

March 11, 2015

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

Re: **Notice of Exempt Modification – Facility Modification
Farmdale Road, Waterbury, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains fifteen (15) antennas at the 129-foot level on the existing 150-foot tower off Farmdale Road in Waterbury, Connecticut (the “Property”). The tower is owned by American Tower Corporation. The Council approved Cellco’s use of the existing tower in 1994. Cellco now intends to modify its facility by replacing three (3) of its existing antennas with two (2) model LNX-6514DS-VTM, 700 MHz antennas and one (1) model LNX-4514DS-VTM, 700 MHz antennas, at the same 129-foot level on the tower. Included in Attachment 1 are specifications for Cellco’s replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Neil M. O’Leary, Mayor for the City of Waterbury and Springwiche Cellular Tower Holdings LLC, owner of the Property.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s replacement antennas will be installed on its existing antenna platform at the 129-foot level of the tower.

Robinson+Cole

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2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

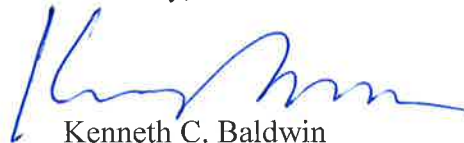
4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis Report included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,



Kenneth C. Baldwin

Enclosures
Copy to:

Neil M. O'Leary, Mayor
Springwich Cellular Tower Holdings LLC
Timothy Parks

ATTACHMENT 1

Product Specifications

COMMScope®

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY



Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.7	16.3
Beamwidth, Horizontal, degrees	65	65
Beamwidth, Vertical, degrees	12.5	11.2
Beam Tilt, degrees	0–10	0–10
USLS, typical, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	20	20
CPR at Sector, dB	10	10
Isolation, dB	30	30
VSWR Return Loss, dB	1.4 15.6	1.4 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896
Beamwidth, Horizontal Tolerance, degrees	±3	±3

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

Mechanical Specifications

Color Radome Material	Light gray Fiberglass, UV resistant
Connector Interface Location Quantity	7-16 DIN Female Bottom 2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph
Antenna Dimensions, L x W x D	1847.0 mm x 301.0 mm x 181.0 mm 72.7 in x 11.9 in x 7.1 in
Net Weight	14.2 kg 31.3 lb
Model with factory installed AISG 2.0 RET	LNX-6514DS-A1M

Product Specifications

COMMSCOPE®

LNX-4514DS-VTM

Andrew® Antenna, 698–896 MHz, 45° horizontal beamwidth, RET compatible

POWERED BY



Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain, dBi	15.5	16.4
Beamwidth, Horizontal, degrees	47	45
Beamwidth, Vertical, degrees	17.3	15.8
Beam Tilt, degrees	2–18	2–18
USLS, typical, dB	16	15
Front-to-Back Ratio at 180°, dB	32	28
Isolation, dB	30	30
VSWR Return Loss, dB	1.4 15.6	1.4 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	500	500
Polarization	±45°	±45°

Mechanical Specifications

Color Radome Material	Light gray Fiberglass, UV resistant
Connector Interface Location Quantity	7-16 DIN Female Bottom 2
Wind Loading, maximum	586.4 N @ 150 km/h 131.8 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h 150.0 mph
Antenna Dimensions, L x W x D	1308.0 mm x 389.0 mm x 163.0 mm 51.5 in x 15.3 in x 6.4 in
Net Weight	13.3 kg 29.3 lb
Model with factory installed AISG 2.0 RET	LNX-4514DS-A1M

ATTACHMENT 2

CARRIER	General		Power		Density		CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
	# OF CHAN.	WATTS ERP	HEIGHT								
*AT&T UMTS	2	500	154		0.0152	880	0.5867	2.58%			
*AT&T UMTS	1	500	154		0.0076	1900	1.0000	0.76%			
*AT&T LTE	1	500	154		0.0076	700	0.4667	1.62%			
*AT&T LTE	1	500	154		0.0076	1900	1.0000	0.76%			
*AT&T LTE	1	500	154		0.0076	2300	1.0000	0.76%			
*Arch Paging	1	1990	161		0.0276	931.19	0.6208	4.45%			
Verizon PCS	7	289	129		0.0437	1970	1.0000	4.37%			
Verizon Cellular	9	278	129		0.0541	869	0.5793	9.33%			
Verizon AWS	1	1267	129		0.0274	2145	1.0000	2.74%			
Verizon 700	1	669	129		0.0145	746	0.4973	2.91%			
										30.28%	
* Source: Siting Council											

ATTACHMENT 3



AMERICAN TOWER®
CORPORATION

Structural Analysis Report

Structure : 150 ft Monopole
ATC Site Name : Wtbr - Waterbury, CT
ATC Site Number : 302476
Engineering Number : 60998922
Proposed Carrier : Verizon
Carrier Site Name : Waterbury
Carrier Site Number : 117721
Site Location : Farmdale Drive
Waterbury, CT 06704-2833
41.570667, -73.017600
County : New Haven
Date : January 30, 2015
Max Usage : 100%
Result : Pass

Reviewed by:
Raphael Mohamed, PE
Senior Strategic
Implementation Lead

Prepared By:
Michael B. Davenport
Structural Engineer III

Michael B. Davenport



Jan 30 2015 4:01 PM



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Calculations Attached



Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 150 ft monopole to reflect the change in loading by Verizon.

Supporting Documents

Tower Drawings	ITT Meyer Type "B" Specifications (AT&T Spec. AT-8935, dated April 13, 1984) Smith Cullum Mapping: Acquisition #CT-0012, dated June 7, 2001
Foundation Drawing	Girard & Co. Engineers Job #38926, dated July 10, 1984
Modifications	SpectraSite Communications Drawing #CT-0012-M1, dated January 12, 2005

Analysis

The tower was analyzed using tnxTower version 6.1 tower analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

Basic Wind Speed:	99 mph (3-Second Gust)
Basic Wind Speed w/ Ice:	50 mph (3-Second Gust) w/ 3/4" radial ice concurrent
Code:	ANSI/TIA-222-G / 2003 IBC w/ 2005 CT Supplement & 2009 CT Amendment
Structure Class:	II
Exposure Category:	B
Topographic Category:	1

Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact American Tower via email at Engineering@americantower.com. Please include the American Tower site name, site number, and engineering number in the subject line for any questions.



Existing and Reserved Equipment

Elevation ¹ (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
150.0	154.0	3	CCI DTMABP7819VG12A	Platform w/ Handrails	(12) 1 1/4" Coax (6) 0.78" 8 AWG 6 (1) 2" conduit (1) 0.39" Fiber Trunk	AT&T Mobility
		3	Raycap DC6-48-60-18-8F			
		9	ADC DD1900			
		6	Ericsson RRUS A2 Module			
		6	Ericsson RRUS 11 (Band 7)			
		3	Ericsson RRUS E2 B29			
		6	Ericsson RRUS-12 B2			
		3	Ericsson RRUS-32			
		3	Powerwave 7770.00			
		3	CCI HPA-65R-BUU-H6			
		6	CCI HPA-65R-BUU-H8			
		129.0	129.0			
3	Alcatel-Lucent RRH2x40-AWS					
3	Antel BXA-171063/8CF					
3	Antel BXA-171063-8BF-EDIN-X					
3	Andrew DB948F85E-M					
3	Antel BXA-80063-4CF-EDIN-X					
1	RFS DB-T1-6Z-8AB-0Z					

Equipment to be Removed

Elevation ¹ (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
129.0	129.0	1	Antel BXA-70080-6CF-EDIN-X	Low Profile Platform	(3) 1 5/8" Coax	Verizon
		2	Antel BXA-70063-6CF-EDIN-X			

Proposed Equipment

Elevation ¹ (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
129.0	129.0	1	Commscope LNX-4514DS-A1M	Platform w/ Handrails	(3) 1 5/8" Coax	Verizon
		2	Commscope LNX-6514DS-A1M			

¹Mount elevation is defined as height above bottom of steel structure to the bottom of mount, RAD elevation is defined as center of antenna above ground level (AGL).

Install proposed coax alongside existing Verizon coax.



Structure Usages

Structural Component	Controlling Usage	Pass/Fail
Anchor Bolts	11%	Pass
Shaft	100%	Pass
Base Plate	7%	Pass
Flanges	74%	Pass

Foundations

Reaction Component	Analysis Reactions
Moment (Kips-Ft)	146.4
Axial (Kips)	73.9
Shear (Kips)	3.8

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required.

Deflection and Sway*

Antenna Elevation (ft)	Deflection (ft)	Sway (Rotation) (°)
129.0	0.238	0.606

*Deflection and Sway was evaluated considering a design wind speed of 60 mph (3-Second Gust) per ANSI/TIA-222-G



Standard Conditions

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

- Information supplied by the client regarding the structure itself, antenna, mounts and feed line loading on the structure and its components, or other relevant information.

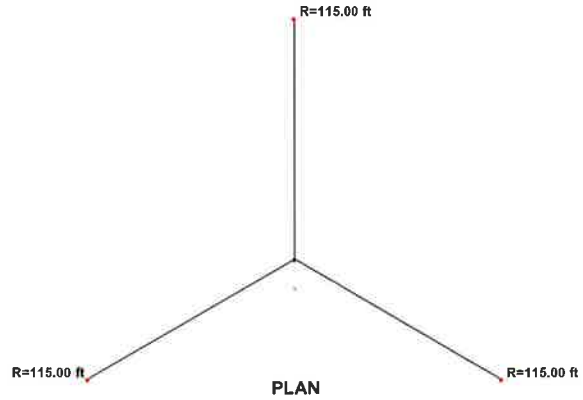
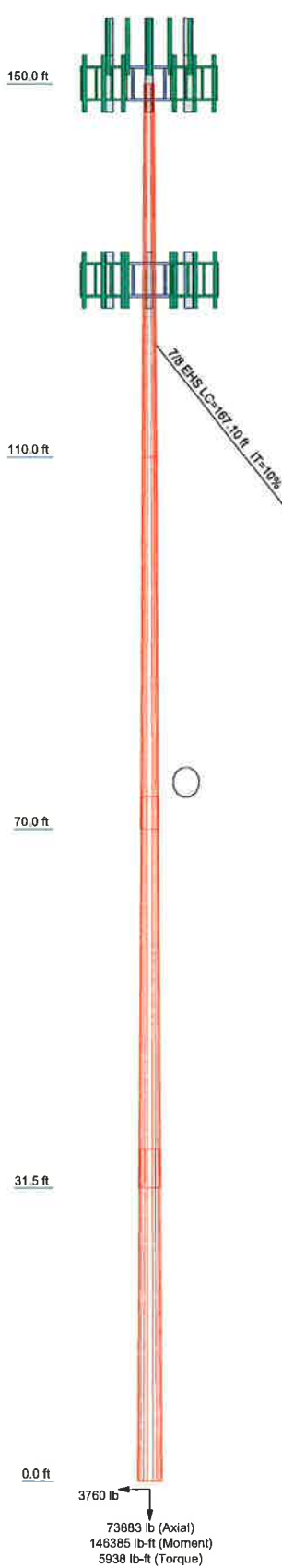
- Information from drawings in the possession of American Tower Corporation, or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Service, PLLC 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 that their capacity has not significantly changed from the "as new" condition.

Unless explicitly agreed by both the client and American Tower Corporation, all services will be performed in accordance with the current revision of ANSI/TIA -222. The design basic wind speed will be determined based on the minimum basic wind speed as prescribed in ANSI/TIA-222. Although every effort is taken to ensure that the loading considered is adequate to meet the requirements of all applicable regulatory entities, we can provide no assurance to meet any other local and state codes or requirements. 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.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. A.T. Engineering Service, PLLC is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	40.00	12	0.1875					1474.1
2	40.00	12	0.2500	3.50	21.2500	27.6100	A572-65	2649.4
3	42.00	12	0.3130	4.17	26.5535	33.1000		4251.2
4	35.67	12	0.3750		31.8245	37.9800		5016.0
								13390.7



DESIGNED APPURTENANCE LOADING

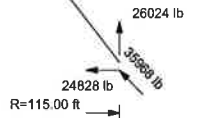
TYPE	ELEVATION	TYPE	ELEVATION
7770.00 (ATI Mobility)	150	HPA-65R-BUU-H6 (ATI Mobility)	150
7770.00 (ATI Mobility)	150	HPA-65R-BUU-H6 (ATI Mobility)	150
7770.00 (ATI Mobility)	150	(2) HPA-65R-BUU-H8 (ATI Mobility)	150
DC6-48-60-18-8F (ATI Mobility)	150	(2) HPA-65R-BUU-H8 (ATI Mobility)	150
DC6-48-60-18-8F (ATI Mobility)	150	(2) HPA-65R-BUU-H8 (ATI Mobility)	150
DC6-48-60-18-8F (ATI Mobility)	150	Flat Platform w/ Handrails (ATI Mobility)	150
(2) RRUS 11 (ATI Mobility)	150	Flat Platform w/ Handrails (Verizon)	129
(2) RRUS 11 (ATI Mobility)	150	DB948F85E-M (Verizon)	129
DTMABP7819VG12A (ATI Mobility)	150	DB948F85E-M (Verizon)	129
DTMABP7819VG12A (ATI Mobility)	150	DB948F85E-M (Verizon)	129
DTMABP7819VG12A (ATI Mobility)	150	BXA-171063-8BF-EDIN-X (Verizon)	129
(3) DD1900 (ATI Mobility)	150	BXA-171063-8BF-EDIN-X (Verizon)	129
(3) DD1900 (ATI Mobility)	150	BXA-171063-8BF-EDIN-X (Verizon)	129
(3) DD1900 (ATI Mobility)	150	BXA-80063/4CF (Verizon)	129
(2) RRUS A2 Module (15.1'Height) (ATI Mobility)	150	BXA-80063/4CF (Verizon)	129
(2) RRUS A2 Module (15.1'Height) (ATI Mobility)	150	BXA-80063/4CF (Verizon)	129
(2) RRUS A2 Module (15.1'Height) (ATI Mobility)	150	(2) FD9R6004/2C-3L (Verizon)	129
(2) RRUS A2 Module (15.1'Height) (ATI Mobility)	150	(2) FD9R6004/2C-3L (Verizon)	129
(2) RRUS A2 Module (15.1'Height) (ATI Mobility)	150	(2) FD9R6004/2C-3L (Verizon)	129
RRUS E2 B29 (ATI Mobility)	150	DB-T1-6Z-8AB-0Z (Verizon)	129
RRUS E2 B29 (ATI Mobility)	150	BXA-171063/8CF (Verizon)	129
RRUS E2 B29 (ATI Mobility)	150	BXA-171063/8CF (Verizon)	129
(2) RRUS-12 B2 (ATI Mobility)	150	BXA-171063/8CF (Verizon)	129
(2) RRUS-12 B2 (ATI Mobility)	150	RRH2x40-AWS (Verizon)	129
(2) RRUS-12 B2 (ATI Mobility)	150	RRH2x40-AWS (Verizon)	129
RRUS-32 (ATI Mobility)	150	RRH2x40-AWS (Verizon)	129
RRUS-32 (ATI Mobility)	150	LNx-4514DS-A1M (Verizon)	129
RRUS-32 (ATI Mobility)	150	LNx-6514DS-A1M (Verizon)	129
RRUS-32 (ATI Mobility)	150	LNx-6514DS-A1M (Verizon)	129
HPA-65R-BUU-H6 (ATI Mobility)	150		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 99 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 99.5%



ALL REACTIONS ARE FACTORED

<p>ATC Engineering 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 466-5147 FAX:</p>		Job: 60998922
		Project: 302476 - Wtbr-Waterbury, CT
Client: Verizon	Drawn by: michael.davenport	App'd:
Code: TIA-222-G	Date: 01/30/15	Scale: NTS
Path: C:\Users\michael.davenport\Desktop\302476-60998922.dwg		Dwg No. E-1

tnxTower ATC Engineering 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 466-5147 FAX:	Job 60998922	Page 1 of 23
	Project 302476 - Wtbr-Waterbury, CT	Date 09:26:22 01/30/15
	Client Verizon	Designed by michael.davenport

Tower Input Data

There is a pole section.

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

The following design criteria apply:

Tower is located in New Haven County, Connecticut.

Basic wind speed of 99 mph.

Structure Class II.

Exposure Category B.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

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

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

Safety factor used in guy design is 1.

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

Options

<ul style="list-style-type: none"> 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) Add IBC .6D+W Combination 	<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 SR Members Have Cut Ends Sort Capacity Reports By Component √ Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption 	<ul style="list-style-type: none"> Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules √ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression √ All Leg Panels Have Same Allowable Offset Girt At Foundation Consider Feedline Torque Include Angle Block Shear Check <li style="text-align: center;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets
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Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	150.00-110.00	40.00	0.00	12	15.0000	21.2500	0.1875	4.0000	A572-65 (65 ksi)
L2	110.00-70.00	40.00	3.50	12	21.2500	27.6100	0.2500	4.0000	A572-65 (65 ksi)

tnxTower ATC Engineering 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 466-5147 FAX:	Job 60998922	Page 2 of 23
	Project 302476 - Wtbr-Waterbury, CT	Date 09:26:22 01/30/15
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Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	70.00-31.50	42.00	4.17	12	26.5535	33.1000	0.3130	4.0000	A572-65 (65 ksi)
L4	31.50-0.00	35.67		12	31.8245	37.3800	0.3750	4.0000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	15.5291	8.9430	250.4541	5.3029	7.7700	32.2335	507.4880	4.4015	3.5175	18.76
	21.9996	12.7165	720.0669	7.5404	11.0075	65.4160	1459.0508	6.2587	5.1925	27.693
L2	21.9996	16.9050	951.5678	7.5180	11.0075	86.4472	1928.1342	8.3201	5.0250	20.1
	28.5840	22.0248	2104.4088	9.7949	14.3020	147.1411	4264.1028	10.8399	6.7295	26.918
L3	28.0550	26.4468	2324.3551	9.3941	13.7547	168.9861	4709.7736	13.0163	6.2775	20.056
	34.2676	33.0447	4534.1011	11.7377	17.1458	264.4438	9187.3181	16.2636	8.0320	25.661
L4	33.6191	37.9753	4794.1771	11.2589	16.4851	290.8190	9714.3026	18.6903	7.5240	20.064
	38.6986	44.6835	7810.0590	13.2478	19.3628	403.3530	15825.2970	21.9919	9.0128	24.034

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.00-110.00				1	1	1		
L2 110.00-70.00				1	1	1		
L3 70.00-31.50				1	1	1		
L4 31.50-0.00				1	1	1		

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 %	
122	EHS	A	7/8	7970.00	10%	19000	1.581	166.95	115.00	0.0000	0.00	100%
		B	7/8	7970.00	10%	19000	1.581	166.95	115.00	0.0000	0.00	100%
		C	7/8	7970.00	10%	19000	1.581	166.95	115.00	0.0000	0.00	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
122	Corner						

tnxTower ATC Engineering 3500 Regency Parkway, Suite 100 Cary, NC 27518 Phone: (919) 466-5147 FAX:	Job 60998922	Page 3 of 23
	Project 302476 - Wtbr-Waterbury, CT	Date 09:26:22 01/30/15
	Client Verizon	Designed by michael.davenport

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
122.00	A572-50 (50 ksi)	Solid Round			No	A572-50 (50 ksi)	Solid Round	1 1/4

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
122	263.95	263.95	263.95		2.73 2.9 sec/pulse	2.73 2.9 sec/pulse	2.73 2.9 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
122	No	No			1	1	1	1

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
122	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
122	A	61.00	20	5	1.5950
	B	61.00	20	5	1.5950
	C	61.00	20	5	1.5950

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Guy-Tensioning Information

Temperature At Time Of Tensioning																	
Guy Elevation ft	H ft	V ft	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	
122	A	114.19	122.00	9507	2.30	8992	2.43	8479	2.57	7970	2.73	7465	2.92	6966	3.12	6473	3.36
	B	114.19	122.00	9507	2.30	8992	2.43	8479	2.57	7970	2.73	7465	2.92	6966	3.12	6473	3.36
	C	114.19	122.00	9507	2.30	8992	2.43	8479	2.57	7970	2.73	7465	2.92	6966	3.12	6473	3.36

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon)	A	Surface Ar (CaAa)	129.00 - 5.00	2	2	0.000 0.500	1.9800		1.04
1 5/8" Hybriflex (Verizon)	C	Surface Ar (CaAa)	129.00 - 0.00	1	1	0.000 0.250	1.9800		1.30

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf
1 1/4 (AT&T Mobility)	A	No	Inside Pole	150.00 - 5.00	12	No Ice 1/2" Ice 1" Ice 0.00 0.00 0.00	0.66 0.66 0.66
10 mm Cable (AT&T Mobility)	A	No	Inside Pole	150.00 - 5.00	1	No Ice 1/2" Ice 1" Ice 0.00 0.00 0.00	0.07 0.07 0.07
19.7 mm Cable (AT&T Mobility)	A	No	Inside Pole	150.00 - 5.00	6	No Ice 1/2" Ice 1" Ice 0.00 0.00 0.00	0.59 0.59 0.59
2" Conduit (AT&T Mobility)	A	No	Inside Pole	150.00 - 5.00	1	No Ice 1/2" Ice 1" Ice 0.00 0.00 0.00	3.65 3.65 3.65
** **							
1 5/8 (Verizon)	A	No	Inside Pole	129.00 - 5.00	13	No Ice 1/2" Ice 1" Ice 0.00 0.00 0.00	1.04 1.04 1.04

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
L1	150.00-110.00	A	0.000	0.000	7.524	0.000	903.60
		B	0.000	0.000	0.000	0.000	0.00

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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
L2	110.00-70.00	C	0.000	0.000	3.762	0.000	24.70
		A	0.000	0.000	15.840	0.000	1231.20
		B	0.000	0.000	0.000	0.000	0.00
L3	70.00-31.50	C	0.000	0.000	7.920	0.000	52.00
		A	0.000	0.000	15.246	0.000	1185.03
		B	0.000	0.000	0.000	0.000	0.00
L4	31.50-0.00	C	0.000	0.000	7.623	0.000	50.05
		A	0.000	0.000	10.494	0.000	815.67
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	6.237	0.000	40.95

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
L1	150.00-110.00	A	1.719	0.000	0.000	17.571	0.000	1107.74
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	10.295	0.000	172.32
L2	110.00-70.00	A	1.657	0.000	0.000	36.373	0.000	1640.96
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	21.178	0.000	346.59
L3	70.00-31.50	A	1.566	0.000	0.000	35.009	0.000	1579.43
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	20.384	0.000	333.59
L4	31.50-0.00	A	1.390	0.000	0.000	23.490	0.000	1067.96
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	16.100	0.000	254.58

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	9	1 5/8"	110.00 - 129.00	1.0000	1.0000
L1	10	1 5/8" Hybriflex	110.00 - 129.00	1.0000	1.0000
L2	9	1 5/8"	70.00 - 110.00	1.0000	1.0000
L2	10	1 5/8" Hybriflex	70.00 - 110.00	1.0000	1.0000
L3	9	1 5/8"	31.50 - 70.00	1.0000	1.0000
L3	10	1 5/8" Hybriflex	31.50 - 70.00	1.0000	1.0000

Discrete Tower Loads

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Description	Face or Leg	Offset Type	Offsets:	Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz Lateral						Vert
			ft	°	ft	ft ²	ft ²	lb	
7770.00 (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	5.51 4.73 6.75	1.70 1.99 3.63	35.00 67.63 105.06
7770.00 (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	5.51 4.73 6.75	1.70 1.99 3.63	35.00 67.63 105.06
7770.00 (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	5.51 4.73 6.75	1.70 1.99 3.63	35.00 67.63 105.06
DC6-48-60-18-8F (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.26 1.67 1.88	1.47 1.67 1.88	31.80 49.52 69.72
DC6-48-60-18-8F (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.26 1.67 1.88	1.47 1.67 1.88	31.80 49.52 69.72
DC6-48-60-18-8F (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.26 1.67 1.88	1.47 1.67 1.88	31.80 49.52 69.72
(2) RRUS 11 (AT&T Mobility)	A	From Leg	2.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.79 3.17 3.41	1.25 1.41 1.59	55.00 74.32 96.56
(2) RRUS 11 (AT&T Mobility)	B	From Leg	2.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.79 3.17 3.41	1.25 1.41 1.59	55.00 74.32 96.56
(2) RRUS 11 (AT&T Mobility)	C	From Leg	2.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.79 3.17 3.41	1.25 1.41 1.59	55.00 74.32 96.56
DTMABP7819VG12A (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.97 0.00 1.43	0.39 0.49 0.60	19.20 26.49 35.63
DTMABP7819VG12A (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.97 0.00 1.43	0.39 0.49 0.60	19.20 26.49 35.63
DTMABP7819VG12A (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.97 0.00 1.43	0.39 0.49 0.60	19.20 26.49 35.63
(3) DD1900 (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.09 1.43 1.59	0.30 0.40 0.51	12.10 19.21 28.18
(3) DD1900 (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.09 1.43 1.59	0.30 0.40 0.51	12.10 19.21 28.18
(3) DD1900 (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	1.09 1.43 1.59	0.30 0.40 0.51	12.10 19.21 28.18
(2) RRUS A2 Module (15.1"Height) (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.06 2.62 2.83	0.48 0.61 0.74	22.00 34.55 49.56
(2) RRUS A2 Module (15.1"Height) (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.06 2.62 2.83	0.48 0.61 0.74	22.00 34.55 49.56
(2) RRUS A2 Module (15.1"Height) (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	2.06 2.62 2.83	0.48 0.61 0.74	22.00 34.55 49.56
RRUS E2 B29 (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.15 3.93 4.19	1.49 1.67 1.87	60.00 83.22 109.64

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	Client	Verizon	Designed by	michael.davenport

Description	Face or Leg	Offset Type	Offsets:	Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz						Vert
			ft	°	ft	ft ²	ft ²	lb	
RRUS E2 B29 (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.15 3.93 4.19	1.49 1.67 1.87	60.00 83.22 109.64
RRUS E2 B29 (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.15 3.93 4.19	1.49 1.67 1.87	60.00 83.22 109.64
(2) RRUS-12 B2 (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.15 3.93 4.19	1.49 1.67 1.87	58.00 81.22 107.64
(2) RRUS-12 B2 (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.15 3.93 4.19	1.49 1.67 1.87	58.00 81.22 107.64
(2) RRUS-12 B2 (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.15 3.93 4.19	1.49 1.67 1.87	58.00 81.22 107.64
RRUS-32 (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.31 4.15 4.44	2.76 3.02 3.29	77.00 104.93 136.47
RRUS-32 (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.31 4.15 4.44	2.76 3.02 3.29	77.00 104.93 136.47
RRUS-32 (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	3.31 4.15 4.44	2.76 3.02 3.29	77.00 104.93 136.47
HPA-65R-BUU-H6 (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	9.66 10.93 11.50	6.45 6.91 7.38	51.00 113.99 183.38
HPA-65R-BUU-H6 (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	9.66 10.93 11.50	6.45 6.91 7.38	51.00 113.99 183.38
HPA-65R-BUU-H6 (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	9.66 10.93 11.50	6.45 6.91 7.38	51.00 113.99 183.38
(2) HPA-65R-BUU-H8 (AT&T Mobility)	A	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	12.98 13.99 14.70	7.52 8.09 8.67	68.00 141.77 223.17
(2) HPA-65R-BUU-H8 (AT&T Mobility)	B	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	12.98 13.99 14.70	7.52 8.09 8.67	68.00 141.77 223.17
(2) HPA-65R-BUU-H8 (AT&T Mobility)	C	From Leg	2.50 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	12.98 13.99 14.70	7.52 8.09 8.67	68.00 141.77 223.17
Flat Platform w/ Handrails (AT&T Mobility)	A	From Leg	2.50 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	36.00 48.40 76.20	42.40 57.40 76.20	2000.00 2450.00 2240.00
** **									
Flat Platform w/ Handrails (Verizon)	B	From Leg	2.50 0.00 0.00	0.0000	129.00	No Ice 1/2" Ice 1" Ice	42.40 48.40 76.20	42.40 57.40 76.20	2000.00 2450.00 2240.00
DB948F85E-M (Verizon)	A	From Leg	2.50 0.00 0.00	0.0000	129.00	No Ice 1/2" Ice 1" Ice	3.25 2.19 2.50	3.27 3.63 4.00	8.50 27.56 50.60
DB948F85E-M (Verizon)	B	From Leg	2.50 0.00 0.00	0.0000	129.00	No Ice 1/2" Ice 1" Ice	3.25 2.19 2.50	3.27 3.63 4.00	8.50 27.56 50.60
DB948F85E-M	C	From Leg	2.50	0.0000	129.00	No Ice	3.25	3.27	8.50

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	Client		Verizon		Designed by		michael.davenport	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight lb
(Verizon)			0.00			1/2" Ice 2.19	3.63	27.56
			0.00			1" Ice 2.50	4.00	50.60
BXA-171063-8BF-EDIN-X (Verizon)	A	From Leg	2.50	0.0000	129.00	No Ice 2.94	2.16	10.50
			0.00			1/2" Ice 3.26	2.46	29.28
			0.00			1" Ice 3.60	2.77	52.05
BXA-171063-8BF-EDIN-X (Verizon)	B	From Leg	2.50	0.0000	129.00	No Ice 2.94	2.16	10.50
			0.00			1/2" Ice 3.26	2.46	29.28
			0.00			1" Ice 3.60	2.77	52.05
BXA-171063-8BF-EDIN-X (Verizon)	C	From Leg	2.50	0.0000	129.00	No Ice 2.94	2.16	10.50
			0.00			1/2" Ice 3.26	2.46	29.28
			0.00			1" Ice 3.60	2.77	52.05
BXA-80063/4CF (Verizon)	A	From Leg	2.50	0.0000	129.00	No Ice 4.71	2.25	9.90
			0.00			1/2" Ice 5.55	2.55	37.73
			0.00			1" Ice 5.94	2.85	69.84
BXA-80063/4CF (Verizon)	B	From Leg	2.50	0.0000	129.00	No Ice 4.71	2.25	9.90
			0.00			1/2" Ice 5.55	2.55	37.73
			0.00			1" Ice 5.94	2.85	69.84
BXA-80063/4CF (Verizon)	C	From Leg	2.50	0.0000	129.00	No Ice 4.71	2.25	9.90
			0.00			1/2" Ice 5.55	2.55	37.73
			0.00			1" Ice 5.94	2.85	69.84
(2) FD9R6004/2C-3L (Verizon)	A	From Leg	2.50	0.0000	129.00	No Ice 0.37	0.08	3.10
			0.00			1/2" Ice 0.45	0.14	5.40
			0.00			1" Ice 0.54	0.20	8.79
(2) FD9R6004/2C-3L (Verizon)	B	From Leg	2.50	0.0000	129.00	No Ice 0.37	0.08	3.10
			0.00			1/2" Ice 0.45	0.14	5.40
			0.00			1" Ice 0.54	0.20	8.79
(2) FD9R6004/2C-3L (Verizon)	C	From Leg	2.50	0.0000	129.00	No Ice 0.37	0.08	3.10
			0.00			1/2" Ice 0.45	0.14	5.40
			0.00			1" Ice 0.54	0.20	8.79
DB-T1-6Z-8AB-0Z (Verizon)	C	From Leg	2.50	0.0000	129.00	No Ice 4.80	2.33	44.00
			0.00			1/2" Ice 5.92	2.56	80.13
			0.00			1" Ice 6.24	2.79	120.22
BXA-171063/8CF (Verizon)	A	From Leg	2.50	0.0000	129.00	No Ice 2.90	2.31	10.50
			0.00			1/2" Ice 3.22	2.62	29.82
			0.00			1" Ice 3.55	2.93	53.16
BXA-171063/8CF (Verizon)	B	From Leg	2.50	0.0000	129.00	No Ice 2.90	2.31	10.50
			0.00			1/2" Ice 3.22	2.62	29.82
			0.00			1" Ice 3.55	2.93	53.16
BXA-171063/8CF (Verizon)	C	From Leg	2.50	0.0000	129.00	No Ice 2.90	2.31	10.50
			0.00			1/2" Ice 3.22	2.62	29.82
			0.00			1" Ice 3.55	2.93	53.16
RRH2x40-AWS (Verizon)	A	From Leg	2.50	0.0000	129.00	No Ice 2.16	1.59	44.00
			0.00			1/2" Ice 2.75	1.80	61.37
			0.00			1" Ice 2.99	2.01	81.63
RRH2x40-AWS (Verizon)	B	From Leg	2.50	0.0000	129.00	No Ice 2.16	1.59	44.00
			0.00			1/2" Ice 2.75	1.80	61.37
			0.00			1" Ice 2.99	2.01	81.63
RRH2x40-AWS (Verizon)	C	From Leg	2.50	0.0000	129.00	No Ice 2.16	1.59	44.00
			0.00			1/2" Ice 2.75	1.80	61.37
			0.00			1" Ice 2.99	2.01	81.63
LNx-4514DS-A1M (Verizon)	A	From Leg	2.50	0.0000	129.00	No Ice 6.78	5.41	38.80
			0.00			1/2" Ice 8.96	5.86	89.31
			0.00			1" Ice 9.52	6.33	145.95
LNx-6514DS-A1M (Verizon)	B	From Leg	2.50	0.0000	129.00	No Ice 8.17	5.41	38.80
			0.00			1/2" Ice 8.96	5.86	89.31
			0.00			1" Ice 9.52	6.33	145.95
LNx-6514DS-A1M (Verizon)	C	From Leg	2.50	0.0000	129.00	No Ice 8.17	5.41	38.80

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	Client Verizon	Designed by michael.davenport

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
(Verizon)			0.00		1/2" Ice	8.96	5.86	89.31
			0.00		1" Ice	9.52	6.33	145.95

Tower Pressures - No Ice

$$G_H = 1.100$$

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
L1 150.00-110.00	129.07	1.063	25	62,548	A	0.000	62,548	62,548	100.00	7,524	0.000
					B	0.000	62,548		100.00	0.000	0.000
					C	0.000	62,548		100.00	3,762	0.000
L2 110.00-70.00	89.45	0.957	23	84,306	A	0.000	84,306	84,306	100.00	15,840	0.000
					B	0.000	84,306		100.00	0.000	0.000
					C	0.000	84,306		100.00	7,920	0.000
L3 70.00-31.50	50.64	0.814	19	99,976	A	0.000	99,976	99,976	100.00	15,246	0.000
					B	0.000	99,976		100.00	0.000	0.000
					C	0.000	99,976		100.00	7,623	0.000
L4 31.50-0.00	15.38	0.7	17	94,917	A	0.000	94,917	94,917	100.00	10,494	0.000
					B	0.000	94,917		100.00	0.000	0.000
					C	0.000	94,917		100.00	6,237	0.000

Tower Pressure - With Ice

$$G_H = 1.100$$

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
L1 150.00-110.00	129.07	1.063	6	1.7192	74,009	A	0.000	74,009	74,009	100.00	17,571	0.000
						B	0.000	74,009		100.00	0.000	0.000
						C	0.000	74,009		100.00	10,295	0.000
L2 110.00-70.00	89.45	0.957	6	1.6573	95,355	A	0.000	95,355	95,355	100.00	36,373	0.000
						B	0.000	95,355		100.00	0.000	0.000
						C	0.000	95,355		100.00	21,178	0.000
L3 70.00-31.50	50.64	0.814	5	1.5656	110,610	A	0.000	110,610	110,610	100.00	35,009	0.000
						B	0.000	110,610		100.00	0.000	0.000
						C	0.000	110,610		100.00	20,384	0.000
L4 31.50-0.00	15.38	0.7	4	1.3898	103,137	A	0.000	103,137	103,137	100.00	23,490	0.000
						B	0.000	103,137		100.00	0.000	0.000
						C	0.000	103,137		100.00	16,100	0.000

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Tower Pressure - Service

$$G_H = 1.100$$

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		ft ²	ft ²	ft ²		ft ²	ft ²
L1 150.00-110.00	129.07	1.063	8	62.548	A	0.000	62.548	62.548	100.00	7.524	0.000
					B	0.000	62.548		100.00	0.000	0.000
					C	0.000	62.548		100.00	3.762	0.000
L2 110.00-70.00	89.45	0.957	7	84.306	A	0.000	84.306	84.306	100.00	15.840	0.000
					B	0.000	84.306		100.00	0.000	0.000
					C	0.000	84.306		100.00	7.920	0.000
L3 70.00-31.50	50.64	0.814	6	99.976	A	0.000	99.976	99.976	100.00	15.246	0.000
					B	0.000	99.976		100.00	0.000	0.000
					C	0.000	99.976		100.00	7.623	0.000
L4 31.50-0.00	15.38	0.7	5	94.917	A	0.000	94.917	94.917	100.00	10.494	0.000
					B	0.000	94.917		100.00	0.000	0.000
					C	0.000	94.917		100.00	6.237	0.000

Tower Forces - No 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	
L1 150.00-110.00	928.30	1474.06	A	1	1	25	1	1	62.548	1741.36	43.53	C
			B	1	1		1	1	62.548			
			C	1	1		1	1	62.548			
L2 110.00-70.00	1283.20	2649.40	A	1	1	23	1	1	84.306	2111.13	52.78	C
			B	1	1		1	1	84.306			
			C	1	1		1	1	84.306			
L3 70.00-31.50	1235.08	4251.18	A	1	1	19	1	1	99.976	2118.40	55.02	C
			B	1	1		1	1	99.976			
			C	1	1		1	1	99.976			
L4 31.50-0.00	856.62	5016.04	A	1	1	17	1	1	94.917	1742.08	55.30	C
			B	1	1		1	1	94.917			
			C	1	1		1	1	94.917			
Sum Weight:	4303.20	13390.68							7712.98			

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	
L1 150.00-110.00	928.30	1474.06	A	1	1	25	1	1	62.548	1741.36	43.53	C
			B	1	1		1	1	62.548			
			C	1	1		1	1	62.548			
L2 110.00-70.00	1283.20	2649.40	A	1	1	23	1	1	84.306	2111.13	52.78	C
			B	1	1		1	1	84.306			
			C	1	1		1	1	84.306			

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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	
L3 70.00-31.50	1235.08	4251.18	A	1	1	19	1	1	99.976	2118.40	55.02	C
			B	1	1		1	1	99.976			
			C	1	1		1	1	99.976			
L4 31.50-0.00	856.62	5016.04	A	1	1	17	1	1	94.917	1742.08	55.30	C
			B	1	1		1	1	94.917			
			C	1	1		1	1	94.917			
Sum Weight:	4303.20	13390.68								7712.98		

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	
L1 150.00-110.00	928.30	1474.06	A	1	1	25	1	1	62.548	1741.36	43.53	C
			B	1	1		1	1	62.548			
			C	1	1		1	1	62.548			
L2 110.00-70.00	1283.20	2649.40	A	1	1	23	1	1	84.306	2111.13	52.78	C
			B	1	1		1	1	84.306			
			C	1	1		1	1	84.306			
L3 70.00-31.50	1235.08	4251.18	A	1	1	19	1	1	99.976	2118.40	55.02	C
			B	1	1		1	1	99.976			
			C	1	1		1	1	99.976			
L4 31.50-0.00	856.62	5016.04	A	1	1	17	1	1	94.917	1742.08	55.30	C
			B	1	1		1	1	94.917			
			C	1	1		1	1	94.917			
Sum Weight:	4303.20	13390.68								7712.98		

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	
L1 150.00-110.00	1280.07	3182.88	A	1	1.2	6	1	1	74.009	630.68	15.77	C
			B	1	1.2		1	1	74.009			
			C	1	1.2		1	1	74.009			
L2 110.00-70.00	1987.55	4814.95	A	1	1.2	6	1	1	95.355	730.89	18.27	C
			B	1	1.2		1	1	95.355			
			C	1	1.2		1	1	95.355			
L3 70.00-31.50	1913.01	6641.25	A	1	1.2	5	1	1	110.610	717.40	18.63	C
			B	1	1.2		1	1	110.610			
			C	1	1.2		1	1	110.610			
L4 31.50-0.00	1322.54	7006.88	A	1	1.2	4	1	1	103.137	579.41	18.39	C
			B	1	1.2		1	1	103.137			
			C	1	1.2		1	1	103.137			
Sum Weight:	6503.17	21645.96								2658.38		

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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	
L1 150.00-110.00	1280.07	3182.88	A	1	1.2	6	1	1	74.009	630.68	15.77	C
			B	1	1.2	1	1	74.009				
			C	1	1.2	1	1	74.009				
L2 110.00-70.00	1987.55	4814.95	A	1	1.2	6	1	1	95.355	730.89	18.27	C
			B	1	1.2	1	1	95.355				
			C	1	1.2	1	1	95.355				
L3 70.00-31.50	1913.01	6641.25	A	1	1.2	5	1	1	110.610	717.40	18.63	C
			B	1	1.2	1	1	110.610				
			C	1	1.2	1	1	110.610				
L4 31.50-0.00	1322.54	7006.88	A	1	1.2	4	1	1	103.137	579.41	18.39	C
			B	1	1.2	1	1	103.137				
			C	1	1.2	1	1	103.137				
Sum Weight:	6503.17	21645.96								2658.38		

Tower Forces - With 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	
L1 150.00-110.00	1280.07	3182.88	A	1	1.2	6	1	1	74.009	630.68	15.77	C
			B	1	1.2	1	1	74.009				
			C	1	1.2	1	1	74.009				
L2 110.00-70.00	1987.55	4814.95	A	1	1.2	6	1	1	95.355	730.89	18.27	C
			B	1	1.2	1	1	95.355				
			C	1	1.2	1	1	95.355				
L3 70.00-31.50	1913.01	6641.25	A	1	1.2	5	1	1	110.610	717.40	18.63	C
			B	1	1.2	1	1	110.610				
			C	1	1.2	1	1	110.610				
L4 31.50-0.00	1322.54	7006.88	A	1	1.2	4	1	1	103.137	579.41	18.39	C
			B	1	1.2	1	1	103.137				
			C	1	1.2	1	1	103.137				
Sum Weight:	6503.17	21645.96								2658.38		

Tower Forces - Service - 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	
L1 150.00-110.00	928.30	1474.06	A	1	1	8	1	1	62.548	572.29	14.31	C
			B	1	1	1	1	62.548				

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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	e			psf			ft ²	lb	plf	
L2 110.00-70.00	1283.20	2649.40	C	1	1	7	1	1	62.548	693.81	17.35	C
			A	1	1				84.306			
			B	1	1				84.306			
L3 70.00-31.50	1235.08	4251.18	C	1	1	6	1	1	84.306	696.20	18.08	C
			A	1	1				99.976			
			B	1	1				99.976			
L4 31.50-0.00	856.62	5016.04	C	1	1	5	1	1	99.976	572.53	18.18	C
			A	1	1				94.917			
			B	1	1				94.917			
Sum Weight:	4303.20	13390.68	C	1	1				94.917	2534.84		

Tower Forces - Service - 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	e			psf			ft ²	lb	plf	
L1 150.00-110.00	928.30	1474.06	A	1	1	8	1	1	62.548	572.29	14.31	C
			B	1	1				62.548			
			C	1	1				62.548			
L2 110.00-70.00	1283.20	2649.40	A	1	1	7	1	1	84.306	693.81	17.35	C
			B	1	1				84.306			
			C	1	1				84.306			
L3 70.00-31.50	1235.08	4251.18	A	1	1	6	1	1	99.976	696.20	18.08	C
			B	1	1				99.976			
			C	1	1				99.976			
L4 31.50-0.00	856.62	5016.04	A	1	1	5	1	1	94.917	572.53	18.18	C
			B	1	1				94.917			
			C	1	1				94.917			
Sum Weight:	4303.20	13390.68	C	1	1				94.917	2534.84		

Tower Forces - Service - 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	e			psf			ft ²	lb	plf	
L1 150.00-110.00	928.30	1474.06	A	1	1	8	1	1	62.548	572.29	14.31	C
			B	1	1				62.548			
			C	1	1				62.548			
L2 110.00-70.00	1283.20	2649.40	A	1	1	7	1	1	84.306	693.81	17.35	C
			B	1	1				84.306			
			C	1	1				84.306			
L3 70.00-31.50	1235.08	4251.18	A	1	1	6	1	1	99.976	696.20	18.08	C
			B	1	1				99.976			
			C	1	1				99.976			
L4 31.50-0.00	856.62	5016.04	A	1	1	5	1	1	94.917	572.53	18.18	C
			B	1	1				94.917			
			C	1	1				94.917			

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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
ft	lb	lb	C	1	1		1	1	94,917			
Sum Weight:	4303.20	13390.68								2534.84		

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	13390.68			
Bracing Weight	0.00			
Total Member Self-Weight	13390.68			
Guy Weight	791.86			
Total Weight	25063.84			
Wind 0 deg - No Ice		22.32	-14776.27	3199.78
Wind 30 deg - No Ice		7527.98	-12807.79	1846.87
Wind 60 deg - No Ice		13016.53	-7407.47	-0.91
Wind 90 deg - No Ice		15017.30	-22.32	-1848.44
Wind 120 deg - No Ice		12994.20	7368.80	-3200.69
Wind 150 deg - No Ice		7489.32	12785.47	-3695.31
Wind 180 deg - No Ice		-22.32	14776.27	-3199.78
Wind 210 deg - No Ice		-7527.98	12807.79	-1846.87
Wind 240 deg - No Ice		-13016.53	7407.47	0.91
Wind 270 deg - No Ice		-15017.30	22.32	1848.44
Wind 300 deg - No Ice		-12994.20	-7368.80	3200.69
Wind 330 deg - No Ice		-7489.32	-12785.47	3695.31
Member Ice	8255.28			
Guy Ice	2410.85			
Total Weight Ice	47902.46			
Wind 0 deg - Ice		8.26	-5870.74	2025.48
Wind 30 deg - Ice		2947.29	-5088.34	1157.70
Wind 60 deg - Ice		5096.60	-2942.52	-20.29
Wind 90 deg - Ice		5880.27	-8.26	-1192.84
Wind 120 deg - Ice		5088.34	2928.21	-2045.77
Wind 150 deg - Ice		2932.98	5080.08	-2350.54
Wind 180 deg - Ice		-8.26	5870.74	-2025.48
Wind 210 deg - Ice		-2947.29	5088.34	-1157.70
Wind 240 deg - Ice		-5096.60	2942.52	20.29
Wind 270 deg - Ice		-5880.27	8.26	1192.84
Wind 300 deg - Ice		-5088.34	-2928.21	2045.77
Wind 330 deg - Ice		-2932.98	-5080.08	2350.54
Total Weight	25063.84			
Wind 0 deg - Service		7.34	-4856.15	1051.59
Wind 30 deg - Service		2474.04	-4209.22	606.96
Wind 60 deg - Service		4277.82	-2434.43	-0.30
Wind 90 deg - Service		4935.37	-7.34	-607.48
Wind 120 deg - Service		4270.48	2421.72	-1051.89
Wind 150 deg - Service		2461.33	4201.88	-1214.45
Wind 180 deg - Service		-7.34	4856.15	-1051.59
Wind 210 deg - Service		-2474.04	4209.22	-606.96
Wind 240 deg - Service		-4277.82	2434.43	0.30
Wind 270 deg - Service		-4935.37	7.34	607.48
Wind 300 deg - Service		-4270.48	-2421.72	1051.89
Wind 330 deg - Service		-2461.33	-4201.88	1214.45

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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
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
L1	150 - 110	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	6	-55690.08	-206335.19	-108240.57
			Max. Mx	5	-9106.17	-306346.11	3321.52
			Max. My	2	-9110.47	-7409.03	294502.21
			Max. Vy	5	14064.40	-306346.11	3321.52
			Max. Vx	2	-13690.00	-7409.03	294502.21
			Max. Torque	5			6931.61

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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			
L2	110 - 70	Guy A	Bottom Tension	7	35099.13					
			Top Tension	7	35289.44					
			Top Cable Vert	7	25840.52					
			Top Cable Norm	7	24033.51					
			Top Cable Tan	7	52.37					
			Bot Cable Vert	7	-25393.42					
			Bot Cable Norm	7	24229.17					
			Bot Cable Tan	7	264.31					
			Guy B	Bottom Tension	11	35614.69				
		Top Tension		11	35804.98					
		Top Cable Vert		11	26214.46					
		Top Cable Norm		11	24388.43					
		Top Cable Tan		11	54.12					
		Bot Cable Vert		11	-25767.37					
		Bot Cable Norm		11	24584.10					
		Bot Cable Tan		11	266.06					
		Guy C		Bottom Tension	5	35969.05				
			Top Tension	5	36159.31					
			Top Cable Vert	5	26471.31					
			Top Cable Norm	5	24632.54					
			Top Cable Tan	5	57.62					
			Bot Cable Vert	5	-26024.22					
			Bot Cable Norm	5	24828.20					
			Bot Cable Tan	5	269.56					
			Pole			Max Tension	1	0.00	0.00	0.00
		Max. Compression				6	-59824.01	-88364.06	-46972.27	
		Max. Mx				5	-51090.16	-231015.66	-3509.31	
		Max. My				2	-54946.22	-6218.13	226104.82	
Max. Vy	5	-4866.68				-231015.66	-3509.31			
Max. Vx	8	-5304.69				-5942.84	-202673.92			
Max. Torque	7						5945.68			
L3	70 - 31.5	Pole				Max Tension	1	0.00	0.00	0.00
						Max. Compression	6	-66117.16	-52384.80	-34036.75
						Max. Mx	6	-60648.29	-80830.85	-43342.55
			Max. My	2	-59922.25	-1757.01	87800.11			
			Max. Vy	5	-2526.91	-75827.72	-22302.76			
			Max. Vx	8	-2562.11	-2109.97	-39559.60			
			Max. Torque	7			5938.25			
			L4	31.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
						Max. Compression	6	-73882.72	-112878.11	-76087.95
						Max. Mx	10	-73635.16	125284.05	-75713.32
Max. My	2	-73157.44				6527.03	139077.91			
Max. Vy	11	-3634.44				116954.54	-46245.14			
Max. Vx	2	-3676.90				6527.03	139077.91			
Max. Torque	7						5938.06			

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Mast	Max. Vert	6	73882.72	-3011.83	-1931.01
	Max. H _x	11	69012.69	3634.44	-272.93
	Max. H _z	2	73157.44	111.39	3676.90
	Max. M _x	2	139077.91	111.39	3676.90
	Max. M _z	6	112878.11	-3011.83	-1931.01
	Max. Torsion	7	5937.96	-1842.23	-3121.36

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Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Guy C @ 115 ft Elev 0 ft Azimuth 240 deg	Min. Vert	1	42334.45	89.53	-48.61
	Min. H _x	5	69304.60	-3415.97	-281.04
	Min. H _z	8	57735.77	97.34	-3551.91
	Min. M _x	7	-83545.25	-1842.23	-3121.36
	Min. M _z	10	-125284.05	3228.45	-1927.46
	Min. Torsion	13	-5831.63	1686.83	3215.60
	Max. Vert	10	-195.59	-103.41	59.71
	Max. H _x	10	-195.59	-103.41	59.71
	Max. H _z	3	-25614.42	-21033.93	12445.50
	Min. Vert	5	-26024.22	-21636.63	12180.66
Guy B @ 115 ft Elev 0 ft Azimuth 120 deg	Min. H _x	5	-26024.22	-21636.63	12180.66
	Min. H _z	10	-195.59	-103.41	59.71
	Max. Vert	6	-194.38	102.45	59.16
	Max. H _x	11	-25767.37	21423.49	12061.63
	Max. H _z	13	-25402.43	20859.95	12344.39
Guy A @ 115 ft Elev 0 ft Azimuth 0 deg	Min. Vert	11	-25767.37	21423.49	12061.63
	Min. H _x	6	-194.38	102.45	59.16
	Min. H _z	6	-194.38	102.45	59.16
	Max. Vert	2	-197.52	-0.00	-121.17
	Max. H _x	10	-21608.29	403.41	-20581.48
	Max. H _z	2	-197.52	-0.00	-121.17
	Min. Vert	7	-25393.42	-264.31	-24229.17
Min. H _x	6	-21642.83	-406.01	-20614.51	
Min. H _z	7	-25393.42	-264.31	-24229.17	

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	42334.45	-89.53	48.61	2835.00	5221.69	-11.60
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	73157.44	-111.39	-3676.90	-139077.91	6527.03	4734.90
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	68493.86	1464.51	-3212.85	-117743.07	-11587.83	2387.77
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	58240.60	2812.61	-1664.16	-27716.17	-50236.93	-760.02
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	69304.60	3415.97	281.04	47041.27	-104645.66	-3739.80
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	73882.72	3011.83	1931.01	76087.95	-112878.11	-5574.50
1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy	68828.69	1842.23	3121.36	83545.25	-85338.50	-5937.96
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	57735.77	-97.34	3551.91	72740.54	4951.44	-4834.33
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	68612.28	-2053.27	3120.67	83365.52	97462.09	-2379.54
1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy	73635.16	-3228.45	1927.46	75713.32	125284.05	797.79
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	69012.69	-3634.44	272.93	46245.14	116954.54	3746.33

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Load Combination	Vertical lb	Shear _x lb	Shear _y lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _y lb-ft	Torque lb-ft
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	58026.88	-3027.42	-1676.72	-29050.44	62154.46	5543.86
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	68418.51	-1686.83	-3215.60	-117602.36	24644.81	5831.63
1.2 Dead+1.0 Ice+1.0 Temp+Guy	70838.11	-160.94	93.47	5464.65	9416.65	-37.66
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	72811.14	-162.51	-362.77	-964.44	9613.98	1884.49
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	72424.87	50.91	-295.22	1295.51	9423.38	910.78
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	72103.20	213.06	-122.50	4778.11	8227.13	-373.63
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	72424.87	281.35	104.18	7547.73	5859.13	-1571.55
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	72810.34	233.47	322.98	8859.39	3937.67	-2306.76
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	72386.54	69.82	474.31	7888.29	5797.42	-2431.10
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	72001.51	-158.51	528.07	7134.45	9068.37	-1965.41
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	72240.70	-387.62	472.61	7614.73	12402.59	-982.87
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	72593.69	-552.93	319.77	8363.62	14430.79	305.76
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	72240.85	-602.55	100.19	6980.97	12761.01	1497.16
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	72001.87	-535.98	-125.91	4337.65	10674.86	2223.98
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	72387.21	-375.30	-296.70	1133.44	9695.17	2346.76
Dead+Wind 0 deg - Service+Guy	42458.86	-89.95	-667.67	-8372.61	5225.59	999.94
Dead+Wind 30 deg - Service+Guy	42437.44	255.10	-571.21	-6813.09	263.60	508.49
Dead+Wind 60 deg - Service+Guy	42427.79	507.62	-309.19	-2760.52	-3324.35	-135.80
Dead+Wind 90 deg - Service+Guy	42442.17	600.12	48.74	2798.99	-4620.85	-746.40
Dead+Wind 120 deg - Service+Guy	42464.97	508.13	407.19	8459.77	-3336.13	-1145.97
Dead+Wind 150 deg - Service+Guy	42438.12	255.52	669.21	12580.89	340.19	-1241.87
Dead+Wind 180 deg - Service+Guy	42423.36	-88.73	764.99	14094.75	5222.12	-1023.21
Dead+Wind 210 deg - Service+Guy	42434.39	-433.20	668.75	12593.24	10113.76	-533.75
Dead+Wind 240 deg - Service+Guy	42457.82	-686.25	406.17	8465.83	13800.39	110.92
Dead+Wind 270 deg - Service+Guy	42437.44	-778.75	47.49	2781.72	15084.78	723.36
Dead+Wind 300 deg - Service+Guy	42425.74	-686.97	-310.22	-2788.58	13797.40	1124.13
Dead+Wind 330 deg - Service+Guy	42436.65	-434.91	-571.71	-6836.74	10202.18	1220.07

Solution Summary

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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	-25063.82	0.00	0.13	25063.73	-0.10	0.001%
2	35.72	-29973.24	-24719.69	-35.72	29973.24	24719.66	0.000%
3	12583.12	-29918.22	-21424.91	-12583.10	29918.22	21424.90	0.000%
4	21759.72	-29863.19	-12390.78	-21759.71	29863.19	12390.77	0.000%
5	25104.38	-29918.22	-35.72	-25104.36	29918.22	35.71	0.000%
6	21724.00	-29973.24	12328.92	-21724.00	29973.24	-12328.91	0.000%
7	12521.26	-29918.22	21389.20	-12521.26	29918.22	-21389.19	0.000%
8	-35.72	-29863.19	24719.69	35.72	29863.19	-24719.69	0.000%
9	-12583.12	-29918.21	21424.91	12583.12	29918.22	-21424.89	0.000%
10	-21759.72	-29973.24	12390.78	21759.69	29973.24	-12390.76	0.000%
11	-25104.38	-29918.21	35.72	25104.36	29918.22	-35.73	0.000%
12	-21724.00	-29863.19	-12328.92	21724.00	29863.19	12328.91	0.000%
13	-12521.26	-29918.22	-21389.20	12521.24	29918.22	21389.19	0.000%
14	0.00	-53237.42	0.00	0.30	53237.41	-0.25	0.001%
15	8.26	-53278.17	-6668.90	-8.26	53278.17	6668.80	0.000%
16	3346.02	-53237.42	-5778.95	-3345.81	53237.40	5778.46	0.001%
17	5787.83	-53196.66	-3341.60	-5787.46	53196.66	3341.38	0.001%
18	6677.73	-53237.42	-8.26	-6677.65	53237.42	8.27	0.000%
19	5779.56	-53278.17	3327.29	-5779.48	53278.17	-3327.25	0.000%
20	3331.71	-53237.42	5770.69	-3331.66	53237.42	-5770.64	0.000%
21	-8.26	-53196.66	6668.90	8.31	53196.66	-6668.58	0.001%
22	-3346.02	-53237.42	5778.95	3345.77	53237.41	-5778.64	0.001%
23	-5787.83	-53278.17	3341.60	5787.38	53278.15	-3341.36	0.001%
24	-6677.73	-53237.42	8.26	6677.32	53237.41	-8.22	0.001%
25	-5779.56	-53196.66	-3327.29	5779.30	53196.66	3327.08	0.001%
26	-3331.71	-53237.42	-5770.69	3331.69	53237.41	5770.62	0.000%
27	7.34	-25075.12	-5077.51	-7.34	25075.12	5077.50	0.000%
28	2584.61	-25063.82	-4400.75	-2584.61	25063.82	4400.75	0.000%
29	4469.52	-25052.52	-2545.11	-4469.52	25052.52	2545.11	0.000%
30	5156.52	-25063.82	-7.34	-5156.52	25063.82	7.34	0.000%
31	4462.18	-25075.12	2532.40	-4462.18	25075.12	-2532.40	0.000%
32	2571.91	-25063.82	4393.41	-2571.91	25063.82	-4393.41	0.000%
33	-7.34	-25052.52	5077.51	7.34	25052.52	-5077.51	0.000%
34	-2584.61	-25063.82	4400.75	2584.60	25063.82	-4400.73	0.000%
35	-4469.52	-25075.12	2545.11	4469.49	25075.12	-2545.09	0.000%
36	-5156.52	-25063.82	7.34	5156.52	25063.82	-7.34	0.000%
37	-4462.18	-25052.52	-2532.40	4462.18	25052.52	2532.40	0.000%
38	-2571.91	-25063.82	-4393.41	2571.91	25063.82	4393.41	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00018025
2	Yes	6	0.00000001	0.00094125
3	Yes	6	0.00000001	0.00050303
4	Yes	6	0.00000001	0.00023319
5	Yes	6	0.00000001	0.00042347
6	Yes	7	0.00000001	0.00014024
7	Yes	7	0.00000001	0.00011431
8	Yes	6	0.00000001	0.00017592
9	Yes	6	0.00000001	0.00046511
10	Yes	6	0.00000001	0.00073611
11	Yes	6	0.00000001	0.00042427
12	Yes	6	0.00000001	0.00036515
13	Yes	6	0.00000001	0.00068275

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14	Yes	4	0.00000001	0.00042042
15	Yes	6	0.00000001	0.00018226
16	Yes	5	0.00000001	0.00079358
17	Yes	5	0.00000001	0.00067484
18	Yes	6	0.00000001	0.00015584
19	Yes	6	0.00000001	0.00021728
20	Yes	6	0.00000001	0.00017427
21	Yes	5	0.00000001	0.00064537
22	Yes	5	0.00000001	0.00054046
23	Yes	5	0.00042975	0.00068684
24	Yes	5	0.00000001	0.00082720
25	Yes	5	0.00000001	0.00087369
26	Yes	6	0.00000001	0.00016324
27	Yes	5	0.00000001	0.00007758
28	Yes	5	0.00000001	0.00004434
29	Yes	5	0.00000001	0.00003949
30	Yes	5	0.00000001	0.00008298
31	Yes	5	0.00000001	0.00009599
32	Yes	5	0.00000001	0.00009227
33	Yes	5	0.00000001	0.00005974
34	Yes	4	0.00000001	0.00082574
35	Yes	4	0.00000001	0.00091792
36	Yes	5	0.00000001	0.00006263
37	Yes	5	0.00000001	0.00008581
38	Yes	5	0.00000001	0.00008559

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110	6.716	29	1.1812	0.0573
L2	110 - 70	0.615	35	0.2224	0.0193
L3	73.5 - 31.5	0.114	34	0.0117	0.0075
L4	35.667 - 0	0.047	34	0.0088	0.0024

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	7770.00	29	6.716	1.1812	0.0579	16298
129.00	Flat Platform w/ Handrails	29	2.853	0.6055	0.0343	3880
122.00	Guy	29	1.802	0.4434	0.0275	2910

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 110	42.522	6	5.8387	0.2803

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L2	110 - 70	9.044	10	1.6598	0.0955
L3	73.5 - 31.5	2.610	10	0.3820	0.0357
L4	35.667 - 0	0.615	10	0.1491	0.0115

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	7770.00	6	42.522	5.8387	0.2807	3690
129.00	Flat Platform w/ Handrails	6	22.250	3.3666	0.1661	876
122.00	Guy	6	16.544	2.6588	0.1367	656

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.
L1	122.00 (A) (7)	7/8 EHS	7970.00	79699.84	35289.40	47820.00	1.000	1.355 ✓
	122.00 (B) (6)	7/8 EHS	7970.00	79699.84	35805.00	47820.00	1.000	1.336 ✓
	122.00 (C) (5)	7/8 EHS	7970.00	79699.84	36159.30	47820.00	1.000	1.322 ✓

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	150 - 110 (1)	TP21.25x15x0.1875	40.00	28.00	48.9	11.5845	-50377.80	615724.00	0.082
L2	110 - 70 (2)	TP27.61x21.25x0.25	40.00	122.00	194.7	16.9050	-55779.60	100711.00	0.554
L3	70 - 31.5 (3)	TP33.1x26.5535x0.313	42.00	122.00	152.7	26.9966	-60790.20	261667.00	0.232
L4	31.5 - 0 (4)	TP37.38x31.8245x0.375	35.67	122.00	127.4	38.7590	-67238.30	539470.00	0.125

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{rx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	M_{uy} lb-ft	ϕM_{ry} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
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	Client Verizon	Designed by michael.davenport

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 $\frac{M_{uy}}{\phi M_{uy}}$
L1	150 - 110 (1)	TP21.25x15x0.1875	287554.17	315006.67	0.913	0.00	315006.67	0.000
L2	110 - 70 (2)	TP27.61x21.25x0.25	233001.67	531001.67	0.439	0.00	531001.67	0.000
L3	70 - 31.5 (3)	TP33.1x26.5535x0.313	91718.33	1081866.67	0.085	0.00	1081866.67	0.000
L4	31.5 - 0 (4)	TP37.38x31.8245x0.375	70043.67	1861291.67	0.038	0.00	1861291.67	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	150 - 110 (1)	TP21.25x15x0.1875	4657.12	403664.00	0.012	3755.25	638735.00	0.006
L2	110 - 70 (2)	TP27.61x21.25x0.25	4434.46	623034.00	0.007	5582.57	1076708.33	0.005
L3	70 - 31.5 (3)	TP33.1x26.5535x0.313	2249.38	994959.00	0.002	5574.72	2193683.33	0.003
L4	31.5 - 0 (4)	TP37.38x31.8245x0.375	1271.71	1439950.00	0.001	797.79	3774125.00	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u	Ratio M_{ux}	Ratio M_{uy}	Ratio V_u	Ratio T_u	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 110 (1)	ϕP_n 0.082	ϕM_{ux} 0.913	ϕM_{uy} 0.000	ϕV_n 0.012	ϕT_n 0.006	0.995	1.000	4.8.2 ✓
L2	110 - 70 (2)	0.554	0.439	0.000	0.007	0.005	0.993	1.000	4.8.2 ✓
L3	70 - 31.5 (3)	0.232	0.085	0.000	0.002	0.003	0.317	1.000	4.8.2 ✓
L4	31.5 - 0 (4)	0.125	0.038	0.000	0.001	0.000	0.162	1.000	4.8.2 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail	
L1	150 - 110	Pole	TP21.25x15x0.1875	1	-50377.80	615724.00	99.5	Pass	
		Guy A@122	7/8	7	35289.40	47820.00	73.8	Pass	
		Guy B@122	7/8	6	35805.00	47820.00	74.9	Pass	
		Guy C@122	7/8	5	36159.30	47820.00	75.6	Pass	
L2	110 - 70	Pole	TP27.61x21.25x0.25	2	-55779.60	100711.00	99.3	Pass	
L3	70 - 31.5	Pole	TP33.1x26.5535x0.313	3	-60790.20	261667.00	31.7	Pass	
L4	31.5 - 0	Pole	TP37.38x31.8245x0.375	4	-67238.30	539470.00	16.2	Pass	
							Summary		
							Pole (L1)	99.5	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
						Guy A (L1)	73.8	Pass
						Guy B (L1)	74.9	Pass
						Guy C (L1)	75.6	Pass
						RATING =	99.5	Pass

Base/Flange Plate	Plate Type	Baseplate
	Pole Diameter	37.38 in
	Pole Thickness	0.375 in
	Plate Length	44 in
	Plate Thickness	2.5 in
	Plate Fy	60 ksi
	Weld Length	0.3125 in
	ϕ_s Resistance	1382.37 k-in
	Applied	94.09 k-in
	#	0
Stiffeners		

Code Rev. **G**

Date **1/30/2015**
 Engineer **BD**
 Site # **302476**
 Carrier **Verizon**

Moment **146.4 k-ft**
 Axial **73.9 k**

Bolts	#	8
	Bolt Circle	44 in
	(R)adial / (S)quare	S
	Bolt Gap	6 in
	Diameter	2.25 in
	Hole Diameter	2.75 in
	Type	A615-75
	Fy	75 ksi
	Fu	100 ksi
	ϕ_s Resistance	259.82 k
Applied	28.99 k	
#	0	
Reinforcement		
#	0	
Extra Bolts		

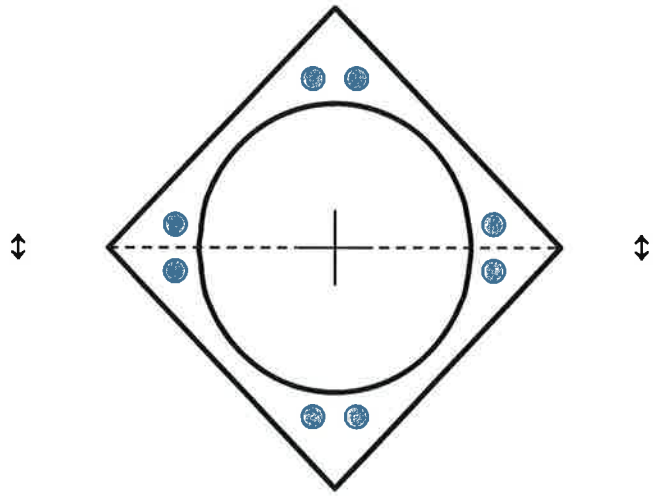


Plate Stress Ratio:
0.07 (Pass)

Bolt Stress Ratio:
0.11 (Pass)

Base/Flange Plate	Plate Type	Flange @ 110.0 ft
	Pole Diameter	21.267 in
	Pole Thickness	0.1875 in
	Plate Diameter	28.5 in
	Plate Thickness	1 in
	Plate Fy	60 ksi
	Weld Length	0.3125 in
	Allowable	75.16 k-in
	Applied	55.27 k-in
	Stiffeners	#

Code Rev. **G**

Date **1/30/2015**
 Engineer **BD**
 Site # **302476**
 Carrier **Verizon**

Moment **287.6 k-ft**
 Axial **50.4 k**

Required Flange Thickness:
0.86 in OK

Bolts	#	12
	Bolt Circle	25.75 in
	(R)adial / (S)quare	R
	Diameter	1 in
	Hole Diameter	1.125 in
	Type	A325
	Fy	92 ksi
	Fu	120 ksi
	Allowable	54.52 k
	Applied	40.45 k
Reinforcement	#	0
Extra Bolts	#	0

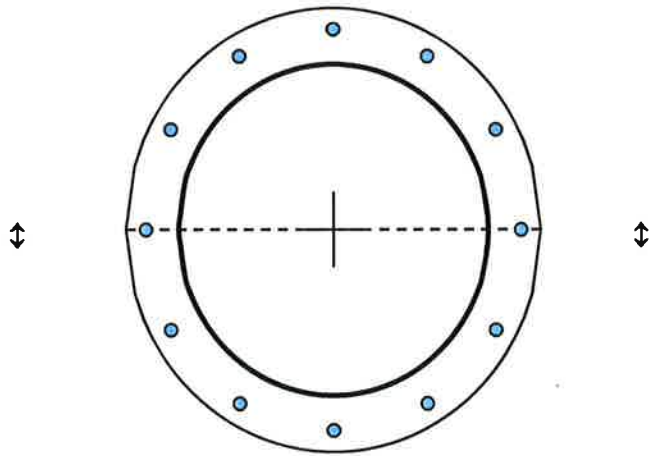


Plate Stress Ratio:
0.74 (Pass)

Bolt Stress Ratio:
0.74 (Pass)

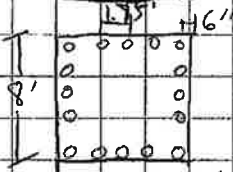


AMERICAN TOWER CORPORATION

302476

Water - Waterbury, CT

Fdn. Check



Capacity both $\approx 60K$

$$\phi OTM_{cap} = 60K (5)(7) (0.9) = 1890 K\text{-ft.}$$

$$usage = \frac{144 K\text{-ft}}{1890 K\text{-ft}} = 0.08, OK$$

Anchor Rods

$$T_{applied} = 25.8 K$$

$$V = 24.6 K$$

$$\left(\frac{V_{ub}}{\phi R_{nv}}\right)^2 + \left(\frac{T_{ub}}{\phi R_{nt}}\right)^2 = \left(\frac{24.6}{35.6}\right)^2 + \left(\frac{25.8}{25.2}\right)^2$$

$$0.51 + 0.16 = 0.67, OK$$