ROBINSON & COLE LLP

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

August 28, 2013

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

Re: **EM-VER-083-130627 – 1969 Saybrook Road, Middletown, Connecticut**
EM-VER-115-130524 – 54 Waterbury Road, Prospect, Connecticut
EM-VER-119-130618 – 2 West Street, Rocky Hill, Connecticut
EM-VER-049-130726 – 37 Bacon Road, Enfield, Connecticut
EM-VER-129-130425 – 400 Main Street, Somers, Connecticut
EM-VER-134-130604 – Brendan Street, Stafford, Connecticut
EM-VER-139-130618 – 44 Fyler Place, Suffield, Connecticut

Completion of Construction Activity

Dear Ms. Bachman:

The purpose of this letter is to notify the Siting Council that construction activity associated with the above-referenced Cellco Partnership d/b/a Verizon Wireless telecommunications facilities has been completed.

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

EM-VER-115-130524
54 Waterbury Road, Prospect

July 29, 2014

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

Re: **Completion of Construction Activity**

Dear Ms. Bachman:

The purpose of this letter is to notify the Siting Council that construction activity associated with the Cellco Partnership d/b/a Verizon Wireless telecommunications facility modifications listed below has been completed.

EM-VER-083-130308 – 213 Court Street, Middletown, Connecticut
EM-VER-089-130308 – 200 Stanley Street, New Britain, Connecticut
EM-VER-137-130314 – 7 Broadway Avenue Ext., Stonington, Connecticut
EM-VER-148-130312 – 20 Alexander Drive, Wallingford, Connecticut
EM-VER-089-130322 – Lester Street, New Britain, Connecticut
EM-VER-110-130325 – 21-35 East Main Street (a/k/a 1 Central Square), Plainville, Connecticut
EM-VER-155-130322 – 1358 New Britain Avenue, West Hartford, Connecticut
EM-VER-084-130411 – 26185 Research Drive, Milford, Connecticut
EM-VER-104-130401 – 2 Hinkley Hill Road, Norwich, Connecticut
EM-VER-148-130408 – 90 North Plains Industrial Road, Wallingford, Connecticut
EM-VER-159-130411 – 250 Silas Deane Highway, Wethersfield, Connecticut
EM-VER-146-130416 – 197 South Street, Vernon, Connecticut
EM-VER-076-130425 – 252 Ridge Road, Madison, Connecticut
EM-VER-077-130425 – 53 Slater Street, Manchester, Connecticut
EM-VER-129-130425 – 400 Main Street, Somers, Connecticut
EM-VER-052-130430 – Town Farm Road, Farmington, Connecticut
EM-VER-080-130430 – 38 Elm Street, Meriden, Connecticut

EM-VER-014-130509 – 850 West Main Street, Branford, Connecticut
EM-VER-025-130506 – 705 West Johnson Avenue, Cheshire, Connecticut
EM-VER-041-130524 – 135 Henry Hill Road, East Haddam, Connecticut
EM-VER-115-130524 – 54 Waterbury Road, Prospect, Connecticut
EM-VER-156-130524 – 668 Jones Hill Road, West Haven, Connecticut
EM-VER-027-130603 – 48 Cow Hill Road, Clinton, Connecticut
EM-VER-148-130603 – 945 East Center Street, Wallingford, Connecticut

If you have any questions or need any additional information regarding this facility please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Copy to:
Sandy M. Carter

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

June 18, 2013

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

RE: **EM-VER-115-130524** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 54 Waterbury Road, Prospect, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated May 23, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/CDM/jb

c: The Honorable Robert J. Chatfield, Mayor, Town of Prospect
William J. Donovan, Zoning Enforcement Officer, Town of Prospect
Charles Bradshaw

ROBINSON & COL

EM-VER-115-130524

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

May 23, 2013

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

Re: **Notice of Exempt Modification – Antenna Swap**
54 Waterbury Road, Prospect, Connecticut

Dear Ms. Bachman:

On May 1, 2013, the Connecticut Siting Council (the "Council") acknowledged receipt of Cellco Partnership d/b/a Verizon Wireless ("Cellco") notice of exempt modification (EM-VER-115-130401). In that filing, Cellco proposed to replace several of its antennas on the existing telecommunications tower at 54 Waterbury Road in Prospect, Connecticut.

Cellco has now decided to modify this facility further and install a different model LTE antennas. Cellco intends to replace its three (3) previously approved LTE antennas with three (3) model BXA-70063-6CF LTE antennas at the 135-foot level. Attached behind Tab 1 are the specifications for the new LTE 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 Robert Chatfield, Mayor for the Town of Prospect. A copy of this letter is being sent to Charles E. and Averyll B. Bradshaw, the owners of the property on which the facility is located.

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 located at the 135-foot level on the 160-foot tower.

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 modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Tab 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 attached behind Tab 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:
Robert Chatfield, Prospect Mayor
Charles E. and Averyll B. Bradshaw
Sandy M. Carter

Amphenol ANTENNA SOLUTIONS

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

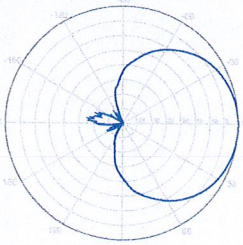
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m² Side: 0.24 m²	Front: 5.5 ft² Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

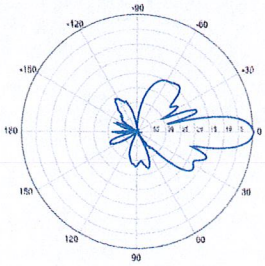
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



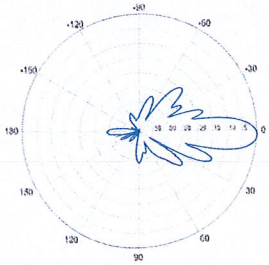
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

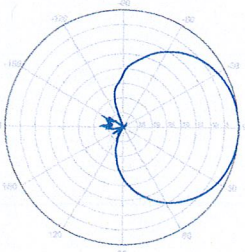


0° | Vertical | 750 MHz

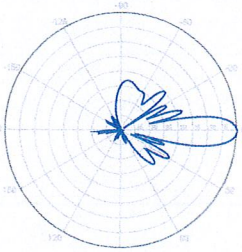
BXA-70063-6CF-EDIN-2



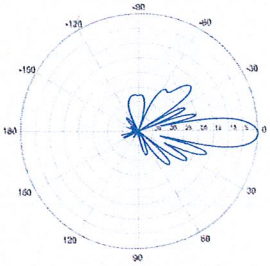
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz

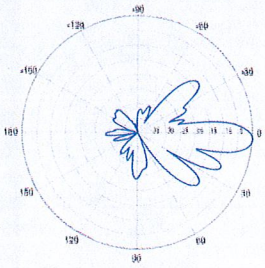


2° | Vertical | 850 MHz

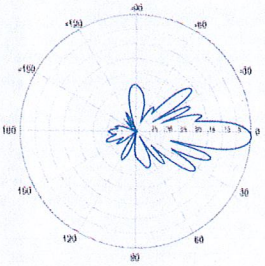
BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3

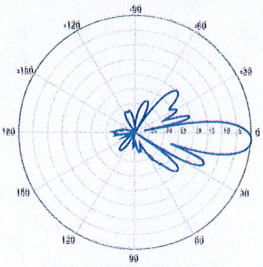


3° | Vertical | 750 MHz

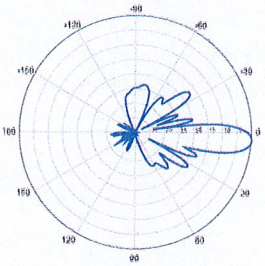


3° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-4

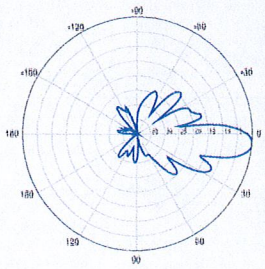


4° | Vertical | 750 MHz

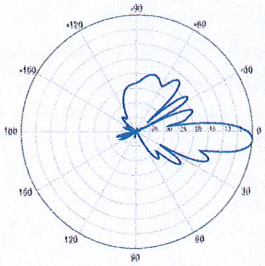


4° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-5

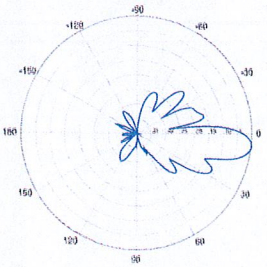


5° | Vertical | 750 MHz

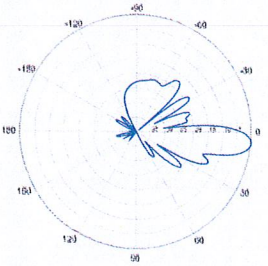


5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6

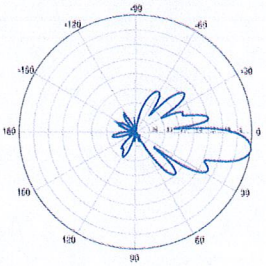


6° | Vertical | 750 MHz

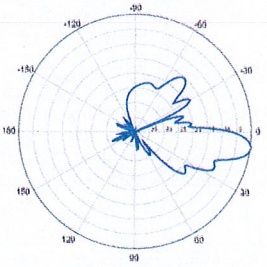


6° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-8

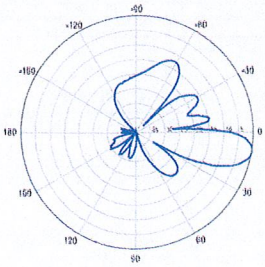


8° | Vertical | 750 MHz

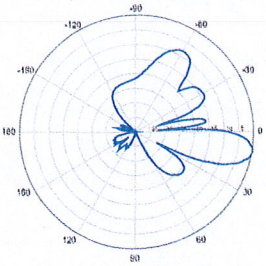


8° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-10



10° | Vertical | 750 MHz



10° | Vertical | 850 MHz

	General	Power	Density					
Site Name: Prospect N								
Tower Height: Verizon @ 135ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*F&S Oil				0.0031	451	0.3007	1.03%	
*New Haven Transit				0.0031	451	0.3007	1.03%	
*US Post Office				0.0031	415	0.2767	1.12%	
*Central Comm.				0.0031	452	0.3013	1.03%	
*CT Motor Club				0.0381	150.92	0.2000	19.05%	
*Sprint-Nextel iDEN	9	100	146	0.0152	851	0.5673	2.68%	
*Sprint-Nextel CDMA	11	421	146	0.0781	1962.5	1.0000	7.81%	
*Clearwire	2	153	146	0.0052	2496	1.0000	0.52%	
*Clearwire	1	211	151	0.0033	23 GHz	1.0000	0.33%	
*AT&T UMTS	2	1077	126	0.0488	880	0.5867	8.32%	
*AT&T UMTS	2	1556	126	0.0705	1900	1.0000	7.05%	
*AT&T GSM	1	538	126	0.0122	880	0.5867	2.08%	
*AT&T GSM	4	934	126	0.0846	1900	1.0000	8.46%	
*AT&T LTE	1	1375	126	0.0311	734	0.4893	6.36%	
Verizon PCS	**14**	**238**	**135**	**0.0657**	**1970**	**1.0000**	**6.57%**	
Verizon Cellular	**9**	**249**	**135**	**0.0442**	**869**	**0.5793**	**7.63%**	
Verizon AWS	**1**	**1750**	**135**	**0.0345**	**2145**	**1.0000**	**3.45%**	
Verizon 700	**1**	**819**	**135**	**0.0162**	**698**	**0.4653**	**3.47%**	
								88.00%
* Source: Siting Council								

ARMOR TOWER ENGINEERING

Structural Analysis of 160 ft Guyed Tower

Site Name: Prospect North
County: New Haven
Location: Prospect, CT

Checked By:

Patrick Botimer
Structural Engineer

STATE OF CONNECTICUT
DMITRIY V. ALBUL
No. 26725
LICENSED PROFESSIONAL ENGINEER

5/19/2013

McPhee Electric Ltd.

505 Main Street

Farmington, CT 06032

March 2013

9 North Main Street, 2nd Floor, Cortland, NY 13045
(607)591-5381 Fax: (866)870-0840 www.ArmorTower.com

May 16, 2013

Douglas Barker
McPhee Electric Ltd.
505 Main Street
Farmington, CT 06032

ARMOR TOWER ENGINEERING

RE: Verizon Wireless – Prospect North
54 Waterbury Road, Prospect, CT 06712

Douglas:

We have completed the structural analysis of the subject tower and **have found it to be adequate within the scope of this analysis to support the proposed antenna loading**. The tower was analyzed according to the requirements of TIA/EIA 222-F standard for New Haven County for 85 mph (fastest mile) wind speed with no ice and 74 mph wind with ½" ice.

The tower we analyzed is a 160' guyed tower consisting of welded sections with pipe legs and pipe bracing. Tower face dimension is 30" the full height above an 80" tapered base. The tower mast is laterally supported by three levels of guying attached to one set of three guy anchors. Foundation details have not been provided for our review and are therefore considered unknown.

The loading used in the analysis consisted of the existing antennas/lines as well as the following:

- Remove (3) existing APX75-866514T0 Verizon antennas.
- Add (3) BXA-70063-6CF-2 (1 per sector) @ 135' for Verizon Wireless on existing antenna frames.

Feed lines were assumed to be located as shown on drawing E-7.

The results of the analysis showed all other tower elements were loaded within allowable limits. For a detailed listing of the tower's performance, please see page 20 of 21 of the calculations.

We appreciate the opportunity to provide our services to McPhee Electric Ltd. and Verizon Wireless and if you have any questions concerning this analysis, please contact us.

Sincerely,

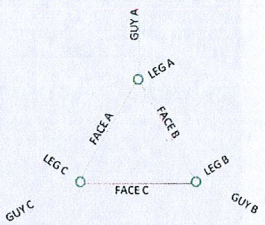
Alexander Smirnov
ARMOR TOWER, INC.

STATE OF CONNECTICUT
DMITRIY V. ALBUL
No. 28725
LICENSED PROFESSIONAL ENGINEER

5/19/2013

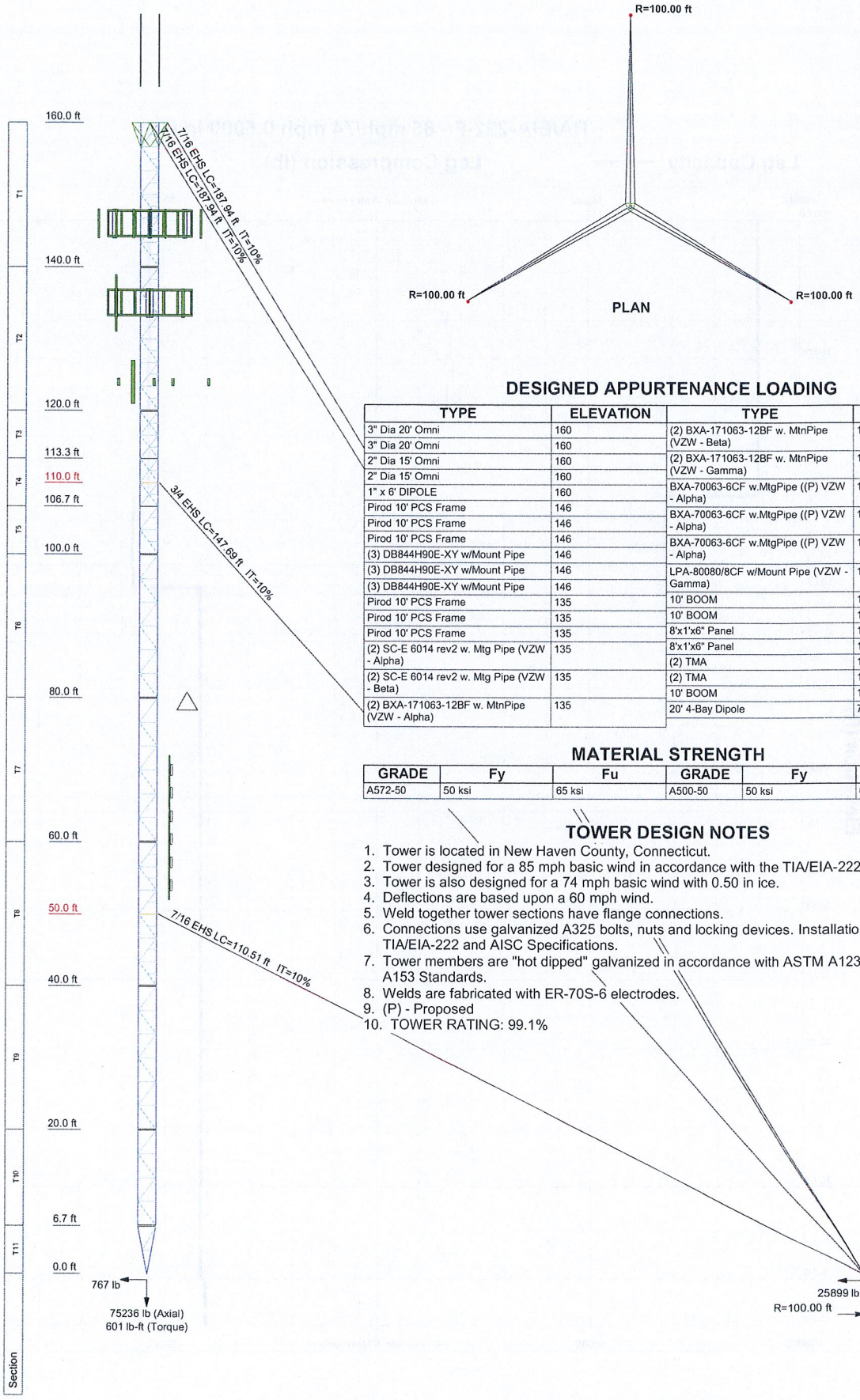
9 North Main Street, 2nd Floor, Cortland, NY 13045
(607)591-5381 Fax: (866)870-0840 www.ArmorTower.com

PRIMARY ASSUMPTIONS USED IN THE ANALYSIS



1. Leg A is assumed to be oriented North.
2. Allowable steel stresses are defined by AISC-ASD 9th Edition and all welds conform to AWS D1-1 specifications.
3. Armor Tower has been commissioned to analyze the tower according to the requirements of TIA/EIA 222-F for New Haven County, CT. Per this code, a basic wind speed of 85 mph (fastest mile) without ice and 74 mph with ½" ice is recommended. This site is not within a special wind region. It is the client's responsibility to check with local authorities or the tower owner if a greater wind or ice loading is required to be considered in the analysis. Note that Section 3108.4 of the International Building Code states that "Towers shall be designed to resist wind loads according to TIA/EIA-222".
4. The acceptability of the analyzed antenna loading is the responsibility of Verizon Wireless and its affiliates to confirm with the respective carriers or the tower owner.
5. Any deviation from the analyzed antenna loading will require a re-analysis of the tower for verification of structural integrity. Proposed feed lines were assumed to be located as shown on drawing E-7.
6. This analysis assumes all tower members are galvanized adequately to prevent corrosion of the steel and that all tower members are in "like new" condition with no physical deterioration. This analysis also assumes the tower has been maintained properly per TIA/EIA 222-F Annex E recommended inspection and maintenance procedures for tower owners and is in a plumb condition. Armor Tower has not completed a condition assessment of the tower.
7. No accounting for residual stresses due to incorrect tower erection can be made. This analysis assumes all bolts are appropriately tightened providing necessary connection continuity and that the installation of the tower was performed by a qualified tower erector.
8. This certification does not include foundations. Geotechnical or foundation information was not provided to Armor Tower to complete a foundation review. Armor Tower therefore does not accept responsibility for foundation adequacy.
9. No conclusions, expressed or implied, shall indicate that Armor Tower has made an evaluation of the original design, materials, fabrication, or potential erection deficiencies. Any information contrary to that assumed for the purpose of preparing this analysis could alter the findings and conclusions stated.
10. Tower member sizes and geometry are based on a tower structural analysis completed by Bay State Design in 11/05/11. Note that this is not a condition assessment of the tower. Existing and proposed antenna loading is based on customer-supplied data.
11. The investigation of the load carrying capacities of the antenna supporting frames/mounts is outside the scope of this analysis. Antenna mount certification can be completed under separate contract.

9 North Main Street, 2nd Floor, Cortland, NY 13045
(607)591-5381 Fax: (866)870-0840 www.ArmorTower.com



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
3" Dia 20' Omni	160	(2) BXA-171063-12BF w. MtnPipe (VZW - Beta)	135
3" Dia 20' Omni	160	(2) BXA-171063-12BF w. MtnPipe (VZW - Gamma)	135
2" Dia 15' Omni	160	BXA-70063-6CF w.MtgPipe ((P) VZW - Alpha)	135
2" Dia 15' Omni	160	BXA-70063-6CF w.MtgPipe ((P) VZW - Alpha)	135
1" x 6' DIPOLE	160	BXA-70063-6CF w.MtgPipe ((P) VZW - Alpha)	135
Pirod 10' PCS Frame	146	LPA-80080/8CF w/Mount Pipe (VZW - Gamma)	135
Pirod 10' PCS Frame	146	10' BOOM	124
Pirod 10' PCS Frame	146	10' BOOM	124
(3) DB844H90E-XY w/Mount Pipe	146	8'x1'x6" Panel	124
(3) DB844H90E-XY w/Mount Pipe	146	8'x1'x6" Panel	124
(3) DB844H90E-XY w/Mount Pipe	146	(2) TMA	124
Pirod 10' PCS Frame	135	(2) TMA	124
Pirod 10' PCS Frame	135	10' BOOM	124
Pirod 10' PCS Frame	135	20' 4-Bay Dipole	72 - 52
(2) SC-E 6014 rev2 w. Mtg Pipe (VZW - Alpha)	135		
(2) SC-E 6014 rev2 w. Mtg Pipe (VZW - Beta)	135		
(2) BXA-171063-12BF w. MtnPipe (VZW - Alpha)	135		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A500-50	50 ksi	62 ksi

TOWER DESIGN NOTES

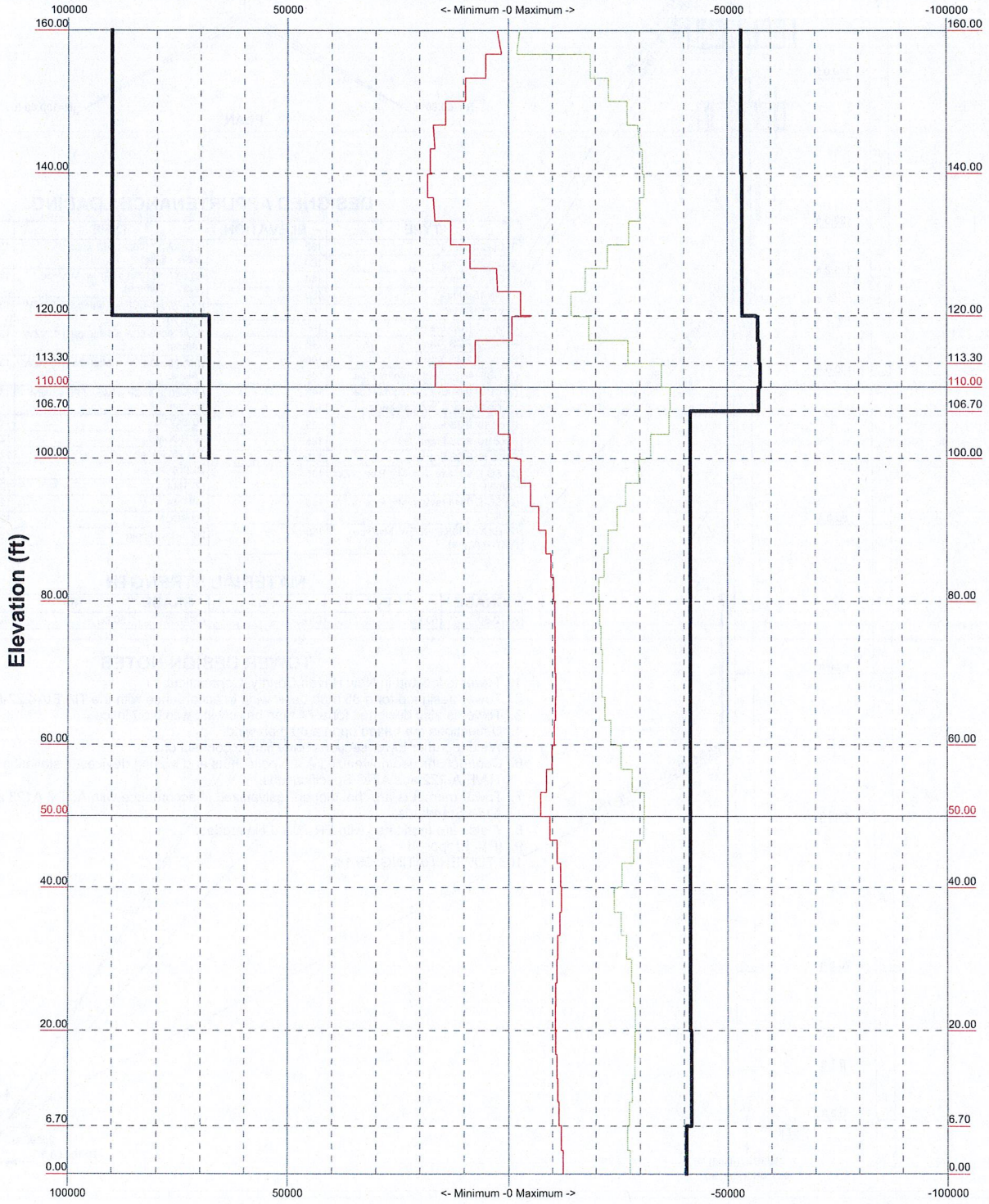
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 60 mph wind.
5. Weld together tower sections have flange connections.
6. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
7. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. Welds are fabricated with ER-70S-6 electrodes.
9. (P) - Proposed
10. TOWER RATING: 99.1%

ARMOR TOWER
Armor Tower, Inc.
Armor Tower
9 N.Main St.
Cortland, NY
Phone: (607) 591-5381
FAX: (866) 870-0840

Job: ***STRUCTURAL ANALYSIS OF 160' GUYED TOWE***		
Project: ***Prospect North, CT***		
Client: Verizon Wireless	Drawn by: AAS	App'd:
Code: TIA/EIA-222-F	Date: 05/16/13	Scale: NTS
Path: Z:\McPhee Electric\ProspectCT\ReAnalysis May 2013\RISA\CT81XC010.er		Dwg No. E-1

TIA/EIA-222-F - 85 mph/74 mph 0.5000 in Ice

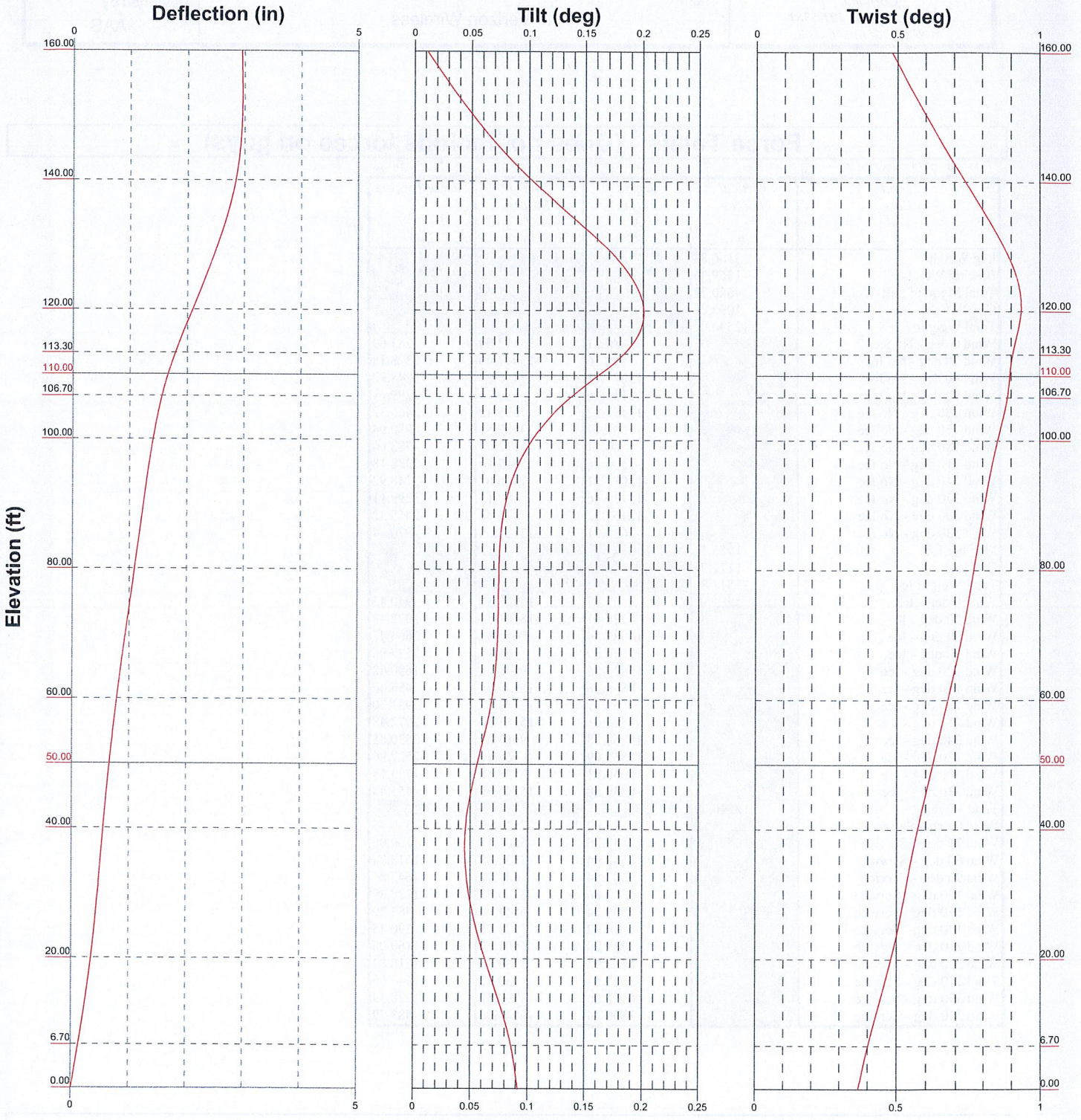
Leg Capacity ——— **Leg Compression (lb)**



ARMOR TOWER Armor Tower, Inc.	*Armor Tower* 9 N.Main St. Cortland, NY Phone: (607) 591-5381 FAX: (866) 870-0840	Job: ***STRUCTURAL ANALYSIS OF 160' GUYED TOWE***	
		Project: ***Prospect North, CT***	
		Client: Verizon Wireless	Drawn by: AAS / App'd:
		Code: TIA/EIA-222-F	Date: 05/16/13 / Scale: NTS
		Path: Z:\McPhee Electric\ProspectCT\ReAnalysis May 2013\RISA\CT81XC010.en	Dwg No. E-3

TIA/EIA-222-F - Service - 60 mph

Maximum Values



ARMOR TOWER Armor Tower, Inc.	*Armor Tower* 9 N.Main St. Cortland, NY Phone: (607) 591-5381 FAX: (866) 870-0840	Job: ***STRUCTURAL ANALYSIS OF 160' GUYED TOWE***	
		Project: ***Prospect North, CT***	
		Client: Verizon Wireless	Drawn by: AAS / App'd:
		Code: TIA/EIA-222-F	Date: 05/16/13 / Scale: NTS
		Path: Z:\McPhee Electric\ProspectCT\ReAnalysis May 2013\RISA\CT81XC010.er	Dwg No. E-5

ARMOR TOWER
Armor Tower
9 N.Main St.
Cortland, NY
Phone: (607) 591-5381
FAX: (866) 870-0840

Job	Page
STRUCTURAL ANALYSIS OF 160' GUYED TOWER	1 of 21
Project	**Date**
Prospect North, CT	13:25:43 05/16/13
Client	**Designed by**
Verizon Wireless	AAS

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	3160.86			
Bracing Weight	1459.36			
Total Member Self-Weight	4620.22			
Guy Weight	1093.00			
Total Weight	12540.09			
Wind 0 deg - No Ice		-80.11	-15112.09	783.60
Wind 30 deg - No Ice		7500.36	-13047.40	2328.18
Wind 60 deg - No Ice		13071.11	-7486.67	3248.92
Wind 90 deg - No Ice		15139.46	80.11	3299.11
Wind 120 deg - No Ice		13151.22	7625.42	2465.32
Wind 150 deg - No Ice		7639.11	13127.51	970.94
Wind 180 deg - No Ice		80.11	15112.09	-783.60
Wind 210 deg - No Ice		-7500.36	13047.40	-2328.18
Wind 240 deg - No Ice		-13071.11	7486.67	-3248.92
Wind 270 deg - No Ice		-15139.46	-80.11	-3299.11
Wind 300 deg - No Ice		-13151.22	-7625.42	-2465.32
Wind 330 deg - No Ice		-7639.11	-13127.51	-970.94
Member Ice	1956.12			
Guy Ice	1172.95			
Total Weight Ice	25511.86			
Wind 0 deg - Ice		-65.17	-18240.50	940.43
Wind 30 deg - Ice		8726.41	-15181.52	2072.48
Wind 60 deg - Ice		14985.54	-8615.31	2664.47
Wind 90 deg - Ice		17565.69	65.17	2527.96
Wind 120 deg - Ice		15827.55	9176.68	1690.42
Wind 150 deg - Ice		8839.28	15246.69	455.48
Wind 180 deg - Ice		65.17	17343.48	-931.30
Wind 210 deg - Ice		-8726.41	15181.52	-2072.48
Wind 240 deg - Ice		-15762.38	9063.81	-2630.85
Wind 270 deg - Ice		-17565.69	-65.17	-2527.96
Wind 300 deg - Ice		-15050.71	-8728.18	-1733.18
Wind 330 deg - Ice		-8839.28	-15246.69	-455.48
Total Weight	12540.09			
Wind 0 deg - Service		-39.92	-7529.90	390.45
Wind 30 deg - Service		3737.20	-6501.13	1160.06
Wind 60 deg - Service		6512.94	-3730.38	1618.84
Wind 90 deg - Service		7543.54	39.92	1643.85
Wind 120 deg - Service		6552.86	3799.52	1228.39
Wind 150 deg - Service		3806.34	6541.04	483.79
Wind 180 deg - Service		39.92	7529.90	-390.45
Wind 210 deg - Service		-3737.20	6501.13	-1160.06
Wind 240 deg - Service		-6512.94	3730.38	-1618.84
Wind 270 deg - Service		-7543.54	-39.92	-1643.85
Wind 300 deg - Service		-6552.86	-3799.52	-1228.39
Wind 330 deg - Service		-3806.34	-6541.04	-483.79

Load Combinations

Comb. No.	*Description*

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 60 deg - No Ice+Guy
5	Dead+Wind 90 deg - No Ice+Guy
6	Dead+Wind 120 deg - No Ice+Guy
7	Dead+Wind 150 deg - No Ice+Guy
8	Dead+Wind 180 deg - No Ice+Guy
9	Dead+Wind 210 deg - No Ice+Guy
10	Dead+Wind 240 deg - No Ice+Guy
11	Dead+Wind 270 deg - No Ice+Guy
12	Dead+Wind 300 deg - No Ice+Guy
13	Dead+Wind 330 deg - No Ice+Guy
14	Dead+Ice+Temp+Guy
15	Dead+Wind 0 deg+Ice+Temp+Guy
16	Dead+Wind 30 deg+Ice+Temp+Guy
17	Dead+Wind 60 deg+Ice+Temp+Guy
18	Dead+Wind 90 deg+Ice+Temp+Guy
19	Dead+Wind 120 deg+Ice+Temp+Guy
20	Dead+Wind 150 deg+Ice+Temp+Guy
21	Dead+Wind 180 deg+Ice+Temp+Guy
22	Dead+Wind 210 deg+Ice+Temp+Guy
23	Dead+Wind 240 deg+Ice+Temp+Guy
24	Dead+Wind 270 deg+Ice+Temp+Guy
25	Dead+Wind 300 deg+Ice+Temp+Guy
26	Dead+Wind 330 deg+Ice+Temp+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.*	*Force lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*
T1	160 - 140	Leg	Max Tension	10	17572.41	-19.52	101.49
			Max. Compression	17	-30592.93	260.82	93.25
			Max. Mx	5	-5957.28	738.34	-596.15
			Max. My	2	-16736.42	117.41	-893.36
			Max. Vy	11	987.09	14.04	-204.58
			Max. Vx	10	-795.20	20.37	429.11
		Diagonal	Max Tension	11	4532.56	0.00	0.00
			Max. Compression	5	-4771.25	0.00	0.00
			Max. Mx	20	80.57	2.80	0.00
			Max. My	17	590.99	0.00	-0.06
			Max. Vy	20	-2.70	0.00	0.00
			Max. Vx	17	-0.06	0.00	0.00
		Horizontal	Max Tension	10	1200.95	0.00	0.00
			Max. Compression	3	-1076.41	0.00	0.00
			Max. Mx	14	92.29	1.67	0.00

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Force lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*
			Max. My	18	493.86	0.00	0.00
			Max. Vy	14	-2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	0.01	-0.49	-0.00
			Max. Compression	24	-0.01	-0.47	-0.00
			Max. Mx	20	0.01	-0.58	0.00
			Max. My	15	0.00	-0.26	0.01
			Max. Vy	20	1.93	-0.58	0.00
			Max. Vx	15	-0.00	0.00	0.00
		Bottom Girt	Max Tension	12	237.22	0.00	0.00
			Max. Compression	6	-280.19	0.00	0.00
			Max. Mx	14	18.16	1.67	0.00
			Max. My	18	3.64	0.00	0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Guy A	Bottom Tension	21	7651.77		
			Top Tension	21	7805.21		
			Top Cable Vert	21	6756.16		
			Top Cable Norm	21	3908.40		
			Top Cable Tan	21	5.72		
			Bot Cable Vert	21	-6366.81		
			Bot Cable Norm	21	4244.21		
			Bot Cable Tan	21	6.04		
		Guy B	Bottom Tension	25	7763.73		
			Top Tension	25	7917.13		
			Top Cable Vert	25	6850.95		
			Top Cable Norm	25	3968.04		
			Top Cable Tan	25	5.59		
			Bot Cable Vert	25	-6461.60		
			Bot Cable Norm	25	4303.85		
			Bot Cable Tan	25	6.16		
		Guy C	Bottom Tension	17	7777.50		
			Top Tension	17	7930.90		
			Top Cable Vert	17	6862.60		
			Top Cable Norm	17	3975.41		
			Top Cable Tan	17	6.11		
			Bot Cable Vert	17	-6473.25		
			Bot Cable Norm	17	4311.22		
			Bot Cable Tan	17	5.64		
		Top Guy Pull-Off	Max Tension	7	2293.56	0.00	0.00
			Max. Compression	13	-2316.35	0.00	0.00
			Max. Mx	14	7.27	4.26	0.00
			Max. My	18	1246.53	0.00	0.00
			Max. Vy	14	6.82	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Torque Arm Top	Max Tension	19	5956.06	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	19	3873.89	-8.01	0.00
			Max. My	24	3359.92	0.00	0.00
			Max. Vy	19	12.82	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Torque Arm Bottom	Max Tension	10	502.73	0.00	0.00
			Max. Compression	21	-9414.06	0.00	0.00
			Max. Mx	20	-5177.06	-13.40	0.00
			Max. My	23	-406.48	0.00	-0.20
			Max. Vy	20	12.90	0.00	0.00
			Max. Vx	23	0.19	0.00	0.00
T2	140 - 120	Leg	Max Tension	6	18227.66	223.47	174.45
			Max. Compression	12	-30998.90	10.64	309.32
			Max. Mx	5	-8872.29	855.99	555.75
			Max. My	2	-18843.30	-93.07	-1108.61

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Force lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*
			Max. Vy	24	-3354.33	153.24	-103.10
			Max. Vx	15	-2641.36	230.95	403.80
		Diagonal	Max Tension	24	6718.08	0.00	0.00
			Max. Compression	18	-7026.72	0.00	0.00
			Max. Mx	20	4967.38	2.81	0.00
			Max. My	23	893.88	0.00	0.09
			Max. Vy	20	-2.71	0.00	0.00
			Max. Vx	23	-0.08	0.00	0.00
		Horizontal	Max Tension	4	1382.92	0.00	0.00
			Max. Compression	10	-1203.08	0.00	0.00
			Max. Mx	14	130.90	1.67	0.00
			Max. My	18	1181.88	0.00	0.00
			Max. Vy	14	-2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	0.02	-0.49	-0.01
			Max. Compression	24	-0.02	-0.48	-0.01
			Max. Mx	20	0.01	-0.64	0.00
			Max. My	24	-0.02	-0.48	-0.01
			Max. Vy	20	1.98	-0.64	0.00
			Max. Vx	24	0.01	0.00	0.00
		Top Girt	Max Tension	7	588.54	0.00	0.00
			Max. Compression	2	-553.54	0.00	0.00
			Max. Mx	14	23.50	1.67	0.00
			Max. My	18	115.40	0.00	0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Bottom Girt	Max Tension	18	1316.41	0.00	0.00
			Max. Compression	8	-1309.94	0.00	0.00
			Max. Mx	14	7.32	1.67	0.00
			Max. My	18	1316.36	0.00	0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
T3	120 - 113.3	Leg	Max Tension	21	7570.64	59.60	-27.28
			Max. Compression	15	-27321.06	-3.68	191.15
			Max. Mx	24	-7733.09	432.58	-78.10
			Max. My	15	-14010.82	272.70	623.79
			Max. Vy	24	-3354.27	432.58	-78.10
			Max. Vx	15	-2640.65	272.70	623.79
		Diagonal	Max Tension	20	3008.71	0.00	0.00
			Max. Compression	24	-4854.58	-0.16	31.12
			Max. Mx	19	2251.76	-11.90	0.45
			Max. My	17	-3858.64	-1.41	45.51
			Max. Vy	19	7.09	-11.90	0.45
			Max. Vx	17	-21.98	-1.41	45.51
		Horizontal	Max Tension	21	1834.25	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	811.15	1.67	0.00
			Max. My	18	1081.17	0.00	0.00
			Max. Vy	14	-2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	17	0.73	0.00	0.00
			Max. Compression	5	-0.01	0.00	0.00
			Max. Mx	21	0.06	1.04	0.00
			Max. My	5	-0.01	0.00	0.00
			Max. Vy	18	45.24	0.00	0.00
			Max. Vx	17	-69.32	0.00	0.00
		Top Girt	Max Tension	18	1130.59	0.00	0.00
			Max. Compression	3	-590.08	0.00	0.00
			Max. Mx	14	94.96	1.67	0.00
			Max. My	18	1130.53	0.00	0.00
			Max. Vy	14	2.67	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	18	-0.00	0.00	0.00
T4	113.3 - 106.7	Leg	Max Tension	21	16463.28	-4.09	-32.84
			Max. Compression	19	-36877.52	-250.11	-39.19
			Max. Mx	18	1217.26	-283.68	32.65
			Max. My	20	-33415.59	113.33	-306.30
			Max. Vy	18	-99.10	-283.68	32.65
			Max. Vx	17	133.30	-13.28	-178.98
		Diagonal	Max Tension	17	3159.56	0.00	0.00
			Max. Compression	23	-4720.89	0.97	38.37
			Max. Mx	23	1805.12	-9.45	-40.57
			Max. My	23	-3397.73	-8.99	-46.74
			Max. Vy	23	5.91	-9.45	-40.57
			Max. Vx	23	22.60	-8.99	-46.74
		Secondary Horizontal	Max Tension	17	0.68	0.00	0.00
			Max. Compression	5	-0.01	0.00	0.00
			Max. Mx	21	0.04	1.18	0.00
			Max. My	5	-0.01	0.00	0.00
			Max. Vy	18	38.74	0.00	0.00
			Max. Vx	17	-69.46	0.00	0.00
		Top Girt	Max Tension	21	2193.17	0.00	0.00
			Max. Compression	10	-393.26	0.00	0.00
			Max. Mx	14	420.19	1.67	0.00
			Max. My	18	931.33	0.00	0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Guy A	Bottom Tension	21	17677.43		
			Top Tension	21	17887.23		
			Top Cable Vert	21	13444.38		
			Top Cable Norm	21	11798.37		
			Top Cable Tan	21	1.55		
			Bot Cable Vert	21	-12988.13		
			Bot Cable Norm	21	11991.66		
			Bot Cable Tan	21	1.55		
		Guy B	Bottom Tension	25	17781.42		
			Top Tension	25	17991.21		
			Top Cable Vert	25	13521.46		
			Top Cable Norm	25	11868.19		
			Top Cable Tan	25	1.88		
			Bot Cable Vert	25	-13065.21		
			Bot Cable Norm	25	12061.48		
			Bot Cable Tan	25	1.88		
		Guy C	Bottom Tension	17	17664.66		
			Top Tension	17	17874.47		
			Top Cable Vert	17	13434.91		
			Top Cable Norm	17	11789.82		
			Top Cable Tan	17	3.87		
			Bot Cable Vert	17	-12978.66		
			Bot Cable Norm	17	11983.11		
			Bot Cable Tan	17	3.87		
		Top Guy Pull-Off	Max Tension	15	6026.02	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	3499.83	4.26	0.00
			Max. My	5	4145.33	0.00	0.00
			Max. Vy	14	6.82	0.00	0.00
			Max. Vx	5	-0.00	0.00	0.00
T5	106.7 - 100	Leg	Max Tension	12	2442.25	97.38	-20.33
			Max. Compression	19	-36568.04	64.41	-301.08
			Max. Mx	23	-12444.58	359.53	-262.53
			Max. My	26	-30904.11	6.13	383.85
			Max. Vy	18	-1115.48	35.38	-348.45
			Max. Vx	26	1216.75	6.17	383.81

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Force lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*
		Diagonal	Max Tension	16	2630.88	0.00	0.00
			Max. Compression	26	-3136.45	0.00	0.00
			Max. Mx	26	-3129.43	2.79	0.00
			Max. My	23	94.47	0.00	0.06
			Max. Vy	26	-2.69	0.00	0.00
			Max. Vx	23	-0.06	0.00	0.00
		Horizontal	Max Tension	19	633.38	0.00	0.00
			Max. Compression	19	-633.38	0.00	0.00
			Max. Mx	14	246.91	1.67	0.00
			Max. My	23	616.50	0.00	0.00
			Max. Vy	14	-2.67	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	18	0.01	-0.47	-0.00
			Max. Compression	24	-0.01	-0.48	-0.00
			Max. Mx	20	0.01	-0.55	0.00
			Max. My	2	0.00	-0.18	0.00
			Max. Vy	20	1.91	-0.55	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Top Girt	Max Tension	15	2157.93	0.00	0.00
			Max. Compression	4	-220.06	0.00	0.00
			Max. Mx	14	789.06	1.67	0.00
			Max. My	18	1545.02	0.00	0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Bottom Girt	Max Tension	19	429.02	0.00	0.00
			Max. Compression	23	-125.74	0.00	0.00
			Max. Mx	14	155.35	1.67	0.00
			Max. My	18	4.79	0.00	0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
T6	100 - 80	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-31332.08	182.72	-360.10
			Max. Mx	19	-26501.85	-295.31	102.29
			Max. My	19	-31332.08	182.72	-360.10
			Max. Vy	18	-1113.85	128.23	-341.48
			Max. Vx	26	1218.41	-52.75	282.36
		Diagonal	Max Tension	17	2183.70	0.00	0.00
			Max. Compression	26	-2605.26	0.00	0.00
			Max. Mx	26	-2598.23	2.79	0.00
			Max. My	23	365.52	0.00	0.06
			Max. Vy	26	-2.69	0.00	0.00
			Max. Vx	23	-0.06	0.00	0.00
		Horizontal	Max Tension	19	542.69	0.00	0.00
			Max. Compression	19	-542.69	0.00	0.00
			Max. Mx	15	359.45	1.67	0.00
			Max. My	23	531.67	0.00	0.00
			Max. Vy	15	-2.67	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Top Girt	Max Tension	23	244.70	0.00	0.00
			Max. Compression	4	-82.86	0.00	0.00
			Max. Mx	14	70.80	1.67	0.00
			Max. My	18	129.55	0.00	0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
		Bottom Girt	Max Tension	20	190.19	0.00	0.00
			Max. Compression	11	-36.85	0.00	0.00
			Max. Mx	14	50.26	1.67	0.00
			Max. My	16	134.75	0.00	-0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Compression	19	-24676.37	219.28	-282.25
			Max. Mx	19	-23060.06	292.52	-278.03
			Max. My	15	-20309.74	202.15	-295.83
			Max. Vy	18	945.59	201.77	-282.97
			Max. Vx	15	-723.87	-44.63	200.98
		Diagonal	Max Tension	24	1041.23	0.00	0.00
			Max. Compression	18	-2090.00	0.00	0.00
			Max. Mx	15	739.06	2.79	0.00
			Max. My	23	352.62	0.00	0.05
			Max. Vy	15	2.69	0.00	0.00
			Max. Vx	23	0.05	0.00	0.00
		Horizontal	Max Tension	17	471.62	0.00	0.00
			Max. Compression	19	-427.41	0.00	0.00
			Max. Mx	14	258.08	1.67	0.00
			Max. My	23	418.19	0.00	0.00
			Max. Vy	14	-2.67	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Top Girt	Max Tension	24	173.49	0.00	0.00
			Max. Compression	4	-4.92	0.00	0.00
			Max. Mx	14	52.90	1.67	0.00
			Max. My	16	46.12	0.00	-0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Bottom Girt	Max Tension	18	158.30	0.00	0.00
			Max. Compression	26	-39.03	0.00	0.00
			Max. Mx	23	64.38	1.67	0.00
			Max. My	16	-12.17	0.00	-0.00
			Max. Vy	23	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
T8	60 - 40	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-30968.63	-435.00	-184.90
			Max. Mx	19	-17460.42	-440.45	-348.68
			Max. My	22	-28418.48	-168.91	-446.38
			Max. Vy	18	947.64	122.76	-283.07
			Max. Vx	22	-903.77	298.13	-184.18
		Diagonal	Max Tension	16	2110.89	0.00	0.00
			Max. Compression	23	-2735.06	0.00	0.00
			Max. Mx	15	1313.58	2.79	0.00
			Max. My	23	524.37	0.00	0.05
			Max. Vy	15	-2.69	0.00	0.00
			Max. Vx	23	0.05	0.00	0.00
		Horizontal	Max Tension	19	536.51	0.00	0.00
			Max. Compression	19	-536.51	0.00	0.00
			Max. Mx	21	415.63	1.67	0.00
			Max. My	23	535.54	0.00	0.00
			Max. Vy	21	-2.67	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	19	0.01	-0.51	-0.01
			Max. Compression	23	-0.01	-0.48	-0.00
			Max. Mx	20	0.01	-0.58	0.00
			Max. My	15	0.00	-0.05	0.01
			Max. Vy	20	1.80	-0.58	0.00
			Max. Vx	15	-0.01	0.00	0.00
		Top Girt	Max Tension	22	245.11	0.00	0.00
			Max. Compression	19	-10.58	0.00	0.00
			Max. Mx	23	224.64	1.67	0.00
			Max. My	16	177.37	0.00	-0.00
			Max. Vy	23	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Bottom Girt	Max Tension	20	265.40	0.00	0.00
			Max. Compression	10	-24.15	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Mx	25	37.83	1.67	0.00
			Max. My	16	254.93	0.00	-0.00
			Max. Vy	25	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Guy A	Bottom Tension	21	6013.10		
			Top Tension	21	6061.50		
			Top Cable Vert	21	2802.37		
			Top Cable Norm	21	5374.80		
			Top Cable Tan	21	0.67		
			Bot Cable Vert	21	-2649.71		
			Bot Cable Norm	21	5397.82		
			Bot Cable Tan	21	0.67		
		Guy B	Bottom Tension	25	6025.01		
			Top Tension	25	6073.40		
			Top Cable Vert	25	2807.74		
			Top Cable Norm	25	5385.42		
			Top Cable Tan	25	0.61		
			Bot Cable Vert	25	-2655.08		
			Bot Cable Norm	25	5408.44		
			Bot Cable Tan	25	0.61		
		Guy C	Bottom Tension	17	6024.22		
			Top Tension	17	6072.62		
			Top Cable Vert	17	2807.39		
			Top Cable Norm	17	5384.72		
			Top Cable Tan	17	0.98		
			Bot Cable Vert	17	-2654.73		
			Bot Cable Norm	17	5407.74		
			Bot Cable Tan	17	0.98		
		Top Guy Pull-Off	Max Tension	25	3260.61	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	17	942.82	4.26	0.00
			Max. My	23	2644.87	0.00	0.00
			Max. Vy	17	6.82	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
T9	40 - 20	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	25	-28971.65	215.31	-332.90
			Max. Mx	19	-24984.41	305.82	-296.54
			Max. My	15	-27388.95	281.09	-355.05
			Max. Vy	19	-701.23	247.40	-303.64
			Max. Vx	22	-904.01	254.98	-108.84
		Diagonal	Max Tension	16	1578.01	0.00	0.00
			Max. Compression	22	-1782.35	0.00	0.00
			Max. Mx	23	-403.60	2.78	0.00
			Max. My	23	354.37	0.00	0.04
			Max. Vy	23	-2.69	0.00	0.00
			Max. Vx	23	0.04	0.00	0.00
		Horizontal	Max Tension	25	501.80	0.00	0.00
			Max. Compression	25	-501.80	0.00	0.00
			Max. Mx	14	307.78	1.67	0.00
			Max. My	23	473.52	0.00	0.00
			Max. Vy	14	-2.67	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Top Girt	Max Tension	26	179.12	0.00	0.00
			Max. Compression	16	-69.68	0.00	0.00
			Max. Mx	25	33.13	1.67	0.00
			Max. My	16	-69.67	0.00	-0.00
			Max. Vy	25	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Bottom Girt	Max Tension	15	219.67	0.00	0.00
			Max. Compression	11	-47.03	0.00	0.00
			Max. Mx	14	61.29	1.67	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	16	154.64	0.00	-0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
T10	20 - 6.7	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	25	-28971.30	225.68	-333.04
			Max. Mx	15	-26576.37	512.97	-247.26
			Max. My	4	-14169.00	311.59	-430.91
			Max. Vy	24	-2745.80	396.06	-59.62
			Max. Vx	20	2991.37	-164.82	-118.02
		Diagonal	Max Tension	21	900.63	0.00	0.00
			Max. Compression	17	-1856.37	0.00	0.00
			Max. Mx	23	675.37	2.77	0.00
			Max. My	23	384.12	0.00	0.04
			Max. Vy	23	-2.69	0.00	0.00
			Max. Vx	23	-0.04	0.00	0.00
		Horizontal	Max Tension	16	524.68	0.00	0.00
			Max. Compression	25	-501.80	0.00	0.00
			Max. Mx	14	316.20	1.67	0.00
			Max. My	23	475.21	0.00	0.00
			Max. Vy	14	-2.67	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Top Girt	Max Tension	26	210.01	0.00	0.00
			Max. Compression	4	-35.87	0.00	0.00
			Max. Mx	14	58.15	1.67	0.00
			Max. My	16	48.90	0.00	-0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Bottom Girt	Max Tension	16	1852.07	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	1140.17	1.67	0.00
			Max. My	16	1602.54	0.00	-0.00
			Max. Vy	14	2.67	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
T11	6.7 - 0	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	16	-27596.93	-86.59	302.91
			Max. Mx	22	-27321.15	-485.35	-570.99
			Max. My	10	-18204.41	-129.44	-908.78
			Max. Vy	23	2914.35	58.00	61.06
			Max. Vx	22	404.08	-166.59	-803.64
		Diagonal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	23	-1188.28	0.00	0.00
			Max. Mx	15	-540.30	1.94	0.00
			Max. My	16	-643.83	0.00	-0.03
			Max. Vy	15	2.04	0.00	0.00
			Max. Vx	16	0.03	0.00	0.00
		Horizontal	Max Tension	23	520.77	0.00	0.00
			Max. Compression	16	-486.15	0.00	0.00
			Max. Mx	14	333.29	0.41	0.00
			Max. My	23	520.77	0.00	0.00
			Max. Vy	14	1.32	0.00	0.00
			Max. Vx	23	0.00	0.00	0.00
		Top Girt	Max Tension	23	2075.61	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	1377.13	1.63	0.00
			Max. My	16	1497.49	0.00	-0.00
			Max. Vy	14	-2.64	0.00	0.00
			Max. Vx	16	0.00	0.00	0.00

Maximum Reactions

Location	*Condition*	*Gov. Load Comb.*	*Vertical lb*	*Horizontal, X lb*	*Horizontal, Z lb*
Mast	Max. Vert	19	75236.24	-538.32	-320.84
	Max. H_x	25	69349.90	633.81	358.50
	Max. H_z	15	75175.42	-18.41	597.27
	Max. M_x	1	0.00	-2.51	-2.69
	Max. M_z	1	0.00	-2.51	-2.69
	Max. Torsion	10	543.25	370.75	-219.60
	Min. Vert	1	38772.68	-2.51	-2.69
	Min. H_x	17	69269.51	-665.84	360.25
	Min. H_z	21	69288.64	-10.90	-766.48
	Min. M_x	1	0.00	-2.51	-2.69
	Min. M_z	1	0.00	-2.51	-2.69
	Min. Torsion	4	-600.84	-507.31	289.38
Guy C @ 100 ft Elev 0 ft Azimuth 240 deg	Max. Vert	10	-1216.36	-659.86	381.88
	Max. H_x	10	-1216.36	-659.86	381.88
	Max. H_z	16	-27463.83	-21463.62	12916.10
	Min. Vert	17	-28218.82	-22335.57	12880.88
	Min. H_x	17	-28218.82	-22335.57	12880.88
	Min. H_z	10	-1216.36	-659.86	381.88
Guy B @ 100 ft Elev 0 ft Azimuth 120 deg	Max. Vert	6	-1198.88	649.69	375.77
	Max. H_x	25	-28362.83	22432.83	12942.40
	Max. H_z	26	-27640.26	21582.94	12993.09
	Min. Vert	25	-28362.83	22432.83	12942.40
	Min. H_x	6	-1198.88	649.69	375.77
	Min. H_z	6	-1198.88	649.69	375.77
Guy A @ 100 ft Elev 0 ft Azimuth 0 deg	Max. Vert	2	-1206.87	0.18	-755.96
	Max. H_x	24	-15545.78	971.08	-13789.14
	Max. H_z	2	-1206.87	0.18	-755.96
	Min. Vert	21	-28279.55	-4.95	-25817.61
	Min. H_x	18	-15693.76	-972.12	-13894.40
	Min. H_z	21	-28279.55	-4.95	-25817.61

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	38772.68	2.51	2.69	0.00	0.00	1.59
Dead+Wind 0 deg - No Ice+Guy	51526.58	5.38	-428.15	0.00	0.00	181.02
Dead+Wind 30 deg - No Ice+Guy	49184.84	302.99	-394.57	0.00	0.00	445.17
Dead+Wind 60 deg - No Ice+Guy	45798.53	507.31	-289.38	0.00	0.00	600.84
Dead+Wind 90 deg - No Ice+Guy	49404.97	488.20	-59.03	0.00	0.00	534.06
Dead+Wind 120 deg - No Ice+Guy	51738.51	366.83	215.52	0.00	0.00	369.01
Dead+Wind 150 deg - No Ice+Guy	49445.29	187.75	455.80	0.00	0.00	126.51
Dead+Wind 180 deg - No Ice+Guy	45765.04	-1.12	585.69	0.00	0.00	-190.29
Dead+Wind 210 deg - No Ice+Guy	49123.29	-192.56	460.06	0.00	0.00	-440.81
Dead+Wind 240 deg - No Ice+Guy	51405.63	-370.75	219.60	0.00	0.00	-543.25
Dead+Wind 270 deg - No Ice+Guy	49237.53	-487.03	-56.89	0.00	0.00	-527.70
Dead+Wind 300 deg - No Ice+Guy	45853.26	-500.16	-286.76	0.00	0.00	-402.86

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 330 deg - No Ice+Guy	49346.62	-292.96	-390.21	0.00	0.00	-122.98
Dead+Ice+Temp+Guy	55005.59	14.58	15.58	0.00	0.00	2.43
Dead+Wind 0 deg+Ice+Temp+Guy	75175.42	18.41	-597.27	0.00	0.00	211.85
Dead+Wind 30 deg+Ice+Temp+Guy	72347.50	418.83	-497.52	0.00	0.00	374.96
Dead+Wind 60 deg+Ice+Temp+Guy	69269.51	665.84	-360.25	0.00	0.00	391.52
Dead+Wind 90 deg+Ice+Temp+Guy	72415.02	655.20	-76.43	0.00	0.00	271.44
Dead+Wind 120 deg+Ice+Temp+Guy	75236.24	538.32	320.84	0.00	0.00	142.58
Dead+Wind 150 deg+Ice+Temp+Guy	72477.21	250.72	617.55	0.00	0.00	5.43
Dead+Wind 180 deg+Ice+Temp+Guy	69288.64	10.90	766.48	0.00	0.00	-217.42
Dead+Wind 210 deg+Ice+Temp+Guy	72271.57	-230.21	619.62	0.00	0.00	-372.32
Dead+Wind 240 deg+Ice+Temp+Guy	75023.24	-517.07	321.70	0.00	0.00	-344.77
Dead+Wind 270 deg+Ice+Temp+Guy	72326.98	-628.75	-76.69	0.00	0.00	-262.00
Dead+Wind 300 deg+Ice+Temp+Guy	69349.90	-633.81	-358.50	0.00	0.00	-164.29
Dead+Wind 330 deg+Ice+Temp+Guy	72476.03	-383.40	-494.46	0.00	0.00	0.60
Dead+Wind 0 deg - Service+Guy	39692.76	3.85	-303.58	0.00	0.00	95.35
Dead+Wind 30 deg - Service+Guy	39915.82	155.72	-260.24	0.00	0.00	230.96
Dead+Wind 60 deg - Service+Guy	40083.24	265.19	-149.02	0.00	0.00	285.33
Dead+Wind 90 deg - Service+Guy	39934.81	305.12	2.32	0.00	0.00	264.15
Dead+Wind 120 deg - Service+Guy	39713.34	265.77	156.03	0.00	0.00	191.61
Dead+Wind 150 deg - Service+Guy	39918.99	152.05	266.31	0.00	0.00	68.78
Dead+Wind 180 deg - Service+Guy	40065.31	1.30	306.40	0.00	0.00	-91.98
Dead+Wind 210 deg - Service+Guy	39910.75	-149.16	266.39	0.00	0.00	-227.27
Dead+Wind 240 deg - Service+Guy	39706.52	-262.01	156.06	0.00	0.00	-280.70
Dead+Wind 270 deg - Service+Guy	39928.07	-300.16	2.34	0.00	0.00	-259.57
Dead+Wind 300 deg - Service+Guy	40083.39	-258.90	-149.00	0.00	0.00	-187.66
Dead+Wind 330 deg - Service+Guy	39916.80	-148.40	-260.24	0.00	0.00	-65.10

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
T1	160 - 140	2.949	33	0.0090	0.4815
T2	140 - 120	2.844	37	0.1023	0.7388
T3	120 - 113.3	2.088	37	0.2033	0.9366
T4	113.3 - 106.7	1.790	37	0.1841	0.9080
T5	106.7 - 100	1.562	37	0.1382	0.8862
T6	100 - 80	1.411	37	0.1058	0.8563
T7	80 - 60	1.088	37	0.0734	0.7659
T8	60 - 40	0.778	37	0.0710	0.6747
T9	40 - 20	0.543	37	0.0452	0.5745
T10	20 - 6.7	0.339	33	0.0652	0.4811
T11	6.7 - 0	0.125	33	0.0831	0.4038

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
160.00	Guy	33	2.949	0.0090	0.4815	19383
146.00	Pirod 10' PCS Frame	37	2.932	0.0685	0.6602	6922
135.00	Pirod 10' PCS Frame	37	2.709	0.1357	0.8039	6384
124.00	10' BOOM	37	2.272	0.1966	0.9268	21214
110.00	Guy	37	1.665	0.1618	0.8962	6129

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
72.00	20' 4-Bay Dipole	37	0.962	0.0738	0.7307	528001
67.00	20' 4-Bay Dipole	37	0.883	0.0741	0.7080	92302
62.00	20' 4-Bay Dipole	37	0.807	0.0725	0.6844	51626
57.00	20' 4-Bay Dipole	37	0.737	0.0675	0.6598	45742
52.00	20' 4-Bay Dipole	37	0.673	0.0599	0.6343	50438
50.00	Guy	37	0.650	0.0566	0.6241	52701

Maximum Tower Deflections - Design Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	160 - 140	12.474	19	0.3013	1.1692
T2	140 - 120	11.053	19	0.4856	1.6189
T3	120 - 113.3	8.380	19	0.6566	1.9880
T4	113.3 - 106.7	7.439	19	0.5910	1.9224
T5	106.7 - 100	6.694	19	0.4769	1.8750
T6	100 - 80	6.146	15	0.4002	1.8064
T7	80 - 60	4.812	15	0.3200	1.6064
T8	60 - 40	3.431	15	0.3187	1.4042
T9	40 - 20	2.327	23	0.2249	1.1826
T10	20 - 6.7	1.361	23	0.2784	0.9857
T11	6.7 - 0	0.489	23	0.3316	0.8293

Critical Deflections and Radius of Curvature - Design Wind

Elevation	*Appurtenance*	*Gov. Load Comb.*	*Deflection*	*Tilt*	*Twist*	*Radius of Curvature*
ft			*in*	°	°	*ft*
160.00	Guy	19	12.474	0.3013	1.1692	9754
146.00	Pirod 10' PCS Frame	19	11.594	0.4196	1.4696	3484
135.00	Pirod 10' PCS Frame	19	10.483	0.5499	1.7546	3263
124.00	10' BOOM	19	8.968	0.6552	1.9761	12254
110.00	Guy	19	7.039	0.5318	1.8970	2293
72.00	20' 4-Bay Dipole	15	4.256	0.3269	1.5287	21016
67.00	20' 4-Bay Dipole	15	3.904	0.3292	1.4783	14820
62.00	20' 4-Bay Dipole	15	3.563	0.3240	1.4258	11572
57.00	20' 4-Bay Dipole	23	3.243	0.3067	1.3709	10977
52.00	20' 4-Bay Dipole	23	2.949	0.2799	1.3143	11789
50.00	Guy	23	2.837	0.2683	1.2916	12166

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	160	Leg	A325N	4309.04	19434.30	0.222 ✓	1.333	Bolt Tension
T2	140	Leg	A325N	0.00	19358.40	0.000 ✓	1.333	Bolt Tension
T5	106.7	Leg	A325N	0.00	19424.60	0.000 ✓	1.333	Bolt Tension
T6	100	Leg	A325N	0.00	19436.80	0.000 ✓	1.333	Bolt Tension
T7	80	Leg	A325N	0.00	19432.30	0.000 ✓	1.333	Bolt Tension
T8	60	Leg	A325N	0.00	19430.90	0.000 ✓	1.333	Bolt Tension
T9	40	Leg	A325N	0.00	19438.10	0.000 ✓	1.333	Bolt Tension
T10	20	Leg	A325N	0.00	19372.70	0.000 ✓	1.333	Bolt Tension
T11	6.7	Leg	A325N	0.00	19437.40	0.000 ✓	1.333	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Initial Tension lb	Breaking Load lb	Actual T lb	Allowable T_a lb	Required S.F.	Actual S.F.
T1	160.00 (A) (317)	2080.00	20800.02	7805.21	10400.00	2.000	2.665 ✓
	160.00 (A) (318)	2080.00	20800.02	7696.65	10400.00	2.000	2.702 ✓
	160.00 (B) (311)	2080.00	20800.02	7917.13	10400.00	2.000	2.627 ✓
	160.00 (B) (312)	2080.00	20800.02	7585.74	10400.00	2.000	2.742 ✓
	160.00 (C) (305)	2080.00	20800.02	7504.55	10400.00	2.000	2.772 ✓
	160.00 (C) (306)	2080.00	20800.02	7930.90	10400.00	2.000	2.623 ✓
T4	110.00 (A) (327)	5830.00	58299.91	17887.20	29150.00	2.000	3.259 ✓
	110.00 (B) (326)	5830.00	58299.91	17991.20	29150.00	2.000	3.240 ✓
	110.00 (C) (323)	5830.00	58299.91	17874.50	29150.00	2.000	3.262 ✓
T8	50.00 (A) (332)	2080.00	20800.02	6061.50	10400.00	2.000	3.431 ✓
	50.00 (B) (331)	2080.00	20800.02	6073.40	10400.00	2.000	3.425 ✓
	50.00 (C) (328)	2080.00	20800.02	6072.62	10400.00	2.000	3.425 ✓

ARMOR TOWER
Armor Tower
9 N.Main St.
Cortland, NY
Phone: (607) 591-5381
FAX: (866) 870-0840

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Client Verizon Wireless	**Designed by** AAS

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	Mast Stability Index	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	20.00	3.32	86.2 K=2.00	1.00	17.741	2.2535	-30592.90	39980.40	0.765 ✓
T2	140 - 120	20.00	3.31	85.9 K=2.00	1.00	17.817	2.2535	-30998.90	40150.30	0.772 ✓
T3	120 - 113.3	6.70	3.31	41.9 K=1.00	0.99	25.232	1.7040	-27321.10	42997.00	0.635 ✓
T4	113.3 - 106.7	6.60	3.30	41.8 K=1.00	0.98	25.182	1.7040	-36877.50	42910.90	0.859 ✓
T5	106.7 - 100	6.70	3.31	83.8 K=2.00	1.00	18.241	1.7040	-36568.00	31082.90	1.176 ✓
T6	100 - 80	20.00	3.31	83.7 K=2.00	1.00	18.255	1.7040	-31332.10	31107.50	1.007 ✓
T7	80 - 60	20.00	3.31	83.7 K=2.00	1.00	18.255	1.7040	-24676.40	31107.50	0.793 ✓
T8	60 - 40	20.00	3.31	83.7 K=2.00	1.00	18.255	1.7040	-30968.60	31107.50	0.996 ✓
T9	40 - 20	20.00	3.31	83.7 K=2.00	1.00	18.255	1.7040	-28971.70	31107.50	0.931 ✓
T10	20 - 6.7	13.30	3.28	83.2 K=2.00	1.00	18.371	1.7040	-28971.30	31304.20	0.925 ✓
T11	6.7 - 0	6.85	3.38	85.7 K=2.00	1.00	17.843	1.7040	-27596.90	30404.50	0.908 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	4.16	3.76	94.6 K=0.70	15.935	0.3326	-4771.25	5300.39	0.900 ✓
T2	140 - 120	4.14	3.75	94.3 K=0.70	15.991	0.3326	-7026.72	5319.04	1.321 ✓
T3	120 - 113.3	4.15	1.87	67.4 K=1.00	21.411	0.3326	-4854.58	7122.16	0.682 ✓
T4	113.3 - 106.7	4.14	1.87	67.3 K=1.00	21.431	0.3326	-4720.89	7128.68	0.662 ✓
T5	106.7 - 100	4.15	3.75	94.4 K=0.70	15.979	0.3326	-3136.45	5315.31	0.590 ✓
T6	100 - 80	4.14	3.75	94.3 K=0.70	15.991	0.3326	-2605.26	5319.04	0.490 ✓
T7	80 - 60	4.14	3.75	94.3 K=0.70	15.991	0.3326	-2090.00	5319.04	0.393 ✓
T8	60 - 40	4.14	3.75	94.3 K=0.70	15.991	0.3326	-2735.06	5319.04	0.514 ✓
T9	40 - 20	4.14	3.75	94.3 K=0.70	15.991	0.3326	-1782.35	5319.04	0.335 ✓

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T10	20 - 6.7	4.13	3.73	93.9 K=0.70	16.080	0.3326	-1856.37	5348.76	0.347 ✓
T11	6.7 - 0	3.81	3.32	83.7 K=0.70	18.266	0.3326	-1188.28	6076.00	0.196 ✓

Horizontal Design Data (Compression)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	2.50	2.26	81.3 K=1.00	18.753	0.3326	-1076.41	6237.97	0.173 ✓
T2	140 - 120	2.50	2.26	81.3 K=1.00	18.753	0.3326	-1203.08	6237.97	0.193 ✓
T5	106.7 - 100	2.50	2.26	81.3 K=1.00	18.753	0.3326	-633.38	6237.97	0.102 ✓
T6	100 - 80	2.50	2.26	81.3 K=1.00	18.753	0.3326	-542.69	6237.97	0.087 ✓
T7	80 - 60	2.50	2.26	81.3 K=1.00	18.753	0.3326	-427.41	6237.97	0.069 ✓
T8	60 - 40	2.50	2.26	81.3 K=1.00	18.753	0.3326	-536.51	6237.97	0.086 ✓
T9	40 - 20	2.50	2.26	81.3 K=1.00	18.753	0.3326	-501.80	6237.97	0.080 ✓
T10	20 - 6.7	2.50	2.26	81.3 K=1.00	18.753	0.3326	-501.80	6237.97	0.080 ✓
T11	6.7 - 0	1.23	0.99	35.8 K=1.00	26.410	0.3326	-486.15	8784.88	0.055 ✓

Secondary Horizontal Design Data (Compression)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	1.25	1.13	72.3 K=1.00	20.499	0.4418	-0.01	9056.00	0.000 ✓
T2	140 - 120	1.25	1.13	72.3 K=1.00	20.499	0.4418	-0.02	9056.00	0.000 ✓
T3	120 - 113.3	1.25	1.13	72.3 K=1.00	20.502	0.4418	-0.01	9057.33	0.000 ✓
T4	113.3 - 106.7	1.25	1.13	72.3 K=1.00	20.502	0.4418	-0.01	9057.33	0.000 ✓
T5	106.7 - 100	1.25	1.13	72.3 K=1.00	20.499	0.4418	-0.01	9056.00	0.000 ✓
T8	60 - 40	1.25	1.13	40.7 K=1.00	25.740	0.3326	-0.01	8562.02	0.000 ✓

Top Girt Design Data (Compression)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T2	140 - 120	2.50	2.26	81.3 K=1.00	15.211	0.3326	-553.54	5059.73	0.109 ✓
T3	120 - 113.3	2.50	2.26	81.3 K=1.00	15.211	0.3326	-590.08	5059.73	0.117 ✓
T4	113.3 - 106.7	2.50	2.26	81.3 K=1.00	15.211	0.3326	-393.26	5059.73	0.078 ✓
T5	106.7 - 100	2.50	2.26	81.3 K=1.00	15.211	0.3326	-220.06	5059.73	0.043 ✓
T6	100 - 80	2.50	2.26	81.3 K=1.00	15.211	0.3326	-82.86	5059.73	0.016 ✓
T7	80 - 60	2.50	2.26	81.3 K=1.00	15.211	0.3326	-4.92	5059.73	0.001 ✓
T8	60 - 40	2.50	2.26	81.3 K=1.00	15.211	0.3326	-10.58	5059.73	0.002 ✓
T9	40 - 20	2.50	2.26	81.3 K=1.00	15.211	0.3326	-69.68	5059.73	0.014 ✓
T10	20 - 6.7	2.50	2.26	81.3 K=1.00	15.211	0.3326	-35.87	5059.73	0.007 ✓

Bottom Girt Design Data (Compression)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	2.50	2.26	81.3 K=1.00	15.211	0.3326	-280.19	5059.73	0.055 ✓
T2	140 - 120	2.50	2.26	81.3 K=1.00	15.211	0.3326	-1309.94	5059.73	0.259 ✓
T5	106.7 - 100	2.50	2.26	81.3 K=1.00	15.211	0.3326	-125.74	5059.73	0.025 ✓
T6	100 - 80	2.50	2.26	81.3 K=1.00	15.211	0.3326	-36.85	5059.73	0.007 ✓
T7	80 - 60	2.50	2.26	81.3 K=1.00	15.211	0.3326	-39.03	5059.73	0.008 ✓
T8	60 - 40	2.50	2.26	81.3 K=1.00	15.211	0.3326	-24.15	5059.73	0.005 ✓
T9	40 - 20	2.50	2.26	81.3 K=1.00	15.211	0.3326	-47.03	5059.73	0.009 ✓

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	2.50	2.26	86.8 K=1.00	17.618	1.2272	-2316.35	21621.00	0.107 ✓

Torque-Arm Bottom Design Data

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140 (309)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-9225.49	32192.10	0.287 ✓
T1	160 - 140 (310)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-9274.10	32192.10	0.288 ✓
T1	160 - 140 (315)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-9310.96	32192.10	0.289 ✓
T1	160 - 140 (316)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-9121.82	32192.10	0.283 ✓
T1	160 - 140 (321)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-8737.93	32192.10	0.271 ✓
T1	160 - 140 (322)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-9414.06	32192.10	0.292 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	20.00	3.32	43.1	30.000	2.2535	17572.40	67606.20	0.260 ✓
T2	140 - 120	20.00	3.31	42.9	30.000	2.2535	18227.70	67606.20	0.270 ✓
T3	120 - 113.3	6.70	3.31	41.9	30.000	1.7040	7570.64	51121.50	0.148 ✓
T4	113.3 - 106.7	6.60	3.30	41.8	30.000	1.7040	16463.30	51121.50	0.322 ✓
T5	106.7 - 100	6.70	3.31	41.9	30.000	1.7040	2442.25	51121.50	0.048 ✓

Diagonal Design Data (Tension)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	4.16	3.76	135.1	30.000	0.3326	4532.56	9979.05	0.454 ✓
T2	140 - 120	4.14	3.75	134.8	30.000	0.3326	6718.08	9979.05	0.673 ✓
T3	120 - 113.3	4.15	1.87	67.4	30.000	0.3326	3008.71	9979.05	0.302 ✓
T4	113.3 - 106.7	4.14	1.87	67.3	30.000	0.3326	3159.56	9979.05	0.317 ✓
T5	106.7 - 100	4.15	3.75	134.8	30.000	0.3326	2630.88	9979.05	0.264 ✓
T6	100 - 80	4.14	3.75	134.8	30.000	0.3326	2183.70	9979.05	0.219 ✓
T7	80 - 60	4.14	3.75	134.8	30.000	0.3326	1041.23	9979.05	0.104 ✓
T8	60 - 40	4.14	3.75	134.8	30.000	0.3326	2110.89	9979.05	0.212 ✓
T9	40 - 20	4.14	3.75	134.8	30.000	0.3326	1578.01	9979.05	0.158 ✓

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T10	20 - 6.7	4.13	3.73	134.2	30.000	0.3326	900.63	9979.05	0.090 ✓

Horizontal Design Data (Tension)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	2.50	2.26	81.3	30.000	0.3326	1200.95	9979.05	0.120 ✓
T2	140 - 120	2.50	2.26	81.3	30.000	0.3326	1382.92	9979.05	0.139 ✓
T3	120 - 113.3	2.50	2.26	81.3	30.000	0.3326	1834.25	9979.05	0.184 ✓
T5	106.7 - 100	2.50	2.26	81.3	30.000	0.3326	633.38	9979.05	0.063 ✓
T6	100 - 80	2.50	2.26	81.3	30.000	0.3326	542.69	9979.05	0.054 ✓
T7	80 - 60	2.50	2.26	81.3	30.000	0.3326	471.62	9979.05	0.047 ✓
T8	60 - 40	2.50	2.26	81.3	30.000	0.3326	536.51	9979.05	0.054 ✓
T9	40 - 20	2.50	2.26	81.3	30.000	0.3326	501.80	9979.05	0.050 ✓
T10	20 - 6.7	2.50	2.26	81.3	30.000	0.3326	524.68	9979.05	0.053 ✓
T11	6.7 - 0	1.23	0.99	35.8	30.000	0.3326	520.77	9979.05	0.052 ✓

Secondary Horizontal Design Data (Tension)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	1.25	1.13	72.3	30.000	0.4418	0.01	13253.60	0.000 ✓
T2	140 - 120	1.25	1.13	72.3	30.000	0.4418	0.02	13253.60	0.000 ✓
T3	120 - 113.3	1.25	1.13	72.3	30.000	0.4418	0.73	13253.60	0.000 ✓
T4	113.3 - 106.7	1.25	1.13	72.3	30.000	0.4418	0.68	13253.60	0.000 ✓
T5	106.7 - 100	1.25	1.13	72.3	30.000	0.4418	0.01	13253.60	0.000 ✓
T8	60 - 40	1.25	1.13	40.7	30.000	0.3326	0.01	9979.05	0.000 ✓

Top Girt Design Data (Tension)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T2	140 - 120	2.50	2.26	81.3	21.600	0.3326	588.54	7184.92	0.082 ✓
T3	120 - 113.3	2.50	2.26	81.3	21.600	0.3326	1130.59	7184.92	0.157 ✓
T4	113.3 - 106.7	2.50	2.26	81.3	21.600	0.3326	2193.17	7184.92	0.305 ✓

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T5	106.7 - 100	2.50	2.26	81.3	21.600	0.3326	2157.93	7184.92	0.300 ✓
T6	100 - 80	2.50	2.26	81.3	21.600	0.3326	244.70	7184.92	0.034 ✓
T7	80 - 60	2.50	2.26	81.3	21.600	0.3326	173.49	7184.92	0.024 ✓
T8	60 - 40	2.50	2.26	81.3	21.600	0.3326	245.11	7184.92	0.034 ✓
T9	40 - 20	2.50	2.26	81.3	21.600	0.3326	179.12	7184.92	0.025 ✓
T10	20 - 6.7	2.50	2.26	81.3	21.600	0.3326	210.01	7184.92	0.029 ✓
T11	6.7 - 0	2.47	2.23	80.2	21.600	0.3326	2075.61	7184.92	0.289 ✓

Bottom Girt Design Data (Tension)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	2.50	2.26	81.3	21.600	0.3326	237.22	7184.92	0.033 ✓
T2	140 - 120	2.50	2.26	81.3	21.600	0.3326	1316.41	7184.92	0.183 ✓
T5	106.7 - 100	2.50	2.26	81.3	21.600	0.3326	429.02	7184.92	0.060 ✓
T6	100 - 80	2.50	2.26	81.3	21.600	0.3326	190.19	7184.92	0.026 ✓
T7	80 - 60	2.50	2.26	81.3	21.600	0.3326	158.30	7184.92	0.022 ✓
T8	60 - 40	2.50	2.26	81.3	21.600	0.3326	265.40	7184.92	0.037 ✓
T9	40 - 20	2.50	2.26	81.3	21.600	0.3326	219.67	7184.92	0.031 ✓
T10	20 - 6.7	2.50	2.26	81.3	21.600	0.3326	1852.07	7184.92	0.258 ✓

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140	2.50	2.26	86.8	30.000	1.2272	2293.56	36815.50	0.062 ✓
T4	113.3 - 106.7	2.50	2.26	86.8	30.000	1.2272	6026.02	36815.50	0.164 ✓
T8	60 - 40	2.50	2.26	86.8	30.000	1.2272	3260.61	36815.50	0.089 ✓

Torque-Arm Top Design Data

Section No.	Elevation	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft	ft	ft		ksi	in^2	lb	lb	
T1	160 - 140 (307)	2.50	2.38	31.3	21.600	2.1100	5956.06	45576.00	0.131 ✓
T1	160 - 140 (308)	2.50	2.38	31.3	21.600	2.1100	5493.20	45576.00	0.121 ✓

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140 (313)	2.50	2.38	31.3	21.600	2.1100	5867.27	45576.00	0.129 ✓
T1	160 - 140 (314)	2.50	2.38	31.3	21.600	2.1100	5551.13	45576.00	0.122 ✓
T1	160 - 140 (319)	2.50	2.38	31.3	21.600	2.1100	5454.06	45576.00	0.120 ✓
T1	160 - 140 (320)	2.50	2.38	31.3	21.600	2.1100	5916.43	45576.00	0.130 ✓

Torque-Arm Bottom Design Data

Section No.	Elevation ft	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140 (309)	4.16	3.96	52.0	21.600	2.1100	502.73	45576.00	0.011 ✓
T1	160 - 140 (310)	4.16	3.96	52.0	21.600	2.1100	309.73	45576.00	0.007 ✓
T1	160 - 140 (315)	4.16	3.96	52.0	21.600	2.1100	502.21	45576.00	0.011 ✓
T1	160 - 140 (316)	4.16	3.96	52.0	21.600	2.1100	181.29	45576.00	0.004 ✓
T1	160 - 140 (322)	4.16	3.96	52.0	21.600	2.1100	382.42	45576.00	0.008 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	160 - 140	Leg	1	-30592.90	53293.87	57.4	Pass
		Diagonal	25	-4771.25	7065.42	67.5	Pass
		Horizontal	34	-1076.41	8315.21	12.9	Pass
		Secondary Horizontal	13	-0.01	12071.65	0.0	Pass
		Bottom Girt	9	-280.19	6744.62	4.2	Pass
		Guy A@160	317	7805.21	10400.00	75.1	Pass
		Guy B@160	311	7917.13	10400.00	76.1	Pass
		Guy C@160	306	7930.90	10400.00	76.3	Pass
		Top Guy Pull-Off@160	4	-2316.35	28820.79	8.0	Pass
		Torque Arm Top@160	307	5956.06	60752.81	9.8	Pass
		Torque Arm Bottom@160	322	-9414.06	42912.07	21.9	Pass
T2	140 - 120	Leg	40	-30998.90	53520.35	57.9	Pass
		Diagonal	48	-7026.72	7090.28	99.1	Pass
		Horizontal	52	-1203.08	8315.21	14.5	Pass
		Secondary Horizontal	51	-0.02	12071.65	0.0	Pass
		Top Girt	44	-553.54	6744.62	8.2	Pass
		Bottom Girt	46	-1309.94	6744.62	19.4	Pass
T3	120 - 113.3	Leg	79	-27321.10	57315.00	47.7	Pass
		Diagonal	91	-4854.58	9493.84	51.1	Pass
		Horizontal	90	1834.25	13302.07	13.8	Pass
		Secondary Horizontal	97	0.73	17667.05	0.7	Pass
		Top Girt	80	1130.59	9577.50	11.8	Pass
T4	113.3 - 106.7	Leg	99	-36877.50	57200.23	64.5	Pass
		Diagonal	112	-4720.89	9502.53	49.7	Pass
		Secondary Horizontal	118	0.68	17667.05	0.6	Pass
		Top Girt	101	2193.17	9577.50	22.9	Pass
		Guy A@110	327	17887.20	29150.00	61.4	Pass
		Guy B@110	326	17991.20	29150.00	61.7	Pass

ARMOR TOWER *Armor Tower* *9 N.Main St.* *Cortland, NY* *Phone: (607) 591-5381* *FAX: (866) 870-0840*	**Job** STRUCTURAL ANALYSIS OF 160' GUYED TOWER	**Page** 21 of 21
	Project Prospect North, CT	**Date** 13:25:43 05/16/13
	Client Verizon Wireless	**Designed by** AAS

Section No.	*Elevation ft*	*Component Type*	*Critical Element*	*P lb*	*SF*P$_{allow}$ lb*	*% Capacity*	*Pass Fail*
		Guy C@110	323	17874.50	29150.00	61.3	Pass
		Top Guy Pull-Off@110	111	6026.02	49075.06	12.3	Pass
T5	106.7 - 100	Leg	120	-36568.00	41433.50	88.3	Pass
		Diagonal	134	-3136.45	7085.31	44.3	Pass
		Horizontal	132	-633.38	8315.21	7.6	Pass
		Secondary Horizontal	131	-0.01	12071.65	0.0	Pass
		Top Girt	123	2157.93	9577.50	22.5	Pass
		Bottom Girt	126	429.02	9577.50	4.5	Pass
T6	100 - 80	Leg	138	-31332.10	41466.30	75.6	Pass
		Diagonal	167	-2605.26	7090.28	36.7	Pass
		Horizontal	149	-542.69	8315.21	6.5	Pass
		Top Girt	142	244.70	9577.50	2.6	Pass
		Bottom Girt	144	190.19	9577.50	2.0	Pass
T7	80 - 60	Leg	170	-24676.40	41466.30	59.5	Pass
		Diagonal	178	-2090.00	7090.28	29.5	Pass
		Horizontal	185	-427.41	8315.21	5.1	Pass
		Top Girt	173	173.49	9577.50	1.8	Pass
		Bottom Girt	175	158.30	9577.50	1.7	Pass
T8	60 - 40	Leg	202	-30968.60	41466.30	74.7	Pass
		Diagonal	225	-2735.06	7090.28	38.6	Pass
		Horizontal	219	-536.51	8315.21	6.5	Pass
		Secondary Horizontal	213	-0.01	11413.17	0.0	Pass
		Top Girt	205	245.11	9577.50	2.6	Pass
		Bottom Girt	208	265.40	9577.50	2.8	Pass
		Guy A@50	332	6061.50	10400.00	58.3	Pass
		Guy B@50	331	6073.40	10400.00	58.4	Pass
		Guy C@50	328	6072.62	10400.00	58.4	Pass
		Top Guy Pull-Off@50	224	3260.61	49075.06	6.6	Pass
T9	40 - 20	Leg	240	-28971.70	41466.30	69.9	Pass
		Diagonal	270	-1782.35	7090.28	25.1	Pass
		Horizontal	251	-501.80	8315.21	6.0	Pass
		Top Girt	243	179.12	9577.50	1.9	Pass
		Bottom Girt	245	219.67	9577.50	2.3	Pass
T10	20 - 6.7	Leg	272	-28971.30	41728.50	69.4	Pass
		Diagonal	280	-1856.37	7129.90	26.0	Pass
		Horizontal	283	-501.80	8315.21	6.0	Pass
		Top Girt	274	210.01	9577.50	2.2	Pass
		Bottom Girt	277	1852.07	9577.50	19.3	Pass
T11	6.7 - 0	Leg	295	-27596.90	40529.20	68.1	Pass
		Diagonal	302	-1188.28	8099.31	14.7	Pass
		Horizontal	301	-486.15	11710.24	4.2	Pass
		Top Girt	299	2075.61	9577.50	21.7	Pass
						Summary	
					Leg (T5)	88.3	Pass
					Diagonal (T2)	99.1	Pass
					Horizontal (T2)	14.5	Pass
					Secondary Horizontal (T3)	0.7	Pass
					Top Girt (T4)	22.9	Pass
					Bottom Girt (T2)	19.4	Pass
					Guy A (T1)	75.1	Pass
					Guy B (T1)	76.1	Pass
					Guy C (T1)	76.3	Pass
					Top Guy Pull-Off (T4)	12.3	Pass
					Torque Arm Top (T1)	9.8	Pass
					Torque Arm Bottom (T1)	21.9	Pass
					Bolt Checks	16.6	Pass
					RATING =	**99.1**	**Pass**