Robinson+Cole

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Also admitted in Massachusetts

July 7, 2014

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

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

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 135-foot level of the existing 160-foot tower at 54 Waterbury Road in Prospect, Connecticut (the "Property"). The tower is owned by Charles E. Bradshaw. The Council approved Cellco's use of this tower in 2006. Cellco now intends to modify its facility by removing six (6) 850 MHz antennas and replacing them with two (2) model SWCP 2X5514, 850 MHz antennas; one (1) model LNX-8514DS-VTM, 850 MHz antenna; and three (3) model HBXX-6517DS, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to install six (6) remote radio heads ("RRHs") behind its 2100 MHz and 700 MHz antennas and two (2) HYBRIFLEX™ antenna cables outside the lattice tower. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

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 of the Town of Prospect. A copy of this letter is being sent to Charles E. and Averyll B. Bradshaw, the owners 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 new antennas and RRHs will be installed at a centerline height of 135 feet on the existing 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 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 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

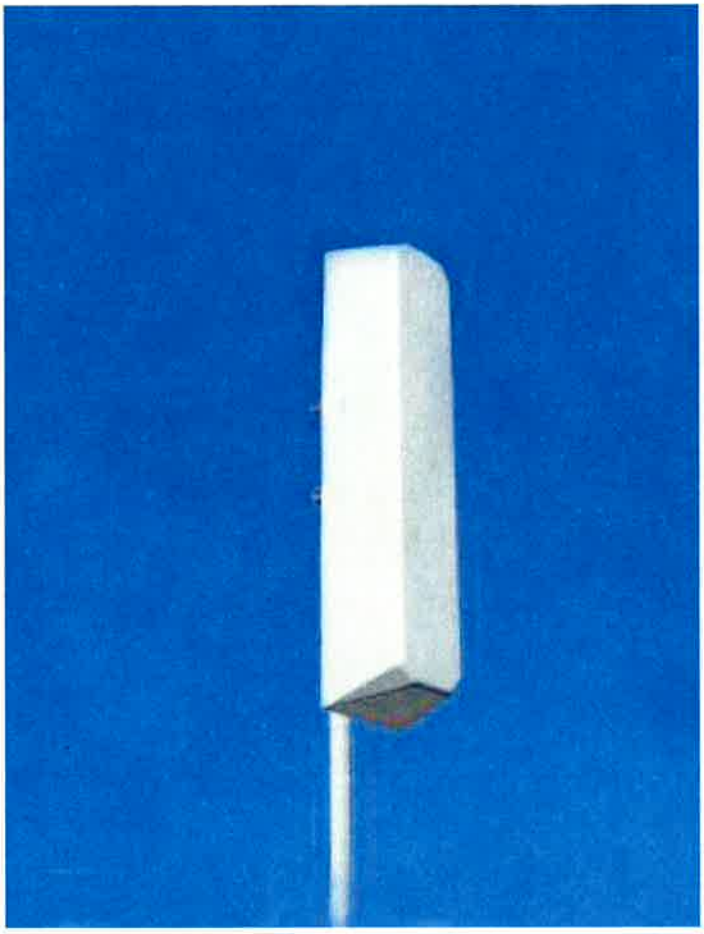
Enclosures
Copy to:
Robert Chatfield, Prospect Mayor
Charles E. and Averyll B. Bradshaw
Sandy M. Carter

ATTACHMENT 1

Swedcom

SWCP 2x5514

698 - 896 MHz Dual (2x) CP log-periodic antenna



Features

- Transmit Diversity Gain
- Can be configured to combine space & polarization diversity
- Outstanding performance over the entire band (698 - 896 MHz)
- Excellent Axial Ratio
- Optimized for 4G & 3G systems
- Low intermodulation
- Improved Side-to-side rejection
- Fading reduction
- Excellent isolation between ports

Electrical specifications

Frequency range:	**698-896 MHz**
Impedance:	**50 ohm**
Connector type:	**7/16 Din**
Return loss:	**18 dB**
Polarization:	**Circular**
Gain ea. port [Circular]:	**2x14 dBdC**
Gain ea. port [Linear]:	**2x11 dBdL**
Axial Ratio:	**2 dB**
Isolation between ports (TX band):	**30 dB**
Front-to-back ratio:	**30 dB**
Intermodulation (2x20W):	**IM3 150 dB**
	IM5 160 dB
	IM7/9 170 dB
Power rating:	**2x 500 W**
H-plane (-3 dB point):	**2x 55°**
V-plane (-3 dB point):	**2x 16°**
Lightning protection:	**DC grounded**

Mechanical specifications

Overall height:	**51.9 in**	**[1318 mm]**
Width:	**13.9 in**	**[353 mm]**
Depth:	**11.3 in**	**[287 mm]**
Weight (excluding brackets):	**20 lbs**	**[9 Kg]**
Wind load measured up to:	**150 mph**	**[240 Km/h]**
Wind area (front of antenna):	**5.01 sq. ft.**	**[0.46 sq.m]**
Lateral thrust at 113 mph/ 180 Km/h (worst case):	**256 lbs**	**[1138 N]**

Materials

Radiating Elements:	**Aluminum**
Transformer (Power distribution)	**Ceramic PCB**
Chassis:	**Aluminum**
Radome:	**Grey Fiberglass/PVC**
Mounting bolts:	**Stainless steel**

The SWCP 2x5514 is made in the U.S.A.

Product Specifications

COMMSCOPE®

LNX-8514DS-VTM

Andrew® Teletilt® Antenna, 698–896 MHz, 85° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896
Gain by all Beam Tilts, average, dBi	15.7	16.2
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.2
Gain by Beam Tilt, average, dBi	0 ° | 15.7 4 ° | 15.7 8 ° | 15.5	0 ° | 16.3 4 ° | 16.3 8 ° | 16.1
Beamwidth, Horizontal, degrees	85	84
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.8
Beamwidth, Vertical, degrees	8.6	7.8
Beamwidth, Vertical Tolerance, degrees	±0.5	±0.4
Beam Tilt, degrees	0–8	0–8
USLS, dB	20	22
Front-to-Back Total Power at 180° ± 30°, dB	22	23
CPR at Boresight, dB	18	18
CPR at Sector, dB	12	11
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°

**Values calculated using NGMN Alliance N-P-BASTA v9.6*

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 2
Wind Loading, maximum	879.0 N @ 150 km/h 197.6 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	2449.0 mm x 301.0 mm x 181.0 mm | 96.4 in x 11.9 in x 7.1 in
Net Weight	23.1 kg | 50.9 lb
Model with factory installed AISG 2.0 RET	LNX-8514DS-A1M

Product Specifications

COMMSCOPE®

HBXX-6517DS-VTM

Andrew® Quad Port Teletilt® Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4 3 ° | 18.7 6 ° | 18.4	0 ° | 18.4 3 ° | 18.7 6 ° | 18.5	0 ° | 18.7 3 ° | 18.9 6 ° | 18.6
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°

**Values calculated using NGMN Alliance N-P-BASTA v9.6*

Mechanical Specifications

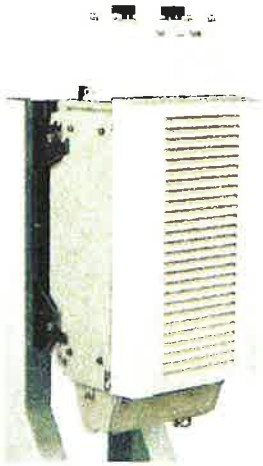
Color | Radome Material	Light gray | PVC, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph
Antenna Dimensions, L x W x D	1903.0 mm x 305.0 mm x 166.0 mm | 74.9 in x 12.0 in x 6.5 in
Net Weight	19.5 kg | 43.0 lb
Model with factory installed AISG 2.0 RET	HBXX-6517DS-A2M

Alcatel·Lucent

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

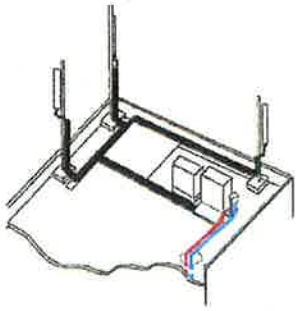
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced.
The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.

Features

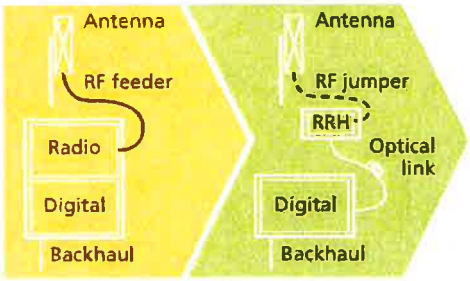
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

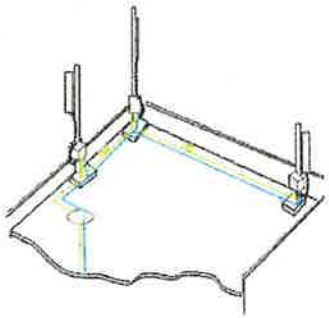
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170m (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
  - ¬ TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
  - ¬ One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
  - ¬ Single mode dual fiber (SM/DF)
- Multi-mode variant
  - ¬ Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

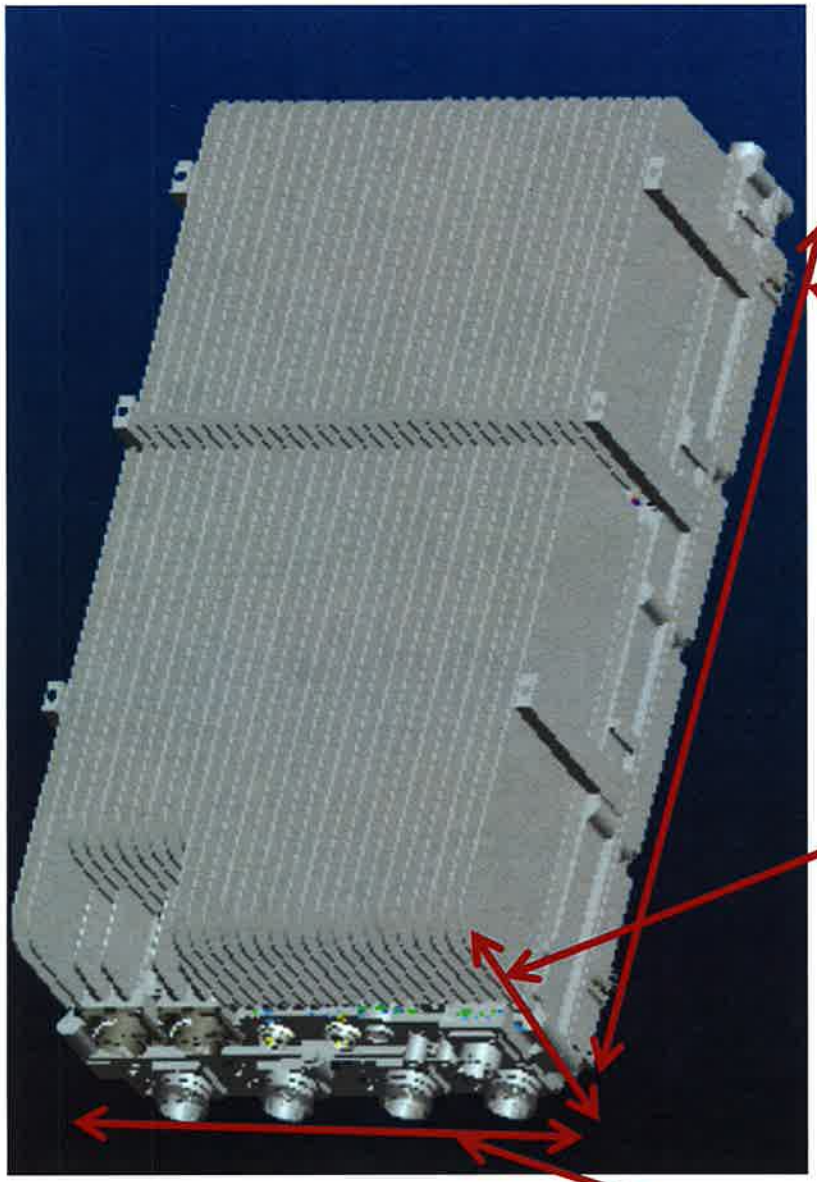
- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

Alcatel·Lucent

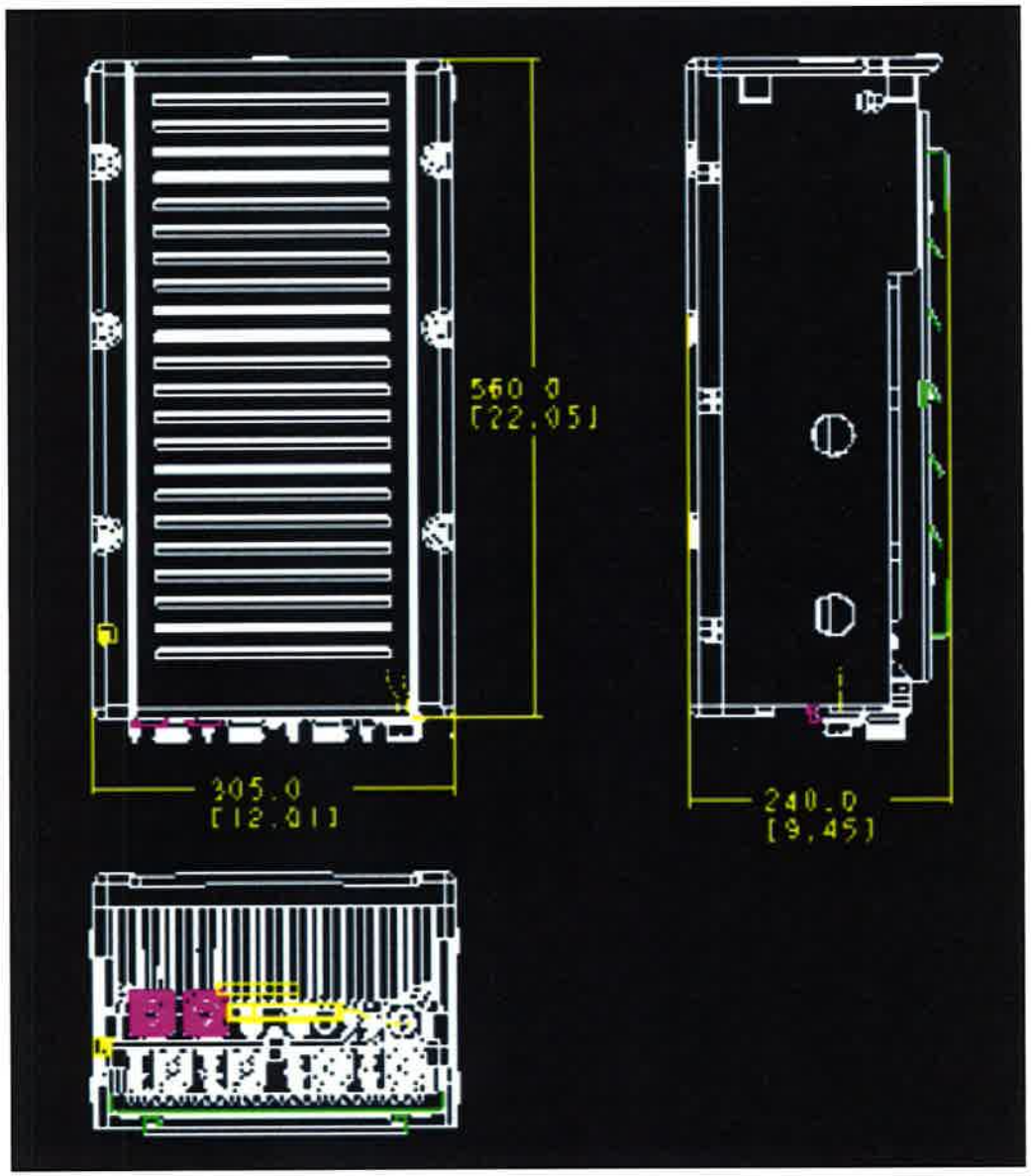
Size without solar shield or mounting brackets



525 mm tall not counting connectors or lifting features

160 mm thick

290 mm wide


560.0
[22.05]
205.0
[12.01]
240.0
[9.45]

Product Data Sheet HB158-1-08U8-S8J18

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

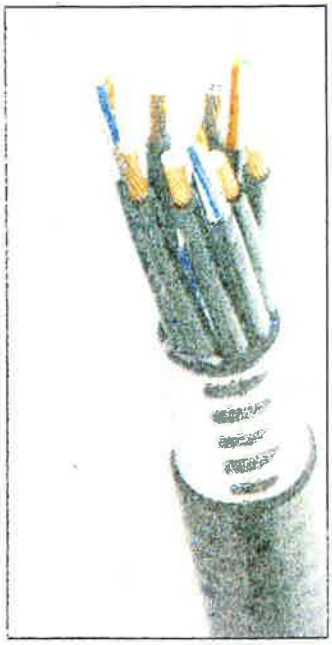


Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.295)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

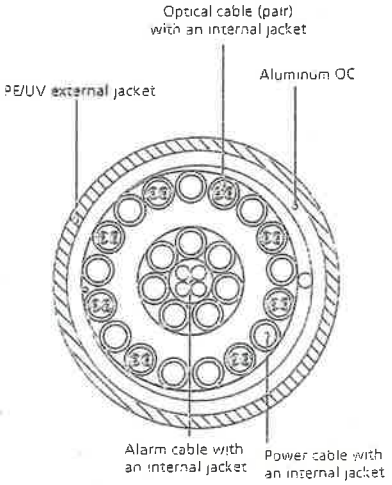


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Prospect N								
Tower Height: 160'								
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	**7**	**819**	**135**	**0.1131**	**1970**	**1.0000**	**11.31%**	
Verizon	**9**	**348**	**135**	**0.0618**	**869**	**0.5793**	**10.67%**	
Verizon	**1**	**1794**	**135**	**0.0354**	**2145**	**1.0000**	**3.54%**	
Verizon	**1**	**819**	**135**	**0.0162**	**698**	**0.4973**	**3.25%**	
								95.6%
* Source: Siting Council								

ATTACHMENT 3

ARMOR TOWER ENGINEERING

Reanalysis of a 160 ft Guyed Tower

Site Number: ECP-2-0144

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

Checked By:

Patrick Propert

Patrick Propert
Structural Engineer

STATE OF CONNECTICUT
DWAYNE V. ALBUE
No. 28725
LICENSED PROFESSIONAL ENGINEER

06/11/2014

McPHEE ELECTRIC Ltd.
ELECTRICAL CONTRACTORS

505 Main Street

Farmington, CT 06032

June 2014

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

June 10, 2014

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

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 subject tower is a 160' guyed tower consisting of welded sections with pipe legs and pipe bracing. The tower has been previously reinforced. Tower face dimension is 30" the full height above a 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 for Verizon Wireless at 135' on existing antenna frames:

- Keep (3) BXA-70063-6CF antennas (1 per sector).
- Keep (3) BXA-171063-12BF antennas (1 per sector) and add (3) Alcatel-Lucent RH-2X60-PCS RRH units (1 per sector).
- Add (3) Commscope HBXX-6517DS-A2M antennas, (3) Alcatel-Lucent RH-2X40-AWS RRH units, and (1) RFS DB-T1-6Z-8AB-0Z distribution box.
- Replace (4) SE-C 6014 antennas with (2) SWCP 2X5514 antennas (1 alpha and 1 beta sector) and (2) LPA-80080/6CF with (1) LNX-8514DS-VTM (gamma sector).
- Keep (18) 1-5/8" coax and Add (2) HB158-1-08U8-S8J18 hybrid fiber cable to 135'.

The proposed feed line is to be located as shown on drawing E-7.

The results of the analysis showed all tower elements to be loaded within allowable limits with a maximum stress rating of 88%. We recommend a post-construction inspection be completed by an engineer to document that tower-mounted equipment has been placed in compliance with the requirements of this analysis. For a detailed listing of the tower's performance, please see pages 9 to 11 of the calculations.

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

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,

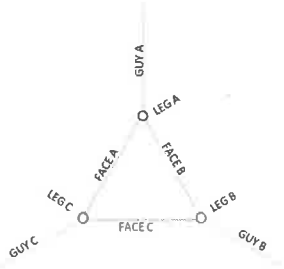
ARMOR TOWER, INC.

Archan Shah
Structural Engineer

06/11/2014

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 according to the ASCE 7 wind map. 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. The proposed feed line is 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. Site observations indicate chipping paint and surface rust on the galvanizing.
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 installation or erection deficiencies. Any information contrary to that assumed for the purpose of preparing this analysis could alter the findings and conclusions stated herein. The scope of the initial structural mapping of this tower was to identify the members required to numerically model the tower for our analysis. We recommend that a details mapping be completed to determine the dimensional constraints of the potentially upgraded elements to minimize field construction issues.
10. Tower member sizes, geometry, are based on a tower reinforcement design completed by Bay State Design in January 2011. Existing antenna loading is based on customer supplied data. It is our assumption that this data is complete and accurately reflects the existing conditions of the tower and equipment. Armor Tower has not been commissioned to field validate the data. Armor Tower reserves the right to add to or modify this report as more information becomes available. Proposed equipment was outlined in an RF design dated May 2014.

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.
12. This tower does not have an industry-approved fall protection system installed. For the safety of workers climbing this tower, we recommend a flexible cable safety climb be installed.

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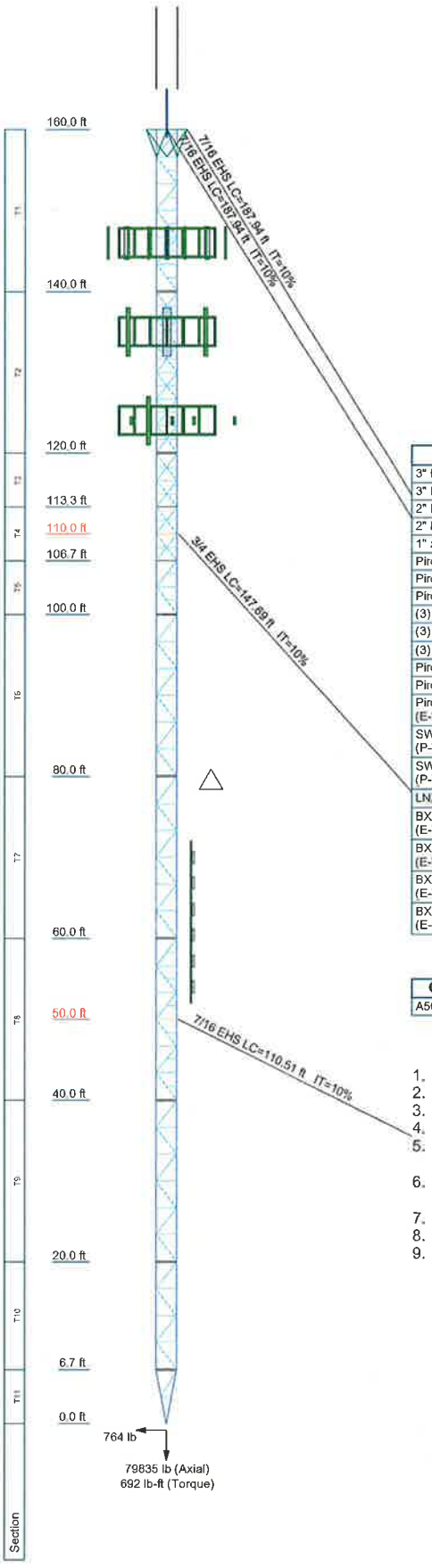
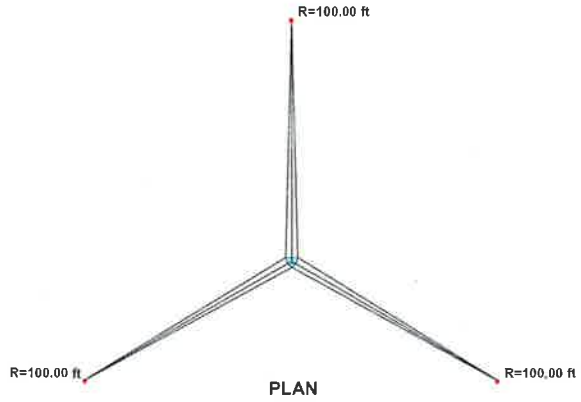




DESIGNED APPURTENANCE LOADING

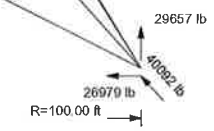
TYPE	ELEVATION	TYPE	ELEVATION
3" Dia 20' Omni	160	BXA-70063-6CF w.MtgPipe (E-VZW-Beta)	135
3" Dia 20' Omni	160	BXA-70063-6CF w.MtgPipe (E-VZW-Gamma)	135
2" Dia 15' Omni	160	HBXX-6517DS-A2M w. Mtg Pipe (P-VZW-Alpha)	135
2" Dia 15' Omni	160	HBXX-6517DS-A2M w. Mtg Pipe (P-VZW-Beta)	135
1" x 6' DIPOLE	160	HBXX-6517DS-A2M w. Mtg Pipe (P-VZW-Gamma)	135
Pirod 10' PCS Frame	146	RRH RH-2X60-AWS (P-VZW-Alpha)	135
Pirod 10' PCS Frame	146	RRH RH-2X60-AWS (P-VZW-Beta)	135
Pirod 10' PCS Frame	146	RRH RH-2X60-AWS (P-VZW-Gamma)	135
(3) DB844H90E-XY w/Mount Pipe	146	DB-T1-6Z-8AB-0Z (P-VZW)	135
(3) DB844H90E-XY w/Mount Pipe	146	RRH RH-2X60-PCS (P-VZW-Alpha)	135
(3) DB844H90E-XY w/Mount Pipe	146	RRH RH-2X60-PCS (P-VZW-Beta)	135
Pirod 10' PCS Frame (E-VZW-Alpha)	135	RRH RH-2X60-PCS (P-VZW-Gamma)	135
Pirod 10' PCS Frame (E-VZW-Beta)	135	8'x1'x6" Panel	124
Pirod 10' PCS Frame (E-VZW-Gamma)	135	8'x1'x6" Panel	124
SWCP 2x5514 w. MtgPipe (P-VZW-Alpha)	135	(2) TMA	124
SWCP 2x5514 w. MtgPipe (P-VZW-Beta)	135	(2) TMA	124
LNX-8514DS-VTM (P-VZW-Gamma)	135	10' BOOM	124
BXA-171063-12BF w. MtnPipe (E-VZW-Alpha)	135	10' BOOM	124
BXA-171063-12BF w. MtnPipe (E-VZW-Beta)	135	10' BOOM	124
BXA-171063-12BF w. MtnPipe (E-VZW-Gamma)	135	20' 4-Bay Dipole	72 - 52
BXA-70063-6CF w.MtgPipe (E-VZW-Alpha)	135		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A53-B-35	35 ksi	63 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. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. Verizon Wireless antennas are indicated as (E)xisting and (P)roposed.
9. TOWER RATING: 87.6%



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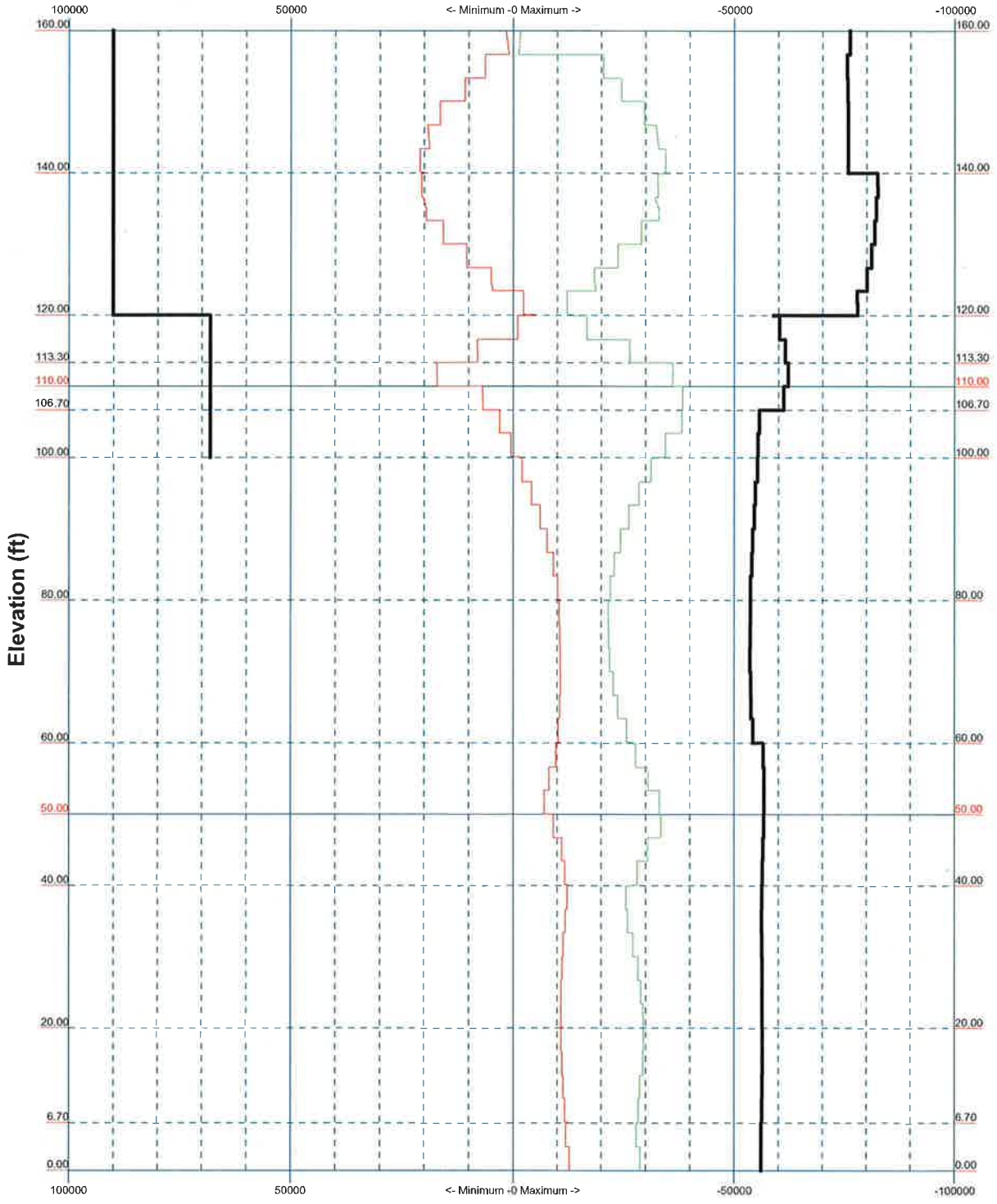
Phone: (607) 591-5381
FAX: (866) 870-0840

Job: ***REANALYSIS OF 160' GUYED TOWER***			
Project: ***Prospect North, CT***			
Client: Verizon Wireless	Drawn by: Archan Shah	App'd:	
Code: TIA/EIA-222-F	Date: 06/10/14	Scale: NTS	
Path:		Dwg No. E-1	

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

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



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Project: ***Prospect North, CT***			
Client: Verizon Wireless	Drawn by: Archan Shah		App'd:
Code: TIA/EIA-222-F	Date: 06/09/14		Scale: NTS
Path:			Dwg No E-3

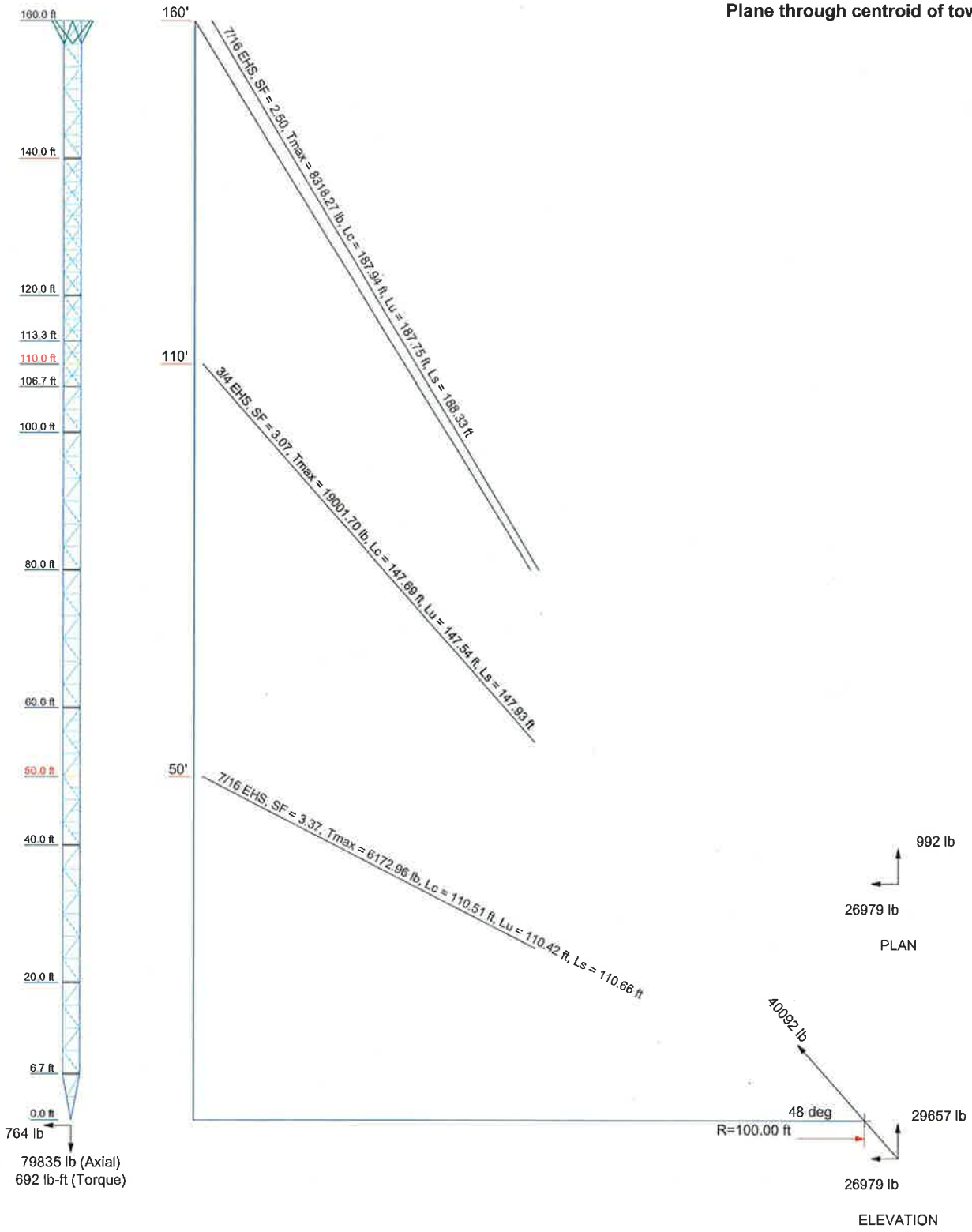
Guy Tensions and Tower Reactions

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

Maximum Values

Anchor 'C'@100 ft Azimuth 240 deg Elev 0 ft

Plane through centroid of tower



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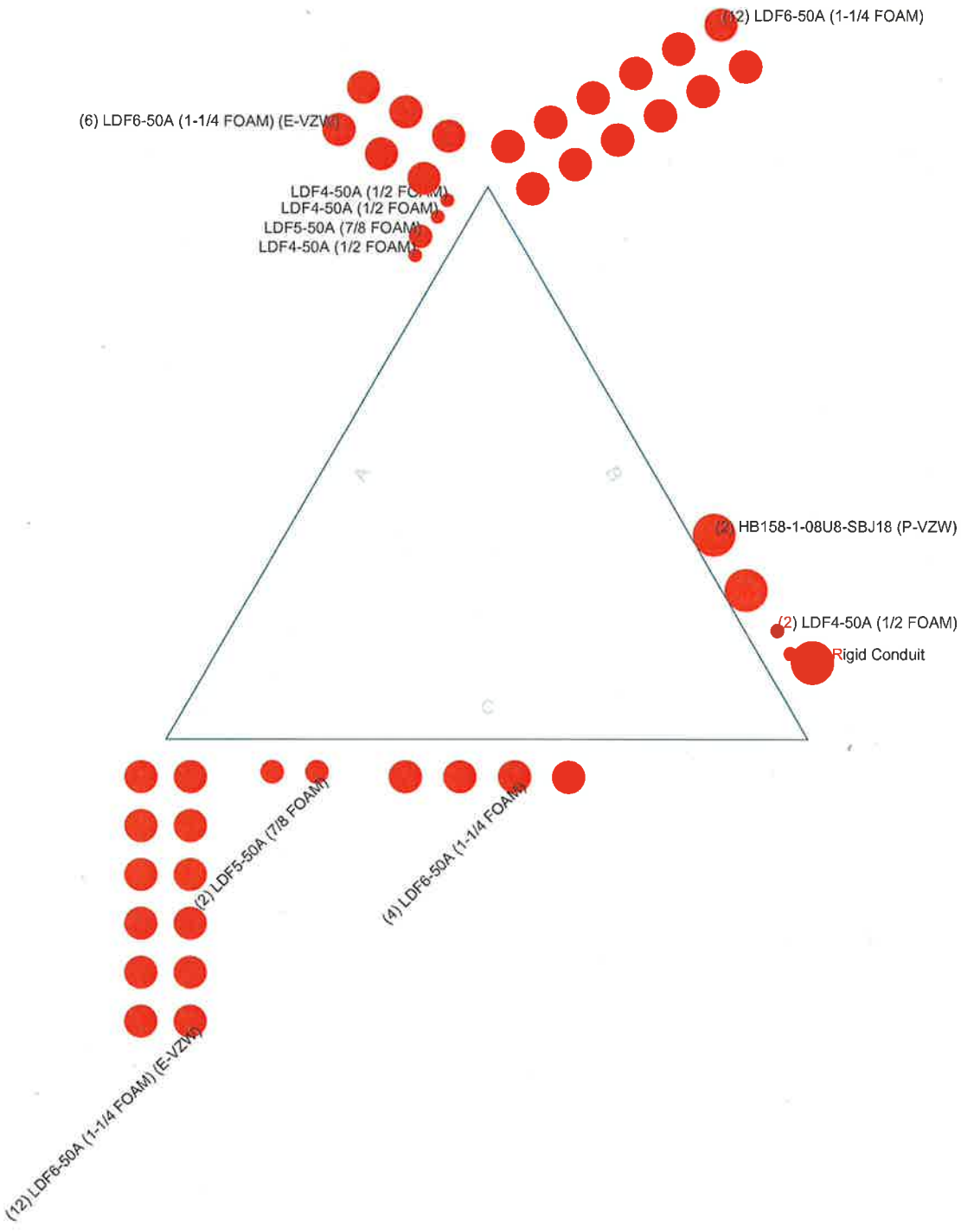
Job: ***REANALYSIS OF 160' GUYED TOWER***			
Project: ***Prospect North, CT***			
Client: Verizon Wireless	Drawn by: Archan Shah		App'd:
Code: TIA/EIA-222-F	Date: 06/09/14		Scale: NTS
Path:			Dwg No. E-6

Feed Line Plan

Round Flat App In Face App Out Face



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Job: ***REANALYSIS OF 160' GUYED TOWER***			
Project: ***Prospect North, CT***			
Client: Verizon Wireless	Drawn by: Archan Shah		App'd:
Code: TIA/EIA-222-F	Date: 06/09/14		Scale: NTS
Path:			Dwg No. E-7

ARMOR TOWER ENGINEERING *Armor Tower, Inc.* *9 N Main St.,* *Cortland, NY 13045* *Phone: (607) 591-5381* *FAX: (866) 870-0840*	**Job** REANALYSIS OF 160' GUYED TOWER	**Page** 1 of 11
	Project Prospect North, CT	**Date** 16:23:15 06/09/14
	Client Verizon Wireless	**Designed by** Archan Shah

Load Combinations

Comb. No.	*Description*
1	Dead Only
2	Dead+Wind 0 deg - No Ice+Guy
3	Dead+Wind 30 deg - No Ice+Guy
4	Dead+Wind 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 Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	160 - 140	3.157	29	0.0079	0.5414
T2	140 - 120	3.052	29	0.1107	0.8189
T3	120 - 113.3	2.266	29	0.2251	0.9261
T4	113.3 - 106.7	1.934	29	0.2058	0.9029
T5	106.7 - 100	1.677	29	0.1577	0.8831
T6	100 - 80	1.501	29	0.1226	0.8577
T7	80 - 60	1.127	29	0.0827	0.7818
T8	60 - 40	0.789	37	0.0758	0.6967
T9	40 - 20	0.544	37	0.0463	0.5967
T10	20 - 6.7	0.337	37	0.0652	0.5000
T11	6.7 - 0	0.124	37	0.0824	0.4185

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Client	**Designed by**
Verizon Wireless	Archan Shah

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	29	3.157	0.0079	0.5414	19566
146.00	Pirod 10' PCS Frame	29	3.142	0.0731	0.7451	6988
135.00	Pirod 10' PCS Frame	29	2.917	0.1481	0.8688	6128
124.00	10' BOOM	29	2.464	0.2170	0.9271	13699
110.00	Guy	29	1.794	0.1826	0.8927	5739
72.00	20' 4-Bay Dipole	29	0.987	0.0811	0.7500	152279
67.00	20' 4-Bay Dipole	29	0.901	0.0803	0.7288	66152
62.00	20' 4-Bay Dipole	37	0.820	0.0778	0.7062	42987
57.00	20' 4-Bay Dipole	37	0.746	0.0718	0.6821	39258
52.00	20' 4-Bay Dipole	37	0.679	0.0631	0.6569	43348
50.00	Guy	37	0.654	0.0595	0.6467	45331

Maximum Tower Deflections - Design Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	160 - 140	13.890	23	0.3154	1.3055
T2	140 - 120	12.389	23	0.5221	1.8069
T3	120 - 113.3	9.557	23	0.7311	1.9941
T4	113.3 - 106.7	8.501	23	0.6717	1.9383
T5	106.7 - 100	7.643	23	0.5496	1.8948
T6	100 - 80	6.985	23	0.4667	1.8357
T7	80 - 60	5.362	15	0.3842	1.6599
T8	60 - 40	3.751	15	0.3657	1.4654
T9	40 - 20	2.480	15	0.2525	1.2400
T10	20 - 6.7	1.422	15	0.2961	1.0316
T11	6.7 - 0	0.509	15	0.3458	0.8622

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	23	13.890	0.3154	1.3055	9787
146.00	Pirod 10' PCS Frame	23	12.954	0.4473	1.6735	3495
135.00	Pirod 10' PCS Frame	23	11.796	0.5957	1.8983	3088
124.00	10' BOOM	23	10.196	0.7230	2.0014	7263
110.00	Guy	23	8.043	0.6117	1.9159	2167
72.00	20' 4-Bay Dipole	15	4.707	0.3849	1.5870	15763
67.00	20' 4-Bay Dipole	15	4.298	0.3829	1.5384	11895
62.00	20' 4-Bay Dipole	15	3.903	0.3729	1.4869	9645
57.00	20' 4-Bay Dipole	15	3.533	0.3508	1.4322	9239
52.00	20' 4-Bay Dipole	15	3.192	0.3189	1.3751	9883
50.00	Guy	15	3.063	0.3052	1.3520	10179

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Client Verizon Wireless	**Designed by** Archan Shah

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	5013.26	19437.50	0.258 ✔	1.333	Bolt Tension
T2	140	Leg	A325N	0.00	19427.70	0.000 ✔	1.333	Bolt Tension
T5	106.7	Leg	A325N	0.00	19437.10	0.000 ✔	1.333	Bolt Tension
T6	100	Leg	A325N	0.00	19438.60	0.000 ✔	1.333	Bolt Tension
T7	80	Leg	A325N	0.00	19437.10	0.000 ✔	1.333	Bolt Tension
T8	60	Leg	A325N	0.00	19437.00	0.000 ✔	1.333	Bolt Tension
T9	40	Leg	A325N	0.00	19438.50	0.000 ✔	1.333	Bolt Tension
T10	20	Leg	A325N	0.00	19387.20	0.000 ✔	1.333	Bolt Tension
T11	6.7	Leg	A325N	0.00	19438.20	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) (429)	2080.00	20800.02	8154.35	10400.00	2.000	2.551 ✔
	160.00 (A) (430)	2080.00	20800.02	7931.24	10400.00	2.000	2.623 ✔
	160.00 (B) (423)	2080.00	20800.02	8199.99	10400.00	2.000	2.537 ✔
	160.00 (B) (424)	2080.00	20800.02	7876.89	10400.00	2.000	2.641 ✔
	160.00 (C) (417)	2080.00	20800.02	7777.64	10400.00	2.000	2.674 ✔
	160.00 (C) (418)	2080.00	20800.02	8318.27	10400.00	2.000	2.501 ✔
T4	110.00 (A) (437)	5830.00	58299.91	18879.80	29150.00	2.000	3.088 ✔
	110.00 (B) (436)	5830.00	58299.91	18983.70	29150.00	2.000	3.071 ✔
	110.00 (C) (435)	5830.00	58299.91	19001.70	29150.00	2.000	3.068 ✔
T8	50.00 (A) (440)	2080.00	20800.02	6153.68	10400.00	2.000	3.380 ✔
	50.00 (B) (439)	2080.00	20800.02	6172.96	10400.00	2.000	3.370 ✔
	50.00 (C) (438)	2080.00	20800.02	6168.62	10400.00	2.000	3.372 ✔

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	43.1 K=1.00	0.99	25.224	2.2535	-34509.80	56842.80	0.607 ✔
T2	140 - 120	20.00	1.65	21.5	0.97	27.432	2.2535	-34010.60	61820.00	0.550 ✔

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Prospect North, CT	16:23:15 06/09/14
Client	**Designed by**
Verizon Wireless	Archan Shah

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 $\frac{P}{P_a}$	
T3	120 - 113.3	6.70	1.65	K=1.00 21.0 K=1.00	0.96	27.063	1.7040	-26439.00	46116.70	0.573	✔
T4	113.3 - 106.7	6.60	1.65	20.9 K=1.00	0.95	26.918	1.7040	-38403.10	45869.40	0.837	✔
T5	106.7 - 100	6.70	3.31	41.9 K=1.00	0.96	24.495	1.7040	-38193.30	41741.10	0.915	✔
T6	100 - 80	20.00	3.31	41.9 K=1.00	0.95	24.298	1.7040	-33035.00	41404.90	0.798	✔
T7	80 - 60	20.00	3.31	41.9 K=1.00	0.93	23.864	1.7040	-27038.90	40665.90	0.665	✔
T8	60 - 40	20.00	3.31	41.9 K=1.00	0.98	24.942	1.7040	-33494.00	42501.50	0.788	✔
T9	40 - 20	20.00	3.31	41.9 K=1.00	0.97	24.797	1.7040	-29924.40	42255.00	0.708	✔
T10	20 - 6.7	13.30	3.28	41.6 K=1.00	0.97	24.811	1.7040	-29925.90	42279.90	0.708	✔
T11	6.7 - 0	6.85	3.38	42.9 K=1.00	0.97	24.678	1.7040	-28849.00	42052.60	0.686	✔

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	13.429	0.3326	-5215.04	4466.99	1.167	✔
T2	140 - 120	4.14	1.87	67.4 K=1.00	16.329	0.3326	-4624.31	5431.46	0.851	✔
T3	120 - 113.3	4.15	1.87	67.4 K=1.00	16.325	0.3326	-4936.50	5430.30	0.909	✔
T4	113.3 - 106.7	4.14	1.87	67.3 K=1.00	16.336	0.3326	-5236.35	5433.78	0.964	✔
T5	106.7 - 100	4.15	3.75	94.4 K=0.70	13.453	0.3326	-3397.52	4474.80	0.759	✔
T6	100 - 80	4.14	3.75	94.3 K=0.70	13.458	0.3326	-3147.61	4476.75	0.703	✔
T7	80 - 60	4.14	3.75	94.3 K=0.70	13.458	0.3326	-2371.85	4476.75	0.530	✔
T8	60 - 40	4.14	3.75	94.3 K=0.70	13.458	0.3326	-3232.25	4476.75	0.722	✔
T9	40 - 20	4.14	3.75	94.3 K=0.70	13.458	0.3326	-2711.42	4476.75	0.606	✔
T10	20 - 6.7	4.13	3.73	93.9 K=0.70	13.505	0.3326	-2217.67	4492.30	0.494	✔
T11	6.7 - 0	3.81	3.32	83.7 K=0.70	14.655	0.3326	-1801.53	4874.67	0.370	✔

Horizontal 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 $\frac{P}{P_a}$

ARMOR TOWER ENGINEERING

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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	2.50	2.26	81.3 K=1.00	14.912	0.3326	-1418.29	4960.30	0.286 ✓
T2	140 - 120	2.50	2.26	81.3 K=1.00	14.912	0.3326	-804.55	4960.30	0.162 ✓
T5	106.7 - 100	2.50	2.26	81.3 K=1.00	14.912	0.3326	-661.53	4960.30	0.133 ✓
T6	100 - 80	2.50	2.26	81.3 K=1.00	14.912	0.3326	-572.18	4960.30	0.115 ✓
T7	80 - 60	2.50	2.26	81.3 K=1.00	14.912	0.3326	-468.33	4960.30	0.094 ✓
T8	60 - 40	2.50	2.26	81.3 K=1.00	14.912	0.3326	-580.13	4960.30	0.117 ✓
T9	40 - 20	2.50	2.26	81.3 K=1.00	14.912	0.3326	-518.31	4960.30	0.104 ✓
T10	20 - 6.7	2.50	2.26	81.3 K=1.00	14.912	0.3326	-518.33	4960.30	0.104 ✓
T11	6.7 - 0	1.23	0.99	35.8 K=1.00	19.013	0.3326	-508.20	6324.27	0.080 ✓

Secondary Horizontal 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	1.25	1.13	72.3 K=1.00	20.499	0.4418	-0.01	9056.00	0.000 ✓
T2	140 - 120	2.50	2.26	144.7 K=1.00	7.135	0.4418	-589.08	3152.29	0.187 ✓
T3	120 - 113.3	2.50	2.26	144.7 K=1.00	7.135	0.4418	-457.94	3152.29	0.145 ✓
T4	113.3 - 106.7	2.50	2.26	144.7 K=1.00	7.135	0.4418	-665.16	3152.29	0.211 ✓
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	18.650	0.3326	-0.01	6203.62	0.000 ✓

Top Girt 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 $\frac{P}{P_a}$
T2	140 - 120	2.50	2.26	81.3 K=1.00	14.912	0.3326	-289.07	4960.30	0.058 ✓
T4	113.3 - 106.7	2.50	2.26	81.3 K=1.00	14.912	0.3326	-217.43	4960.30	0.044 ✓
T5	106.7 - 100	2.50	2.26	81.3 K=1.00	14.912	0.3326	-169.97	4960.30	0.034 ✓

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Bottom Girt 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	2.50	2.26	81.3 K=1.00	14.912	0.3326	-380.07	4960.30	0.077 ✔

Top Guy Pull-Off 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	2.50	2.26	86.8 K=1.00	17.618	1.2272	-1489.09	21621.00	0.069 ✔

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 (421)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-10065.50	32192.10	0.313 ✔
T1	160 - 140 (422)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-10261.80	32192.10	0.319 ✔
T1	160 - 140 (427)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-10873.10	32192.10	0.338 ✔
T1	160 - 140 (428)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-10839.80	32192.10	0.337 ✔
T1	160 - 140 (433)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-10431.40	32192.10	0.324 ✔
T1	160 - 140 (434)	4.16	3.96	80.9 K=1.00	15.257	2.1100	-10502.20	32192.10	0.326 ✔

Tension Checks

Leg Design Data (Tension)

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	20.00	3.32	43.1	30.000	2.2535	20919.30	67606.20	0.309 ✔
T2	140 - 120	20.00	1.65	21.5	30.000	2.2535	20599.20	67606.20	0.305 ✔
T3	120 - 113.3	6.70	1.65	21.0	30.000	1.7040	8126.77	51121.50	0.159 ✔
T4	113.3 - 106.7	6.60	1.65	20.9	30.000	1.7040	17180.20	51121.50	0.336 ✔
T5	106.7 - 100	6.70	3.31	41.9	30.000	1.7040	3130.74	51121.50	0.061 ✔

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Diagonal Design Data (Tension)

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	135.1	21.000	0.3326	4836.87	6985.33	0.692 ✓
T2	140 - 120	4.14	1.87	67.4	21.000	0.3326	3223.72	6985.33	0.461 ✓
T3	120 - 113.3	4.15	1.87	67.4	21.000	0.3326	3111.45	6985.33	0.445 ✓
T4	113.3 - 106.7	4.14	1.87	67.3	21.000	0.3326	3450.91	6985.33	0.494 ✓
T5	106.7 - 100	4.15	3.75	134.8	21.000	0.3326	2421.22	6985.33	0.347 ✓
T6	100 - 80	4.14	3.75	134.8	21.000	0.3326	1801.81	6985.33	0.258 ✓
T7	80 - 60	4.14	3.75	134.8	21.000	0.3326	882.55	6985.33	0.126 ✓
T8	60 - 40	4.14	3.75	134.8	21.000	0.3326	1566.90	6985.33	0.224 ✓
T9	40 - 20	4.14	3.75	134.8	21.000	0.3326	1066.22	6985.33	0.153 ✓
T10	20 - 6.7	4.13	3.73	134.2	21.000	0.3326	587.61	6985.33	0.084 ✓

Horizontal Design Data (Tension)

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	2.50	2.26	81.3	21.000	0.3326	1517.83	6985.33	0.217 ✓
T2	140 - 120	2.50	2.26	81.3	21.000	0.3326	1876.59	6985.33	0.269 ✓
T3	120 - 113.3	2.50	2.26	81.3	21.000	0.3326	1556.48	6985.33	0.223 ✓
T5	106.7 - 100	2.50	2.26	81.3	21.000	0.3326	661.53	6985.33	0.095 ✓
T6	100 - 80	2.50	2.26	81.3	21.000	0.3326	583.76	6985.33	0.084 ✓
T7	80 - 60	2.50	2.26	81.3	21.000	0.3326	595.40	6985.33	0.085 ✓
T8	60 - 40	2.50	2.26	81.3	21.000	0.3326	580.13	6985.33	0.083 ✓
T9	40 - 20	2.50	2.26	81.3	21.000	0.3326	621.35	6985.33	0.089 ✓
T10	20 - 6.7	2.50	2.26	81.3	21.000	0.3326	679.24	6985.33	0.097 ✓
T11	6.7 - 0	1.23	0.99	35.8	21.000	0.3326	597.20	6985.33	0.085 ✓

Secondary Horizontal Design Data (Tension)

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	1.25	1.13	72.3	30.000	0.4418	0.01	13253.60	0.000 ✓
T2	140 - 120	2.50	2.26	144.7	30.000	0.4418	589.08	13253.60	0.044 ✓
T3	120 - 113.3	2.50	2.26	144.7	30.000	0.4418	457.94	13253.60	0.035 ✓
T4	113.3 - 106.7	2.50	2.26	144.7	30.000	0.4418	665.16	13253.60	0.050 ✓
T5	106.7 - 100	1.25	1.13	72.3	30.000	0.4418	0.02	13253.60	0.000 ✓
T8	60 - 40	1.25	1.13	40.7	21.000	0.3326	0.01	6985.33	0.000 ✓

ARMOR TOWER ENGINEERING

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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	

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	21.000	0.3326	629.00	6985.33	0.090 ✓
T3	120 - 113.3	2.50	2.26	81.3	21.000	0.3326	510.12	6985.33	0.073 ✓
T4	113.3 - 106.7	2.50	2.26	81.3	21.000	0.3326	2080.36	6985.33	0.298 ✓
T5	106.7 - 100	2.50	2.26	81.3	21.000	0.3326	2146.09	6985.33	0.307 ✓
T6	100 - 80	2.50	2.26	81.3	21.000	0.3326	285.62	6985.33	0.041 ✓
T7	80 - 60	2.50	2.26	81.3	21.000	0.3326	267.14	6985.33	0.038 ✓
T8	60 - 40	2.50	2.26	81.3	21.000	0.3326	349.97	6985.33	0.050 ✓
T9	40 - 20	2.50	2.26	81.3	21.000	0.3326	306.98	6985.33	0.044 ✓
T10	20 - 6.7	2.50	2.26	81.3	21.000	0.3326	327.04	6985.33	0.047 ✓
T11	6.7 - 0	2.47	2.23	80.2	21.000	0.3326	2041.19	6985.33	0.292 ✓

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	21.000	0.3326	701.01	6985.33	0.100 ✓
T2	140 - 120	2.50	2.26	81.3	21.000	0.3326	611.95	6985.33	0.088 ✓
T5	106.7 - 100	2.50	2.26	81.3	21.000	0.3326	343.08	6985.33	0.049 ✓
T6	100 - 80	2.50	2.26	81.3	21.000	0.3326	296.79	6985.33	0.042 ✓
T7	80 - 60	2.50	2.26	81.3	21.000	0.3326	262.71	6985.33	0.038 ✓
T8	60 - 40	2.50	2.26	81.3	21.000	0.3326	365.64	6985.33	0.052 ✓
T9	40 - 20	2.50	2.26	81.3	21.000	0.3326	320.20	6985.33	0.046 ✓
T10	20 - 6.7	2.50	2.26	81.3	21.000	0.3326	2054.57	6985.33	0.294 ✓

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	1486.64	36815.50	0.040 ✓
T4	113.3 - 106.7	2.50	2.26	86.8	30.000	1.2272	6347.64	36815.50	0.172 ✓
T8	60 - 40	2.50	2.26	86.8	30.000	1.2272	3581.38	36815.50	0.097 ✓

ARMOR TOWER ENGINEERING *Armor Tower, Inc.* *9 N Main St..* *Cortland, NY 13045* *Phone: (607) 591-5381* *FAX: (866) 870-0840*	**Job** REANALYSIS OF 160' GUYED TOWER	**Page** 9 of 11
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Torque-Arm Top 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 (419)	2.50	2.38	31.3	21.600	2.1100	6030.71	45576.00	0.132 ✓
T1	160 - 140 (420)	2.50	2.38	31.3	21.600	2.1100	5987.18	45576.00	0.131 ✓
T1	160 - 140 (425)	2.50	2.38	31.3	21.600	2.1100	5989.77	45576.00	0.131 ✓
T1	160 - 140 (426)	2.50	2.38	31.3	21.600	2.1100	5949.47	45576.00	0.131 ✓
T1	160 - 140 (431)	2.50	2.38	31.3	21.600	2.1100	6177.34	45576.00	0.136 ✓
T1	160 - 140 (432)	2.50	2.38	31.3	21.600	2.1100	5864.40	45576.00	0.129 ✓

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 (421)	4.16	3.96	52.0	21.600	2.1100	1122.50	45576.00	0.025 ✓
T1	160 - 140 (422)	4.16	3.96	52.0	21.600	2.1100	1096.63	45576.00	0.024 ✓
T1	160 - 140 (427)	4.16	3.96	52.0	21.600	2.1100	1628.62	45576.00	0.036 ✓
T1	160 - 140 (428)	4.16	3.96	52.0	21.600	2.1100	1656.66	45576.00	0.036 ✓
T1	160 - 140 (433)	4.16	3.96	52.0	21.600	2.1100	1348.43	45576.00	0.030 ✓
T1	160 - 140 (434)	4.16	3.96	52.0	21.600	2.1100	1373.31	45576.00	0.030 ✓

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	-34509.80	75771.45	45.5	Pass
T2	140 - 120	Leg	51	-34010.60	82406.06	41.3	Pass
T3	120 - 113.3	Leg	128	-26439.00	61473.56	43.0	Pass
T4	113.3 - 106.7	Leg	155	-38403.10	61143.91	62.8	Pass
T5	106.7 - 100	Leg	182	-38193.30	55640.89	68.6	Pass
T6	100 - 80	Leg	202	-33035.00	55192.73	59.9	Pass
T7	80 - 60	Leg	243	-27038.90	54207.64	49.9	Pass
T8	60 - 40	Leg	285	-33494.00	56654.50	59.1	Pass
T9	40 - 20	Leg	335	-29924.40	56325.91	53.1	Pass
T10	20 - 6.7	Leg	377	-29925.90	56359.10	53.1	Pass
T11	6.7 - 0	Leg	407	-28849.00	56056.12	51.5	Pass
T1	160 - 140	Diagonal	31	-5215.04	5954.50	87.6	Pass
T2	140 - 120	Diagonal	59	-4624.31	7240.14	63.9	Pass
T3	120 - 113.3	Diagonal	134	-4936.50	7238.59	68.2	Pass
T4	113.3 - 106.7	Diagonal	172	-5236.35	7243.23	72.3	Pass
T5	106.7 - 100	Diagonal	198	-3397.52	5964.91	57.0	Pass
T6	100 - 80	Diagonal	241	-3147.61	5967.51	52.7	Pass
T7	80 - 60	Diagonal	252	-2371.85	5967.51	39.7	Pass
T8	60 - 40	Diagonal	310	-3232.25	5967.51	54.2	Pass
T9	40 - 20	Diagonal	374	-2711.42	5967.51	45.4	Pass

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Section No.	Elevation ft	Component Type	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T10	20 - 6.7	Diagonal	384	-2217.67	5988.24	37.0	Pass
T11	6.7 - 0	Diagonal	415	-1801.53	6497.93	27.7	Pass
T1	160 - 140	Horizontal	42	-1418.29	6612.08	21.4	Pass
T2	140 - 120	Horizontal	114	1876.59	9311.44	20.2	Pass
T3	120 - 113.3	Horizontal	139	1556.48	9311.44	16.7	Pass
T5	106.7 - 100	Horizontal	195	-661.53	6612.08	10.0	Pass
T6	100 - 80	Horizontal	214	-572.18	6612.08	8.7	Pass
T7	80 - 60	Horizontal	255	-468.33	6612.08	7.1	Pass
T8	60 - 40	Horizontal	305	-580.13	6612.08	8.8	Pass
T9	40 - 20	Horizontal	346	-518.31	6612.08	7.8	Pass
T10	20 - 6.7	Horizontal	389	-518.33	6612.08	7.8	Pass
T11	6.7 - 0	Horizontal	412	597.20	9311.44	6.4	Pass
T1	160 - 140	Secondary Horizontal	13	-0.01	12071.65	0.0	Pass
T2	140 - 120	Secondary Horizontal	68	-589.08	4202.00	14.0	Pass
T3	120 - 113.3	Secondary Horizontal	143	-457.94	4202.00	10.9	Pass
T4	113.3 - 106.7	Secondary Horizontal	169	-665.16	4202.00	15.8	Pass
T5	106.7 - 100	Secondary Horizontal	193	-0.01	12071.65	0.0	Pass
T8	60 - 40	Secondary Horizontal	297	-0.01	8269.43	0.1	Pass
T2	140 - 120	Top Girt	53	629.00	9311.44	6.8	Pass
T3	120 - 113.3	Top Girt	130	510.12	9311.44	5.5	Pass
T4	113.3 - 106.7	Top Girt	157	2080.36	9311.44	22.3	Pass
T5	106.7 - 100	Top Girt	186	2146.09	9311.44	23.0	Pass
T6	100 - 80	Top Girt	206	285.62	9311.44	3.1	Pass
T7	80 - 60	Top Girt	246	267.14	9311.44	2.9	Pass
T8	60 - 40	Top Girt	288	349.97	9311.44	3.8	Pass
T9	40 - 20	Top Girt	338	306.98	9311.44	3.3	Pass
T10	20 - 6.7	Top Girt	379	327.04	9311.44	3.5	Pass
T11	6.7 - 0	Top Girt	408	2041.19	9311.44	21.9	Pass
T1	160 - 140	Bottom Girt	8	701.01	9311.44	7.5	Pass
T2	140 - 120	Bottom Girt	55	611.95	9311.44	6.6	Pass
T5	106.7 - 100	Bottom Girt	189	343.08	9311.44	3.7	Pass
T6	100 - 80	Bottom Girt	209	296.79	9311.44	3.2	Pass
T7	80 - 60	Bottom Girt	249	262.71	9311.44	2.8	Pass
T8	60 - 40	Bottom Girt	293	365.64	9311.44	3.9	Pass
T9	40 - 20	Bottom Girt	339	320.20	9311.44	3.4	Pass
T10	20 - 6.7	Bottom Girt	381	2054.57	9311.44	22.1	Pass
T1	160 - 140	Guy A@160	429	8154.35	10400.00	78.4	Pass
T4	113.3 - 106.7	Guy A@110	437	18879.80	29150.00	64.8	Pass
T8	60 - 40	Guy A@50	440	6153.68	10400.00	59.2	Pass
T1	160 - 140	Guy B@160	423	8199.99	10400.00	78.8	Pass
T4	113.3 - 106.7	Guy B@110	436	18983.70	29150.00	65.1	Pass
T8	60 - 40	Guy B@50	439	6172.96	10400.00	59.4	Pass
T1	160 - 140	Guy C@160	418	8318.27	10400.00	80.0	Pass
T4	113.3 - 106.7	Guy C@110	435	19001.70	29150.00	65.2	Pass
T8	60 - 40	Guy C@50	438	6168.62	10400.00	59.3	Pass
T1	160 - 140	Top Guy Pull-Off@160	5	-1489.09	28820.79	5.2	Pass
T4	113.3 - 106.7	Top Guy Pull-Off@110	166	6347.64	49075.06	12.9	Pass
T8	60 - 40	Top Guy Pull-Off@50	313	3581.38	49075.06	7.3	Pass
T1	160 - 140	Torque Arm Top@160	431	6177.34	60752.81	10.2	Pass
T1	160 - 140	Torque Arm Bottom@160	427	-10873.10	42912.07	25.3	Pass
						Summary	
					Leg (T5)	68.6	Pass
					Diagonal (T1)	87.6	Pass
					Horizontal (T1)	21.4	Pass
					Secondary Horizontal (T4)	15.8	Pass

ARMOR TOWER ENGINEERING *Armor Tower, Inc.* *9 N Main St.,* *Cortland, NY 13045* *Phone: (607) 591-5381* *FAX: (866) 870-0840*	**Job** REANALYSIS OF 160' GUYED TOWER	**Page** 11 of 11
	Project Prospect North, CT	**Date** 16:23:15 06/09/14
	Client Verizon Wireless	**Designed by** Archan Shah

Section No.	*Elevation ft*	*Component Type*	*Critical Element*	*P lb*	*SF*P$_{allow}$ lb*	*% Capacity*	*Pass Fail*
					Top Girt (T5)	23.0	Pass
					Bottom Girt (T10)	22.1	Pass
					Guy A (T1)	78.4	Pass
					Guy B (T1)	78.8	Pass
					Guy C (T1)	80.0	Pass
					Top Guy Pull-Off (T4)	12.9	Pass
					Torque Arm Top (T1)	10.2	Pass
					Torque Arm Bottom (T1)	25.3	Pass
					Bolt Checks	19.3	Pass
					RATING =	**87.6**	**Pass**