	700 LTE	850 CDMA	850 LTE	1900 CDMA	1900 LTE	2100 LTE	Location	Make	Model	Cable Length	Cable Size	Inst. Type	Quantity
RRU	YES						Tower	Nokia	UHBA B13 RRH 4x30			PHYSICAL	3
RRU						YES	Tower	Nokia	UHIE B66A RRH 4x45			PHYSICAL	3
RRU					YES		Tower	Nokia	UHFA B25 RRH 4x30			PHYSICAL	3

Retained Non Antennas													
Equipment Type	700 LTE	850 CDMA	850 LTE	1900 CDMA	1900 LTE	2100 LTE	Location	Make	Model	Cable Length	Cable Size	Inst. Type	Quantity
Coaxial Cables							Tower					PHYSICAL	6
OVP Box							Tower					PHYSICAL	2
Hybrid Cable							Tower					PHYSICAL	2
Mount							Tower	Comscope	BSAMNT-SBS-1-2			PHYSICAL	3

Services

700 MHZ LTE

	Current Version:			Proposed Version:		
	0001			0002		
Sector	D1	D2	D3	D1	D2	D3
Azimuth	60	180	290	60	180	290
Cell/ENode B ID	068960	068960	068960	068960	068960	068960
Antenna Model	SBNHH-1D65B_PORT 1 - 45_03DT_0725 (354020)	SBNHH-1D65B_PORT 1 - 45_05DT_0725 (354024)	SBNHH-1D65B_PORT 1 - 45_05DT_0725 (354024)	SBNHH-1D65B_PORT 1 - 45_03DT_0725 (354020)	SBNHH-1D65B_PORT 1 - 45_05DT_0725 (354024)	SBNHH-1D65B_PORT 1 - 45_05DT_0725 (354024)
Antenna Make	ANDREW	ANDREW	ANDREW	ANDREW	ANDREW	ANDREW
Centerline(Ft)	100	100	100	100	100	100
Mechanical DT(Deg.)	0	0	0	0	0	0
Electrical DT	3	5	5	3	5	5
Tip Height	103	103	103	103	103	103
TMA make						
TMA model						
RRU make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU model	UHBA B13 RRH 4x30	UHBA B13 RRH 4x30	UHBA B13 RRH 4x30	B5/B13 RRH-BR04C	B5/B13 RRH-BR04C	B5/B13 RRH-BR04C
# of Tx, Rx Lines	4,4	4,4	4,4	4,4	4,4	4,4
Position						

2100 MHZ LTE

	Current Version:			Proposed Version:		
	0001			0002		
Sector	D1	D2	D3	D1	D2	D3
Azimuth	60	180	290	60	180	290
Cell/ENode B ID	068960	068960	068960	068960	068960	068960
Antenna Model	SBNHH-1D65B_PORT 2 - 45_01DT_2130 (329414)	SBNHH-1D65B_PORT 2 - 45_03DT_2130 (329418)	SBNHH-1D65B_PORT 2 - 45_03DT_2130 (329418)	SBNHH-1D65B_PORT 2 - 45_01DT_2130 (329414)	SBNHH-1D65B_PORT 2 - 45_03DT_2130 (329418)	SBNHH-1D65B_PORT 2 - 45_03DT_2130 (329418)
Antenna Make	ANDREW	ANDREW	ANDREW	ANDREW	ANDREW	ANDREW
Centerline(Ft)	100	100	100	100	100	100
Mechanical DT(Deg.)	0	0	0	0	0	0
Electrical DT	1	3	3	1	3	3
Tip Height	103	103	103	103	103	103
TMA make						
TMA model						
RRU make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU model	UHIE B66A RRH 4x45	UHIE B66A RRH 4x45	UHIE B66A RRH 4x45	B2/B66A RRH-BR049	B2/B66A RRH-BR049	B2/B66A RRH-BR049
# of Tx, Rx Lines	4,4	4,4	4,4	4,4	4,4	4,4
Position						

1900 MHZ LTE

	Current Version:			Proposed Version:		
	0001			0002		
Sector	D1	D2	D3	D1	D2	D3
Azimuth	60	180	290	60	180	290
Cell/ENode B ID	068960	068960	068960	068960	068960	068960
Antenna Model	SBNHH-1D65B_PORT 2 - 45_01DT_1950 (329413)	SBNHH-1D65B_PORT 2 - 45_03DT_1950 (329417)	SBNHH-1D65B_PORT 2 - 45_03DT_1950 (329417)	SBNHH-1D65B_PORT 2 - 45_01DT_1950 (329413)	SBNHH-1D65B_PORT 2 - 45_03DT_1950 (329417)	SBNHH-1D65B_PORT 2 - 45_03DT_1950 (329417)
Antenna Make	ANDREW	ANDREW	ANDREW	ANDREW	ANDREW	ANDREW
Centerline(Ft)	100	100	100	100	100	100
Mechanical DT(Deg.)	0	0	0	0	0	0
Electrical DT	1	3	3	1	3	3
Tip Height	103	103	103	103	103	103
TMA make						
TMA model						
RRU make	Nokia	Nokia	Nokia	Samsung	Samsung	Samsung
RRU model	UHFA B25 RRH 4x30	UHFA B25 RRH 4x30	UHFA B25 RRH 4x30	B2/B66A RRH-BR049	B2/B66A RRH-BR049	B2/B66A RRH-BR049
# of Tx, Rx Lines	4,4	4,4	4,4	4,4	4,4	4,4
Position						

850 MHZ CDMA

	Current Version:			Proposed Version:		
	0001			0002		
Sector	D1	D2	D3	D1	D2	D3
Azimuth	60	180	290	60	180	290
Cell/ENode B ID						
Antenna Model	BXA-80063/4 (97250)	SLCP 2X6014 (242852)	SLCP 2X6014 (242852)	BXA-80063/4 (97250)	SLCP 2X6014 (242852)	SLCP 2X6014 (242852)
Antenna Make	ANTEL INTERNATIONAL, INC.	SWEDCOM	SWEDCOM	ANTEL INTERNATIONAL, INC.	SWEDCOM	SWEDCOM
Centerline(Ft)						
Mechanical DT(Deg.)	100	100	100	100	100	100
Electrical DT	0	4	4	0	4	4
Tip Height	0	0	0	0	0	0
TMA make	102.1	102.2	102.2	102.1	102.2	102.2
TMA model						
RRU make						
RRU model						
# of Tx, Rx Lines						
Position	,	,	,	,	,	,

850 MHZ LTE

	Current Version:	Proposed Version:		
		0002		
Sector		D1	D2	D3
Azimuth		60	180	290
Cell/ENode B ID		068960	068960	068960
Antenna Model		SBNHH-1D65B_PORT 1 - 45_03DT_0850 (354021)	SBNHH-1D65B_PORT 1 - 45_05DT_0850 (354025)	SBNHH-1D65B_PORT 1 - 45_05DT_0850 (354025)
Antenna Make		ANDREW	ANDREW	ANDREW
Centerline(Ft)		100	100	100
Mechanical DT(Deg.)		0	0	0
Electrical DT		3	5	5
Tip Height		103	103	103
TMA make				
TMA model				
RRU make		Samsung	Samsung	Samsung
RRU model		B5/B13 RRH-BR04C	B5/B13 RRH-BR04C	B5/B13 RRH-BR04C
# of Tx, Rx Lines		4,4	4,4	4,4
Position				

Service Comments

Callsigns Per Antenna - Proposed

Sector	Make	Model	Centerline	Tip Height	Azimuth (TN)	Elec. Tilt	Mech. Tilt	Gain	Horiz BW	Regulatory Power	700 Callsigns	850 Callsigns	1900 Callsigns	2100 Callsigns	28 GHz Callsigns	31 GHz Callsigns
D1	ANTEL INTERNATIONAL, INC.	BXA-80063/4 (97250)	100ft/30.48m	102.1ft/31.12m	60	0	0	13	63.75	431.52		KNKA404				
D1	ANDREW	SBNHH-1D65B_PORT 1 - 45_03DT_0725 (354020)	100ft/30.48m	103ft/31.39m	60	3	0	12.607	69	76.99	WQJQ689					
D1	ANDREW	SBNHH-1D65B_PORT 1 - 45_03DT_0850 (354021)	100ft/30.48m	103ft/31.39m	60	3	0	13.335	66	482.50		KNKA404				
D2	ANDREW	SBNHH-1D65B_PORT 1 - 45_05DT_0725 (354024)	100ft/30.48m	103ft/31.39m	180	5	0	12.632	69.25	77.44	WQJQ689					
D3	ANDREW	SBNHH-1D65B_PORT 1 - 45_05DT_0725 (354024)	100ft/30.48m	103ft/31.39m	290	5	0	12.632	69.25	77.44	WQJQ689					
D2	ANDREW	SBNHH-1D65B_PORT 1 - 45_05DT_0850 (354025)	100ft/30.48m	103ft/31.39m	180	5	0	13.351	64.5	484.28		KNKA404				
D3	ANDREW	SBNHH-1D65B_PORT 1 - 45_05DT_0850 (354025)	100ft/30.48m	103ft/31.39m	290	5	0	13.351	64.5	484.28		KNKA404				

D1	ANDREW	SBNHH-1D65B_PORT 2 - 45_01DT_1950 (329413)	100ft/30.48 m	103ft/31.39 m	60	1	0	16.205	52.75	289.24			KNLH251, WPOJ730			
D1	ANDREW	SBNHH-1D65B_PORT 2 - 45_01DT_2130 (329414)	100ft/30.48 m	103ft/31.39 m	60	1	0	16.163	61	143.23				WQGA906, WQGB276		
D2	ANDREW	SBNHH-1D65B_PORT 2 - 45_03DT_1950 (329417)	100ft/30.48 m	103ft/31.39 m	180	3	0	16.122	53	283.76			KNLH251, WPOJ730			
D3	ANDREW	SBNHH-1D65B_PORT 2 - 45_03DT_1950 (329417)	100ft/30.48 m	103ft/31.39 m	290	3	0	16.122	53	283.76			KNLH251, WPOJ730			
D2	ANDREW	SBNHH-1D65B_PORT 2 - 45_03DT_2130 (329418)	100ft/30.48 m	103ft/31.39 m	180	3	0	16.077	61.75	140.42				WQGA906, WQGB276		
D3	ANDREW	SBNHH-1D65B_PORT 2 - 45_03DT_2130 (329418)	100ft/30.48 m	103ft/31.39 m	290	3	0	16.077	61.75	140.42				WQGA906, WQGB276		
D2	SWEDCO M	SLCP 2X6014 (242852)	100ft/30.48 m	102.2ft/31.15m	180	0	4	14.08	55	496.59			KNKA404			
D3	SWEDCO M	SLCP 2X6014 (242852)	100ft/30.48 m	102.2ft/31.15m	290	0	4	14.08	55	496.59			KNKA404			

Callsigns

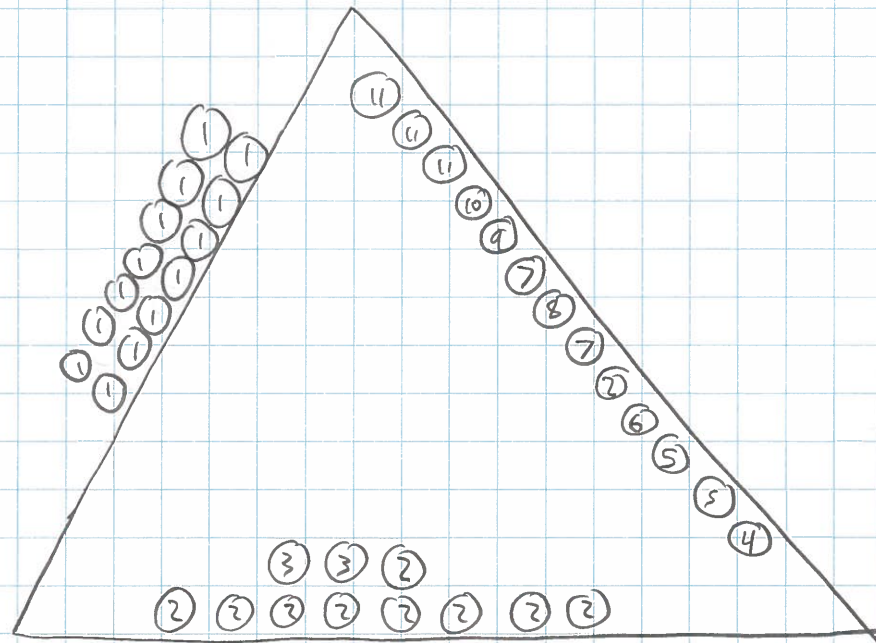
Callsigns	Market	Radio Code	Market Number	Block	State	County	Licensee Name	Wholly Owned	Total MHZ	Freq Range 1	Freq Range 2	Freq Range 3	Freq Range 4	Regulatory Power	Threshold (W)	POPs/Sq Mi	Status	Project Action
KNKA404	Hartford-New Britain-Bristol, CT	CL	CMA032	A	CT	Hartford	Cellco Partnership	Yes	25.000	824.000-835.000	869.000-880.000	845.000-846.500	890.000-891.500	496.59	500	1216.2	Active	Added
KNLH251	Hartford, CT	CW	BTA184	F	CT	Hartford	Cellco Partnership	Yes	10.000	1890.000-1895.000	1970.000-1975.000	.000-.000	.000-.000	289.24	1640	1216.2	Active	Retained
WPLM398	Hartford, CT	LD	BTA184	B	CT	Hartford	Nextlink Wireless, LLC	Yes	150.000	3100.000-31075.000	31225.000-31300.000	.000-.000	.000-.000			1216.2	Active	
WPOH943	Hartford, CT	LD	BTA184	A	CT	Hartford	Nextlink Wireless, LLC	Yes	300.000	29100.000-29250.000	31075.000-31225.000	.000-.000	.000-.000			1216.2	Active	
WPOJ730	Hartford, CT	CW	BTA184	C	CT	Hartford	Cellco Partnership	Yes	15.000	1895.000-1902.500	1975.000-1982.500	.000-.000	.000-.000	289.24	1640	1216.2	Active	Retained
WQGA906	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-	AW	BEA010	B	CT	Hartford	Cellco Partnership	Yes	20.000	1720.000-1730.000	2120.000-2130.000	.000-.000	.000-.000	143.23	1640	1216.2	Active	Retained
WQGB276	Hartford-New Britain-Bristol, CT	AW	CMA032	A	CT	Hartford	Cellco Partnership	Yes	20.000	1710.000-1720.000	2110.000-2120.000	.000-.000	.000-.000	143.23	1640	1216.2	Active	Retained
WQJQ689	Northeast	WU	REA001	C	CT	Hartford	Cellco Partnership	Yes	22.000	746.000-757.000	776.000-787.000	.000-.000	.000-.000	77.44	1000	1216.2	Active	Retained

Designer West Hartford center CT Date SU 7/23/18
 Title Bk Checker _____
 Subject _____ Job No. _____
 Sheet No. _____ of _____

upper guy wire 0.85" ϕ
 lower guy wire 0.89" ϕ
 anchor for guys 1.55" ϕ

Verizon Coax

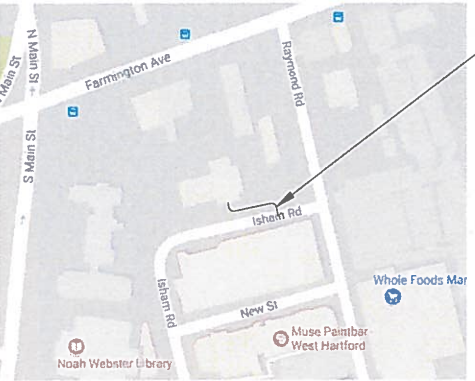
- (12) 1-5/8" coax
- (2) 1-5/8" hybrid cables



- | | |
|---|----------------------------------|
| ① (12) 1-5/8" coax + (2) 1-5/8" hybrids (Verizon) | ⑨ (1) 1/4" coax (From dog house) |
| ② (10) 1-1/4" coax (From dog house) | ⑩ (1) 1/2" coax (From dog house) |
| ③ (2) 1-1/4" coax (From penthouse) | ⑪ (3) 7/8" coax (From dog house) |
| ④ (1) 1-5/8" coax (From dog house) | |
| ⑤ (2) 1/2" coax (From dog house) | |
| ⑥ (1) 1-5/8" flex conduit (From dog house) | |
| ⑦ (2) 1-5/8" coax (From penthouse) | |
| ⑧ (1) 7/8" coax (From penthouse) | |

★ There are some coax coming out of dog house that terminate @ base of tower

APPROXIMATE TRUE NORTH



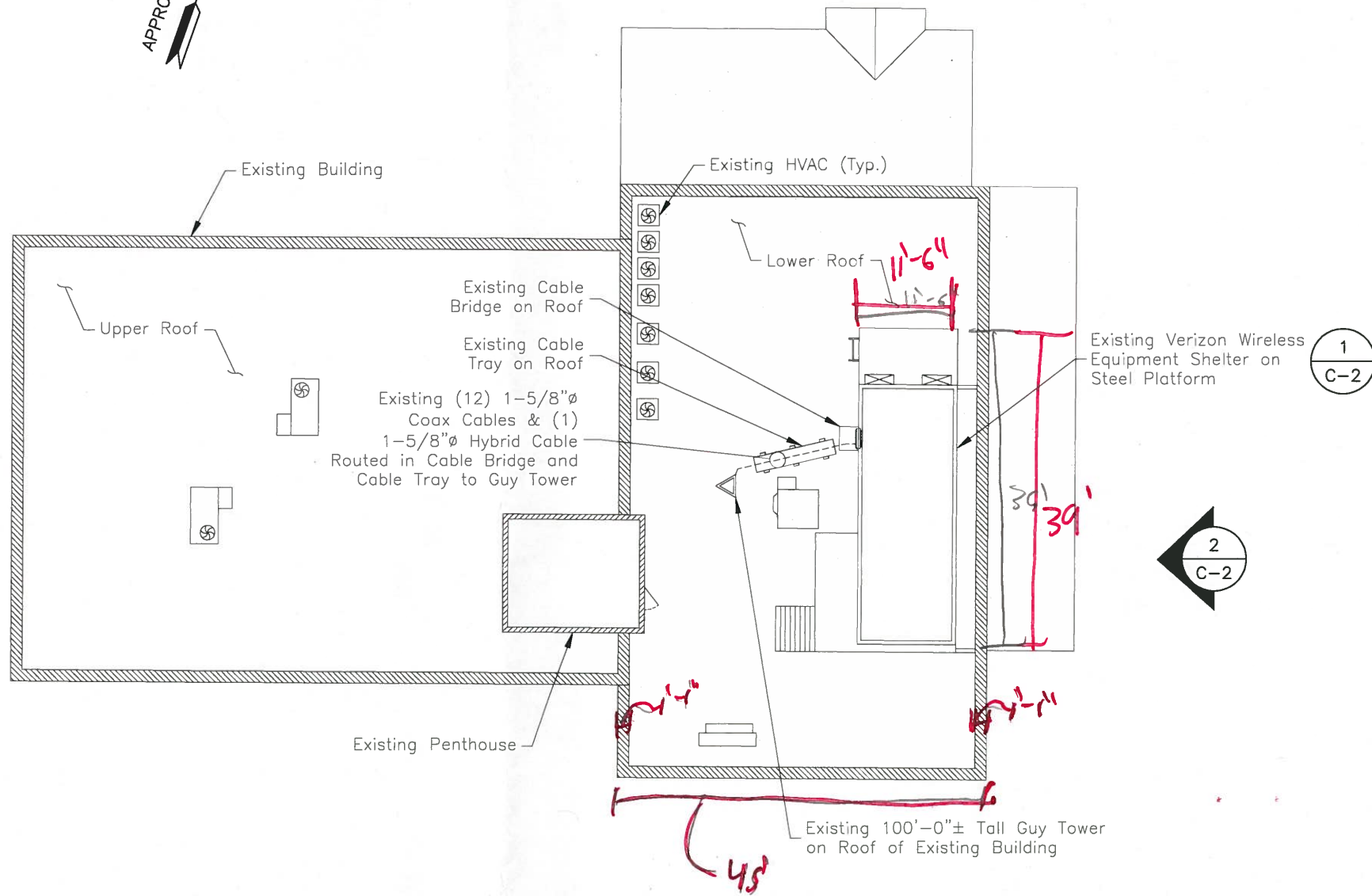
Existing Centerline of Access

KEY MAP

SCALE: N.T.S.

1

APPROXIMATE TRUE NORTH

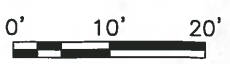


NOTES:

1. NORTH SHOWN AS APPROXIMATE.
2. SOME EXISTING AND PROPOSED INFORMATION NOT SHOWN FOR CLARITY.
3. ROOF PLAN & ELEVATION BASED A SITE VISIT BY DEWBERRY ENGINEERS INC. ON 06/07/17.
4. EXISTING ANTENNAS SHOWN AS APPROXIMATE. ELEVATION BASED ON EXISTING INFORMATION AND VISUAL INSPECTION AND HAVE NOT BEEN VERIFIED THROUGH AN ANTENNA MAPPING.
5. MOUNT ALL ANTENNAS, COAX, RRR'S, OVP BOXES, ETC. IN ACCORDANCE WITH STRUCTURAL ANALYSIS COMPLETED BY CENTEK ENGINEERING DATED JULY 22, 2016.
6. REUSE EXISTING ANTENNA MOUNTS AND COAX. INSPECT FOR DAMAGE OR DECAY AND REPLACE AS NEEDED PER STRUCTURAL ANALYSIS.
7. THIS DOCUMENT WAS DEVELOPED TO REFLECT A SPECIFIC SITE AND ITS SITE CONDITIONS AND IS NOT TO BE USED FOR ANOTHER SITE OR WHEN OTHER CONDITIONS PERTAINS. REUSE OF THIS DOCUMENT IS AT THE SOLE RISK OF THE USER.

ROOF PLAN

SCALE: 1"=20' FOR 11"x17"
1"=10' FOR 22"x34"



2

20'-3" tall
3'-3" tall parapet

CELLCO
PARTNERSHIP
d/b/a **verizon**
WIRELESS

99 EAST RIVER DRIVE
EAST HARTFORD, CT 06108

**WEST HARTFORD
CENTER CT**

CONSTRUCTION DRAWINGS

0	11/29/17 ISSUED AS FINAL
A	06/30/17 FOR COMMENT

Dewberry[®]
Dewberry Engineers Inc.
600 PARSIPPANY ROAD
SUITE 301
PARSIPPANY, NJ 07054
PHONE: 973.739.8400
FAX: 973.739.8710

JIANG YU, P.E.
CONNECTICUT LICENSE NO. 0023222

DRAWN BY: NRS

REVIEWED BY: BSH

CHECKED BY: GHN

PROJECT NUMBER: 50067815

JOB NUMBER: 50091672

SITE ADDRESS:

14-20 ISHAM ROAD
WEST HARTFORD, CT 06107

SHEET TITLE

KEY MAP &
ROOF PLAN

SHEET NUMBER

C-1

