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

November 27, 2012

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

RE: **EM-VER-004-121106** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Talcott Mountain Science Center, 324 Montevideo Road, Avon, 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:

- Prior to antenna installation, the tower modifications identified in the Structural Analysis Report and Reinforcement Design prepared by Centek Engineering dated October 31, 2012, and stamped by Carlo Centore shall be implemented;
- Not more than 45 days following completion of the antenna installation, a signed letter from a Professional Engineer duly licensed in the State of Connecticut shall be submitted to the Council to certify that the recommended modifications have been completed and the tower does not exceed 100 percent of the post-construction structural rating;
- Any deviation from the proposed modification as specified in this notice and supporting materials with 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;
- Not more than 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 November 5, 2012. 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,

Linda Roberts MAB

Linda Roberts
Executive Director

LR/CDM/jbw

c: The Honorable Mark W. Zacchio, Chairman Town Council, Town of Avon
Brandon Robertson, Town Manager, Town of Avon
Steven V. Kushner, Town Planner, Town of Avon
Talcott Mountain Science Center

EM-VER-004-121106

ROBINSON & COLE LLP

CK for $1625.00

REC'D
2012 NOV -6 P 2:22
D-P-U-C
EXECUTIVE SECRETARY

NNETH C. BALDWIN

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Direct (860) 275-8345

Also admitted in Massachusetts

November 5, 2012

RECEIVED
NOV - 6 2012
CONNECTICUT
SITING COUNCIL

Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
Talcott Mountain Science Center, 324 Montevideo Road, Avon, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains six (6) wireless telecommunications antennas at the 55-foot level on an existing 60-foot lattice tower at the above-referenced address. The tower and underlying property are owned by Talcott Mountain Science Center. Cellco's use of the tower was approved by the Council in 1989. Cellco now intends to remove all of its existing antennas and install two (2) model LPA-80063-6CF cellular antennas; two (2) model LPA-80080-6CF cellular antennas; four (4) model LPA-171063-8CF PCS antennas; one (1) model APX75-866514-CT8 LTE antenna; and one (1) model BXA-70080-6CF LTE antenna, for a total of ten (10) antennas, all at the same 55-foot level on the tower. Cellco also intends to remove its nine (9) existing coax cables and replace them with twelve (12) new coax cables. Attached behind Tab 1 are the specifications for Cellco's replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Brandon Roberts, Town Manager of the Town of Avon. A copy of this letter is also being sent to Talcott Mountain Science Center, the owner of the property on which the tower 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), as amended.

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 55-foot level on the existing 60-foot tower.

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

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) adopted safety standard. A Far Field Approximation 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, with certain modifications, can support Cellco's proposed modifications. (See Structural Analysis Report and Reinforcement Design included 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:
Brandon Roberts, Avon Town Manger
Talcott Mountain Science Center
Sandy M. Carter

Amphenol ANTENNA SOLUTIONS

LPA-80063-6CF-EDIN-X

V-Pol | Log Periodic | 63° | 14.5 dBd

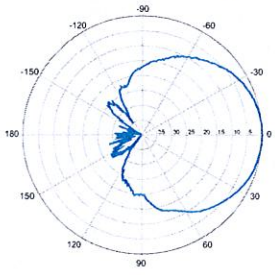
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics		
Frequency bands	806-960 MHz	
Polarization	Vertical	
Horizontal beamwidth	63°	
Vertical beamwidth	10°	
Gain	14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.4:1	
Null fill	5% (-26.02 dB)	
Input power	500 W	
Lightning protection	Direct Ground	
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1805 x 385 x 332 mm	71.1 x 15.2 x 13.1 in
Depth of antenna with z-bracket	372 mm	14.6 in
Weight without mounting brackets	12.3 kg	27 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.70 m^2 Side: 0.59 m^2	Front: 7.5 ft^2 Side: 6.3 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 885 N Side: 757 N	Front: 199 lbf Side: 170 lbf

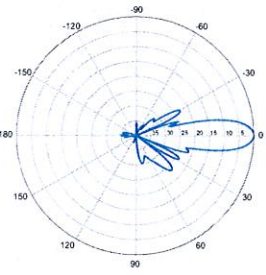
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit (0-20°)	21700000	50-102 mm 2.0-4.0 in	11 kg 25 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80063-6CF-EDIN-X



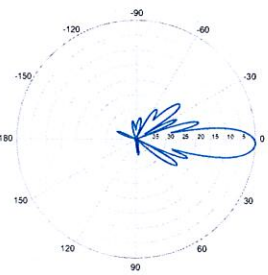
Horizontal

LPA-80063-6CF-EDIN-0



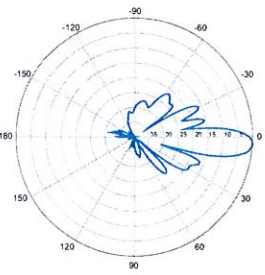
0° | Vertical

LPA-80063-6CF-EDIN-2



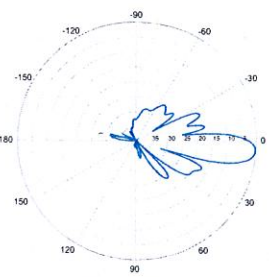
2° | Vertical

LPA-80063-6CF-EDIN-4



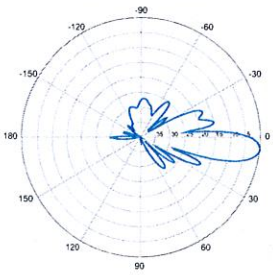
4° | Vertical

LPA-80063-6CF-EDIN-5



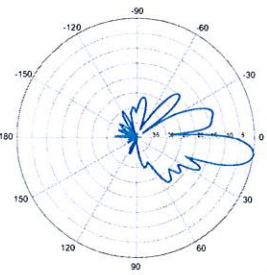
5° | Vertical

LPA-80063-6CF-EDIN-6



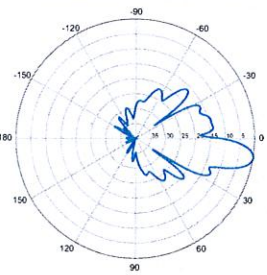
6° | Vertical

LPA-80063-6CF-EDIN-8



8° | Vertical

LPA-80063-6CF-EDIN-10



10° | Vertical

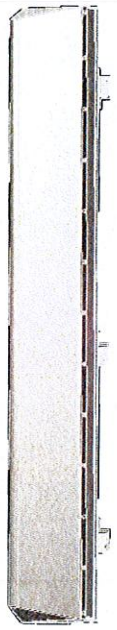
Amphenol ANTENNA SOLUTIONS

LPA-80080-6CF-EDIN-X

V-Pol | Log Periodic | 80° | 14.0 dBd

Replace "X" with desired electrical downtilt

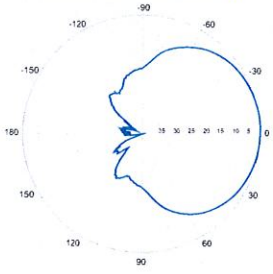
Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.



Electrical Characteristics		
Frequency bands	806-960 MHz	
Polarization	Vertical	
Horizontal beamwidth	80°	
Vertical beamwidth	10°	
Gain	14.0 dBd (16.1 dBi)	
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.4:1	
Upper sidelobe suppression (0°)	-22.6 dB	
Null fill	10% (-20.0 dB)	
Input power	500 W	
Lightning protection	Direct Ground	
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1800 x 140 x 335 mm	70.9 x 5.5 x 13.2 in
Depth of antenna with z-bracket	375 mm	14.8 in
Weight without mounting brackets	9.5 kg	21.0 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.25 m^2 Side: 0.61 m^2	Front: 2.7 ft^2 Side: 6.6 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 415 N Side: 878 N	Front: 93 lbf Side: 198 lbf

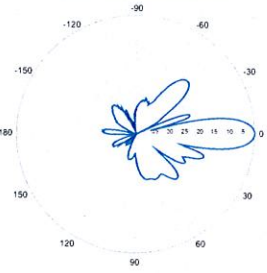
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit (0-20°)	21700000	50-102 mm 2.0-4.0 in	11 kg 25 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80080-6CF-EDIN-X



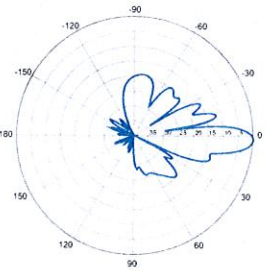
Horizontal | 750 MHz

LPA-80080-6CF-EDIN-0



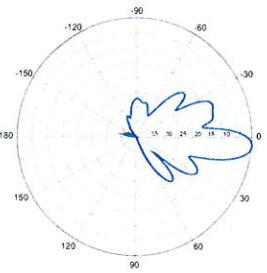
0° | Vertical

LPA-80080-6CF-EDIN-2



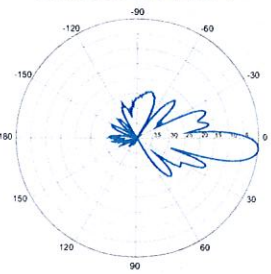
2° | Vertical

LPA-80080-6CF-EDIN-4



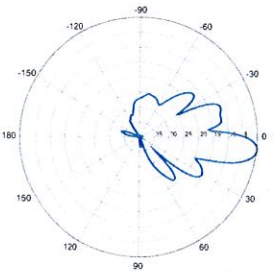
4° | Vertical

LPA-80080-6CF-EDIN-5



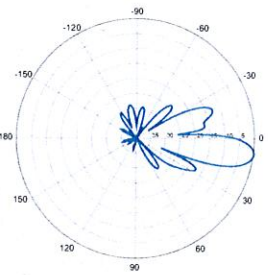
5° | Vertical

LPA-80080-6CF-EDIN-6



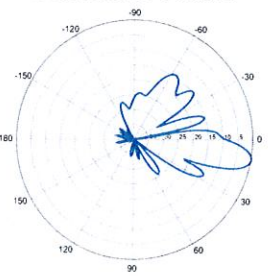
6° | Vertical

LPA-80080-6CF-EDIN-8



8° | Vertical

LPA-80080-6CF-EDIN-10



10° | Vertical

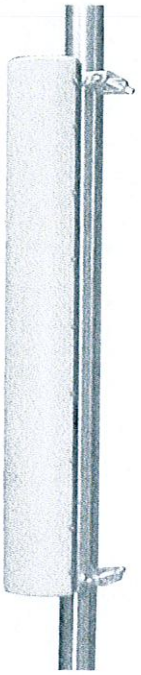
Amphenol ANTENNA SOLUTIONS

LPA-171063-8CF-EDIN-X

V-Pol | Log Periodic | 63° | 17.0-17.5 dBi

Replace "X" with desired electrical downtilt.

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

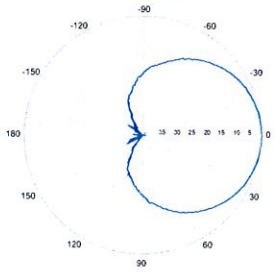


Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1755 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	Vertical		
Horizontal beamwidth	61°	63°	60°
Vertical beamwidth	6°	7°	6°
Gain	14.9 dBd (17.0 dBi)	15.4 dBd (17.5 dBi)	14.9 dBd (17.0 dBi)
Electrical downtilt (X)	0, 2		
Impedance	50Ω		
VSWR	≤ 1.5:1		
Null fill	5% (-26.02 dB)		
Input power	250 W		
Lightning protection	Direct Ground		
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)		

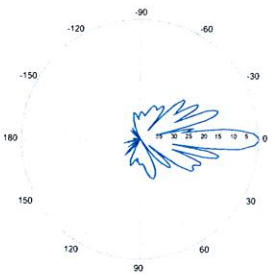
Mechanical Characteristics		
Dimensions Length x Width x Depth	1207 x 203 x 203 mm	47.5 x 8.0 x 8.0 in
Weight without mounting brackets	5.2 kg	11.5 lbs
Survival wind speed	>201 km/hr	>125 mph
Wind area	Front: 0.20 m² Side: 0.27 m²	Front: 2.2 ft² Side: 2.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 246 N Side: 323 N	Front: 55.3 lbf Side: 72.7 lbf

Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5.0 lbs
2-Point Mounting and Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	2.3 kg 5.0 lbs

1710-1880 MHz

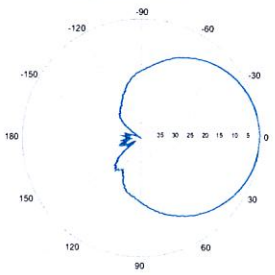


Horizontal

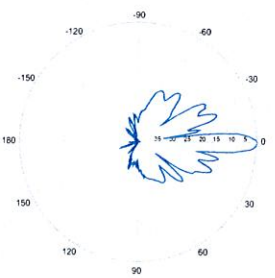


0° | Vertical

1850-1990 MHz

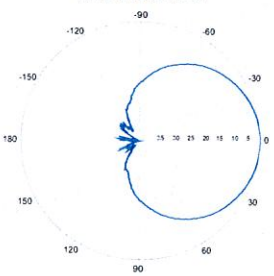


Horizontal

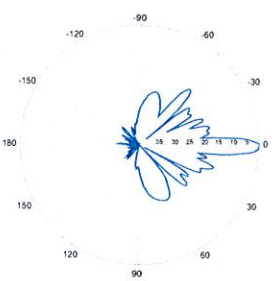


0° | Vertical

1920-2170 MHz



Horizontal

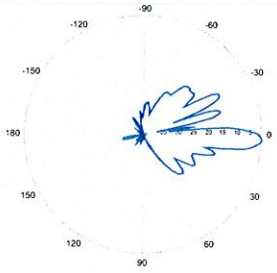


0° | Vertical

LPA-171063-8CF-EDIN-X

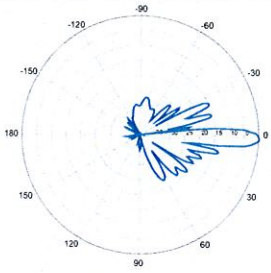
V-Pol | Log Periodic | 63° | 17.0-17.5 dBi

1710-1880 MHz



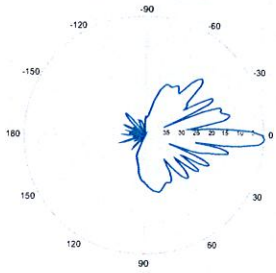
2° | Vertical

1850-1990 MHz



2° | Vertical

1920-2170 MHz



2° | Vertical

Product Data Sheet **APX75-866514-CT8**

Optimizer® Dual Polarized Antenna, 698-896, 65deg, 16.1dBi, 2m, FET, 8deg

Product Description

Wideband antenna for dense networks where site aspect is essential.

Features/Benefits

- **Wideband performance 698-896 MHz**
- **High sidelobe suppression**
- **Null fill**
- **Dual polarization**
- **High front-to-back ratio**

Technical Specifications

Electrical Specifications

Frequency Range, MHz	698-896
Horizontal Beamwidth, deg	66 +/-5
Vertical Beamwidth, deg	9-12
Electrical Downtilt Range, deg	8
Gain, dBi (dBd)	16.1 (14)
1st Upper Sidelobe Suppression, dB	>18
Upper Sidelobe Suppression, dB	>18
Front-To-Back Ratio, dB	>30
Polarization	Slant +/-45 degrees
VSWR	1.40:1
Isolation between Ports, dB	>30
3rd Order IMP @ 2 x 43 dBm, dBc	>150
Impedance, Ohms	50
Maximum Power Input, W	500
Lightning Protection	Chassis Ground
Connector Type/Location	(2) 7-16 Long Neck DIN Female/Bottom

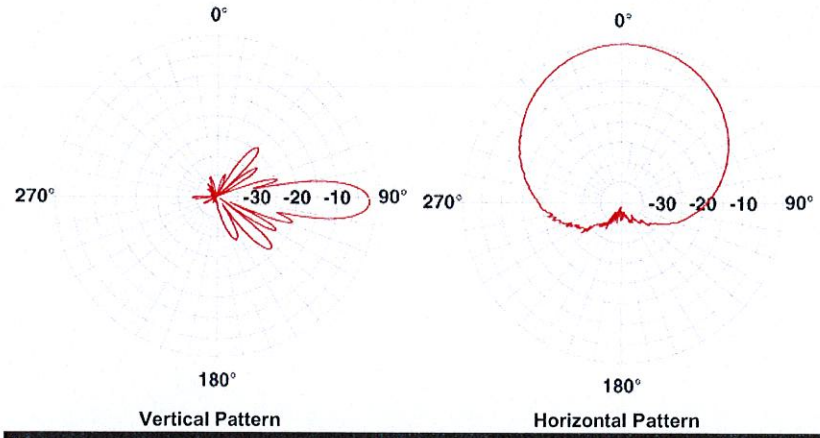
Mechanical Specifications

Dimensions - HxWxD, mm (in)	2082.8 x 311.2 x 120.7 (82 x 12.25 x 4.75)
Weight w/o Mtg Hardware, kg (lb)	14.0 (30.8)
Survival/Rated Wind Speed, km/h (mph)	200 (125) / 160 (100)
Operation temperature, °C (°F)	-40 to +60 (-40 to +140)
Radome Material/Color	ASA Plastic/Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Radiating Element Material	Brass
Reflector Material	Aluminum

Ordering Information

Mounting Hardware	APM40-3
Mounting Pipe Diameter, mm (in)	60-120 (2.36-4.72)
Mounting Hardware Weight, kg (lb)	5.4 (11.9)

Optimizer® Dual Polarized Antenna, 698-896, 65deg, 16.1dBi, 2m, FET, 8deg



Vertical Pattern **Horizontal Pattern**

Notes

For additional mounting information please click "External Document Link" below.

External Document Links

APM40 Series Datasheet
APM40 Series Installation Instructions

Amphenol ANTENNA SOLUTIONS

BXA-70080-6CF-EDIN-X

X-Pol | FET Panel | 80° | 13.5 dBd

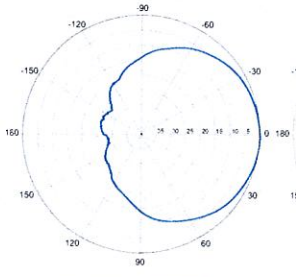
Replace "X" with desired electrical downtilt.

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	82°	80°
Vertical beamwidth	12°	10°
Gain	13.0 dBd (15.1 dBi)	13.5 dBd (15.6 dBi)
Electrical downtilt (X)	0, 2, 4, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.6 dB
Front-to-back ratio (+/-30°)	-26.9 dB	-25.6 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -30 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 204 x 151 mm	71.0 x 8.0 x 5.9 in
Depth with z-brackets	191 mm	7.5 in
Weight without mounting brackets	8.2 kg	18 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.37 m^2 Side: 0.27 m^2	Front: 3.9 ft^2 Side: 2.9 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 531 N Side: 475 N	Front: 119 lbf Side: 104 lbf

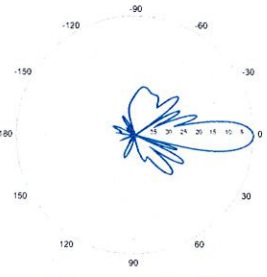
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70080-6CF-EDIN-X-FP		

BXA-70080-6CF-EDIN-X



Horizontal | 750 MHz

BXA-70080-6CF-EDIN-0



0° | Vertical | 750 MHz

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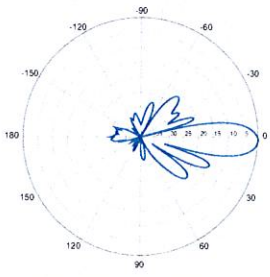
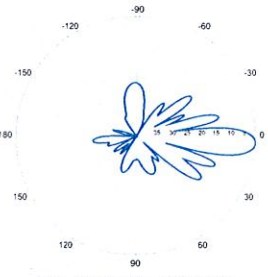
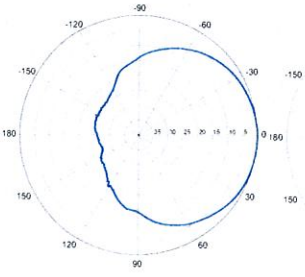


2° | Vertical | 750 MHz

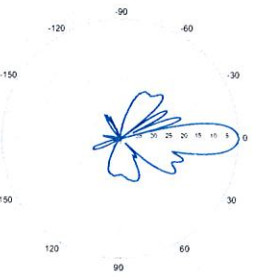
BXA-70080-6CF-EDIN-4



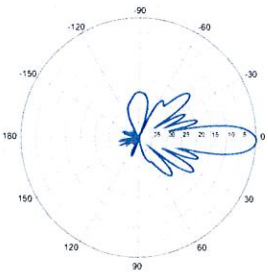
4° | Vertical | 750 MHz



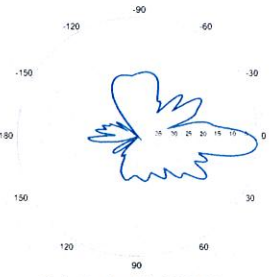
Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

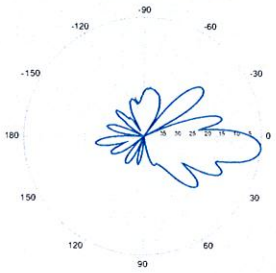


4° | Vertical | 850 MHz

BXA-70080-6CF-EDIN-X

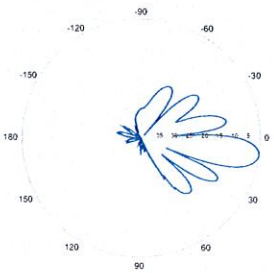
X-Pol | FET Panel | 80° | 13.5 dBd

BXA-70080-6CF-EDIN-6



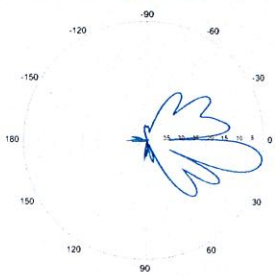
6° | Vertical | 750 MHz

BXA-70080-6CF-EDIN-8

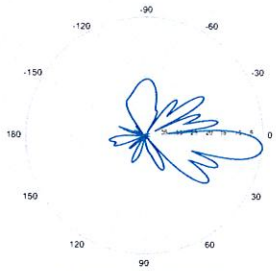


8° | Vertical | 750 MHz

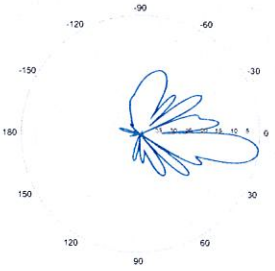
BXA-70080-6CF-EDIN-10



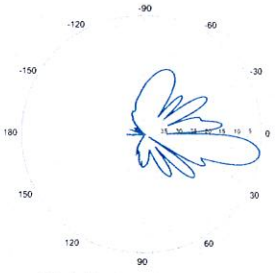
10° | Vertical | 750 MHz



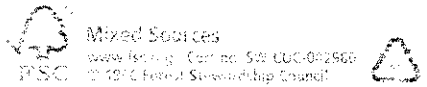
6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz


Mixed Sources
FSC

Far Field Approximation
with downtilt variation

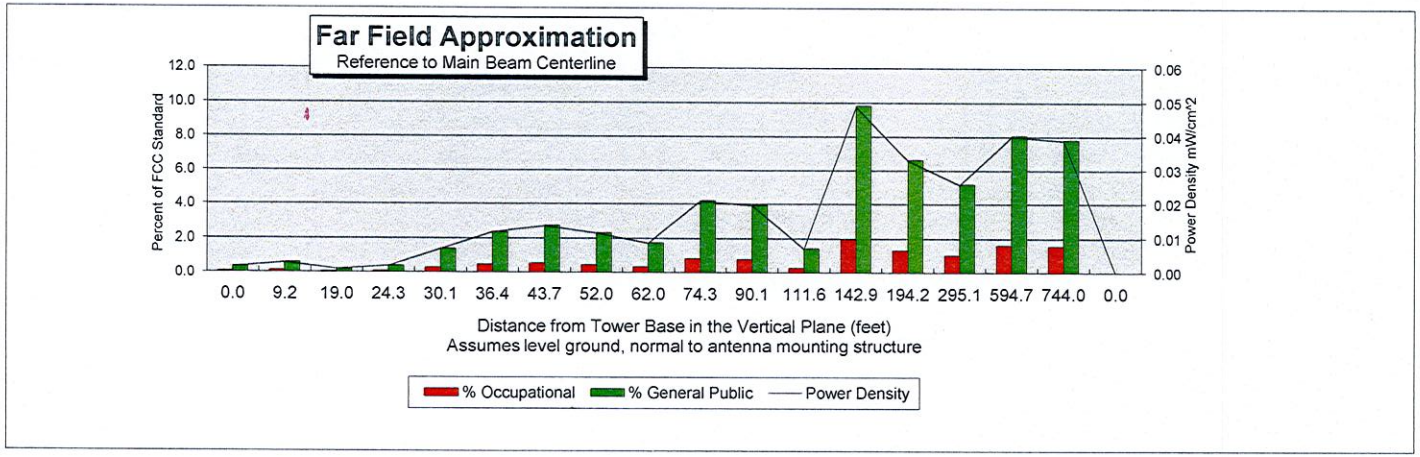
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Talcott Mtn, CT
Site #:	
Date:	10/04/12
Name:	Mark Brauer
File Name:	Talcott Mtn, CT - FF Power

Operating Freq. (MHz)	**746.0**
Antenna Height (ft):	**55.0**
Antenna Gain (dBi):	**16.7**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
Power @ J4 (w):	**2235.0**



This approximation is only valid in the far field, which begins at: 64.4 Feet

Enter Main Beam Distance in feet below:

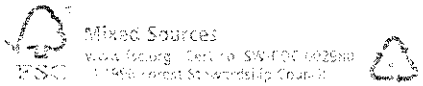
Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	0.0	
Solve for r, dx to antenna	52.0	52.8	55.3	57.4	60.1	63.5	67.9	73.6	80.9	90.7	104.0	123.1	152.1	201.0	299.6	596.9	745.8	#####	
Distance from Antenna Structure Base in Horizontal plane	0.0	9.2	19.0	24.3	30.1	36.4	43.7	52.0	62.0	74.3	90.1	111.6	142.9	194.2	295.1	594.7	744.0	#####	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	0	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.05	0.03	0.03	0.04	0.04	#####	#NUM!
Percent of Occupational Standard	0.1	0.1	0.0	0.1	0.3	0.5	0.5	0.5	0.4	0.8	0.8	0.3	2.0	1.3	1.0	1.6	1.6	#####	#NUM!
Percent of General Population Standard	0.4	0.6	0.2	0.4	1.4	2.4	2.7	2.3	1.8	4.2	3.9	1.4	9.8	6.6	5.2	8.1	7.8	#####	#NUM!

Antenna Type BXA-70063-6CF

9.8 Max%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Pc
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.


Mixed Sources
FSC

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report and Reinforcement Design

60-ft Existing Lattice Tower

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Talcott Mountain

324 Montevideo Road
Avon, CT

Centek Project No. 12001.CO76

~~Date: October 18, 2012~~

Rev 1: October 31, 2012

Prepared for:

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

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

SECTION 4 – DRAWINGS

SECTION 5 – REFERENCE MATERIAL

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Verizon Wireless on the existing lattice (tower) located in Avon, CT.

The host tower is a 60-ft, three legged, steel lattice tower. The tower geometry and structure member sizes were obtained from a previous structural report prepared by Walker Engineering, Inc. job no.; 05031.CO1 dated March 1, 2005.

Antenna and appurtenance information were obtained from the aforementioned Walker structural report, visual verification conducted from grade by Centek personnel during September 2012 and a Verizon RF data sheet.

The tower consists of one (1) tapered and two (2) straight vertical steel sections consisting of ASTM A53-B-35 (35ksi) pipe legs. Diagonal and horizontal lateral support bracing consists of steel angle conforming to ASTM A36 (36ksi) and steel pipe conforming to ASTM A53-B-35 (35ksi). The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by bolted and welded gusset connections. The tower face width is 7.58-ft at the top and 9.70-ft at the bottom.

Verizon proposes the removal of six (6) existing antennas and the installation of ten (10) panel antennas mounted on two (2) proposed 13-ft face mount frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- UNKNOWN (Existing):
  Antennas: One (1) Doppler radar with an 18-ft dome mounted to the top of the tower.
  Coax Cables: One (1) 7/8" Ø cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **VERIZON WIRELESS (Existing to Remove):**
  Antennas: Four (4) Swedcom ALP6011 and two (2) Andrew 932LG65VTE-M panel antennas mounted to the face of the existing tower with a RAD center elevation of ±55-ft above finished grade.
  Coax Cables: Nine (9) 7/8" Ø coax cables on a leg/face of the existing tower as specified in Section 3 of this report.
- **VERIZON WIRELESS (Proposed):**
  Antennas: One (1) RFS APX75-866514-CT8, one (1) Antel BXA-70080-6CF, two (2) Antel LPA-80063-6CF, two (2) LPA-80080-6CF, and four (4) Antel LPA-171063-8CF panel antennas mounted on two (2) 13-ft face mount fames with a RAD center elevation of ±55-ft above finished grade.
  Coax Cables: Twelve (12) 1-5/8" Ø coax cables on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

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

Analysis

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

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

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

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

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

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

Tower Capacity

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

- Calculated stresses were found to be within allowable limits. In Load Case 1, per RISATower "Section Capacity Table", this tower was found to be at **99.6%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T3)	13.1'-19.5'	99.6%	**PASS**
Diagonal (T2)	19.5'-39.5'	65.9%	**PASS**

Foundation and Anchors

Based on observations made and obtained field measurements, the existing tower foundation system was determined to consist of three (3) 4-ft square reinforced concrete pier foundations with heights varying from ±2-ft to ±4ft AGL bearing directly on rock. The existing tower legs are encased within the top ±1.0-ft of the concrete piers.

The rock design parameters utilized in the analysis of the existing foundation system were based on design values established for basalt which is consistent to the site location.

Based on the tower base reactions obtained from our analysis, it is be reasonable to assume that the existing tower foundation system is anchored to the underlying bedrock. However, as the design and extent of the existing anchorage system could not be verified, any additional resistance provided by the presence of anchors was not taken into account.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Load Effect	Proposed Tower Reactions
Leg Shear	7 kips
Leg Compression	71 kips
Leg Uplift	65 kips
Base Moment	575 ft-kips
Base Shear	11 kips

- The foundation system **was NOT found** to be within allowable limits. Reinforcement of the existing foundation is required. Refer to the structural modification drawings in Section 4.0 of this report for specific requirements.

Foundation Type	Design Limit	Allowable Limit/FS	Proposed Loading	Result
Existing Foundation				
Independent Pad & Pier	Bearing Pressure	12.0 ksf (4)	4.4 ksf	**PASS**
	Uplift	2.0 (2)	0.22 (3)	FAIL
Foundation with Reinforcement				
Triangular Mat Foundation	Bearing Pressure	12.0 ksf (4)	1.3 ksf	**PASS**
	OM (5)	2.0 (2)	2.9 (2)	**PASS**

Note 2: Min required Factor of Safety (FS) of 2.0 required per IBC 2003/2005 CSBC Section 3108.4.2.
Note 3: Does not include any additional resistance provided by unconfirmed existence of grouted rock anchors.
Note 4: Minimum allowable soil bearing pressure taken as 12.0ksf (conservative) for basalt rock.
Note 5: (OM) Denotes overturning moment.

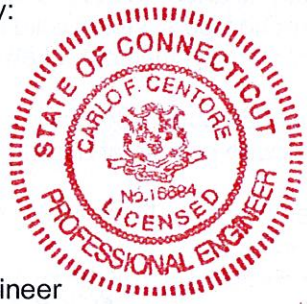
Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed antenna modification **with the implementation of the proposed structural modifications in Section 4.0 of this report.**

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Carlo F. Centore, PE
Principal ~ Structural Engineer

Prepared by:

Jason R. Mead
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

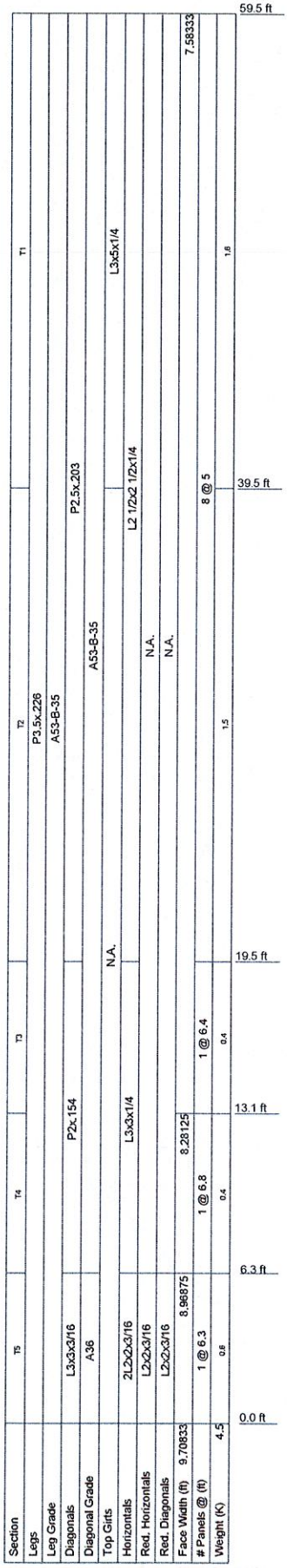
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or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

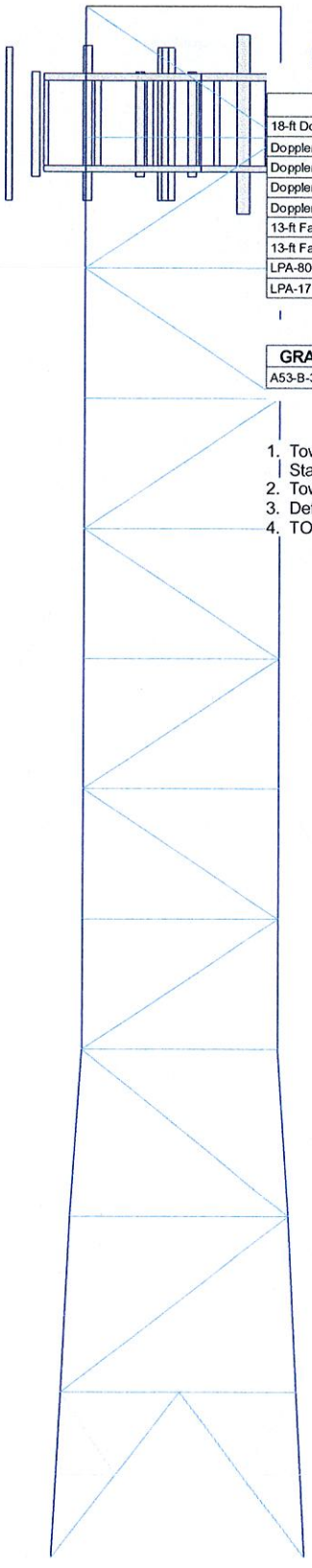
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

RISATower Features:

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





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
18-ft Doppler	68.5	APX75-866514-CT8	55
Doppler Platform	60	LPA-171063-8CF	55
Doppler Platform Support	57	LPA-80063-6CF	55
Doppler Platform Support	57	LPA-80080-6CF	55
Doppler Platform Support	57	LPA-171063-8CF	55
13-ft Face Mount Frame	55	BXA-70080-6CF	55
13-ft Face Mount Frame	55	LPA-171063-8CF	55
LPA-80063-6CF	55	LPA-80080-6CF	55
LPA-171063-8CF	55		

MATERIAL STRENGTH

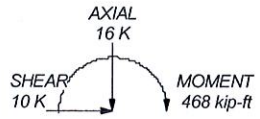
GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

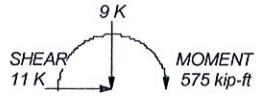
1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 99.6%

△

MAX. CORNER REACTIONS AT BASE:
DOWN: 71 K
UPLIFT: -65 K
SHEAR: 7 K



TORQUE 2 kip-ft
69 mph WIND - 0.5000 in ICE



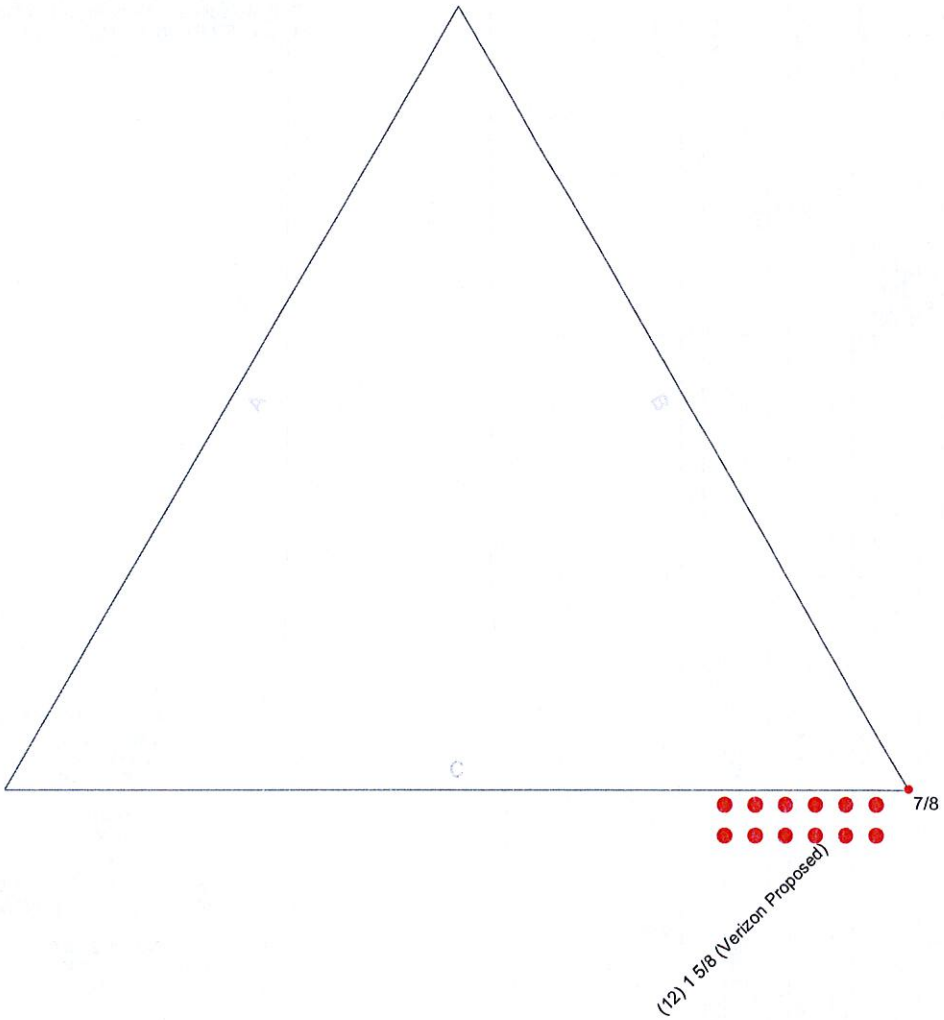
TORQUE 2 kip-ft
REACTIONS - 80 mph WIND

Centek Engineering Inc
63-2 N. Branford Rd.,
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 12001.CO76 - Talcott Mountain ~ Rev 1		
Project: 60' Lattice Tower - 324 Montevideo Road, Avon, CT		
Client: Verizon Wireless	Drawn by: jrm	App'd:
Code: TIA/EIA-222-F	Date: 10/31/12	Scale: NTS
Path: J:\Jobs\12001\00.WTCO76- Talcott Mountain\Rev 1\Calcs\ERI Files\60-ft Lattice Tower.eri		Dwg No. E-1

Feedline Plan

Round Flat App In Face App Out Face



Centek Engineering Inc 63-2 N. Branford Rd., Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***12001.CO76 - Talcott Mountain ~ Rev 1***		
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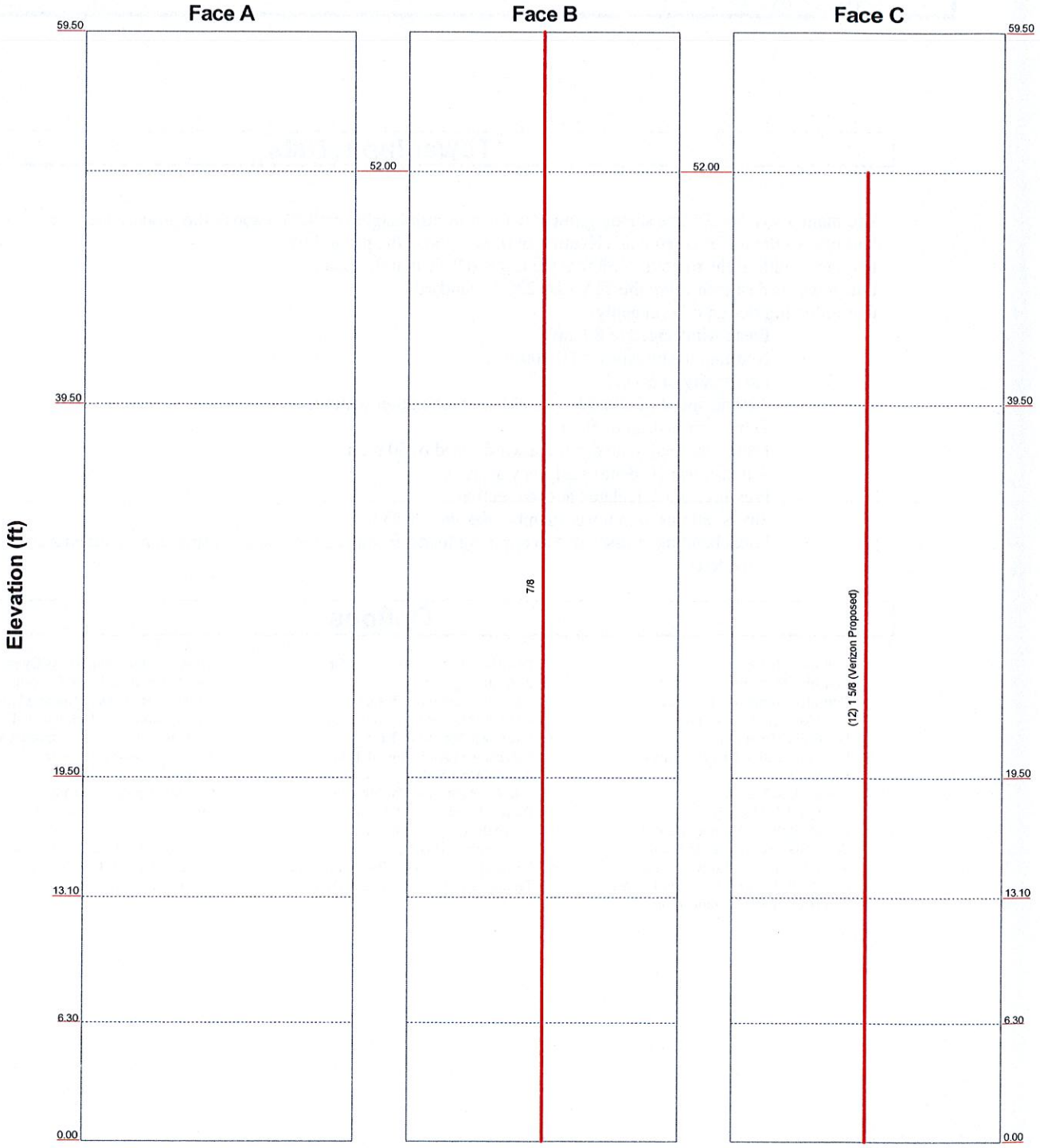
	Client: Verizon Wireless	Drawn by: jrm	App'd:
	Code: TIA/EIA-222-F	Date: 10/31/12	Scale: NTS
	Path: J:\Jobs\12001\00 W\CO76- Talcott Mountain\Rev 1\Calcs\ERI Files\60-ft Lattice Tower.er		Dwg No. E-7

Feedline Distribution Chart
0' - 59'6"

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



Centek Engineering Inc 63-2 N. Branford Rd., Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***12001.CO76 - Talcott Mountain ~ Rev 1***		
	Project: ***60' Lattice Tower - 324 Montevideo Road, Avon, CT***		
	Client: Verizon Wireless	Drawn by: jrm	App'd:
	Code: TIA/EIA-222-F	Date: 10/31/12	Scale: NTS
	Path: J:\Jobs\12001\00.WI\CO76- Talcott Mountain\Rev 1\Calcs\ERI Files\60-ft_Lattice_Tower.er		Dwg No. E-7

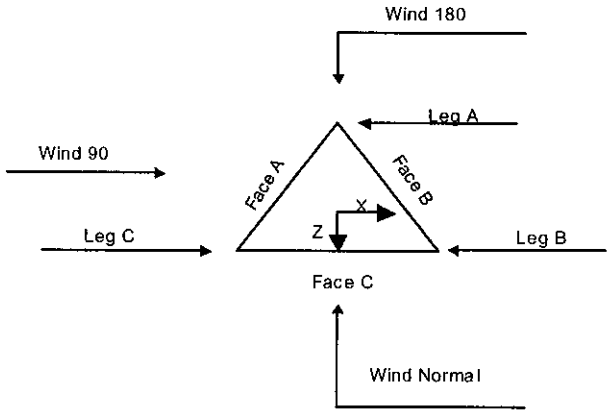
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 59.50 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 7.58 ft at the top and 9.71 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	59.50-39.50			7.58	1	20.00
T2	39.50-19.50			7.58	1	20.00
T3	19.50-13.10			7.58	1	6.40
T4	13.10-6.30			8.28	1	6.80
T5	6.30-0.00			8.97	1	6.30

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	59.50-39.50	5.00	K Brace Left	No	Yes	0.0000	0.0000
T2	39.50-19.50	5.00	K Brace Left	No	Yes	0.0000	0.0000
T3	19.50-13.10	6.40	K Brace Right	No	Yes	0.0000	0.0000
T4	13.10-6.30	6.80	K Brace Left	No	Yes	0.0000	0.0000
T5	6.30-0.00	6.30	K1 Down	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 59.50-39.50	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Pipe	P2.5x.203	A53-B-35 (35 ksi)
T2 39.50-19.50	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Pipe	P2.5x.203	A53-B-35 (35 ksi)
T3 19.50-13.10	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Pipe	P2x.154	A53-B-35 (35 ksi)
T4 13.10-6.30	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Pipe	P2x.154	A53-B-35 (35 ksi)
T5 6.30-0.00	Pipe	P3.5x.226	A53-B-35 (35 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 59.50-39.50	Single Angle	L3x5x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 59.50-39.50	None	Flat Bar		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T2 39.50-19.50	None	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T3 19.50-13.10	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T4 13.10-6.30	None	Single Angle		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T5 6.30-0.00	None	Single Angle		A36 (36 ksi)	Double Equal Angle	2L2x2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T5 6.30-0.00	A36 (36 ksi)	Horizontal (1)	Single Angle	L2x2x3/16	1
		Diagonal (1)	Single Angle	L2x2x3/16	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 59.50-39.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 39.50-19.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 19.50-13.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 13.10-6.30	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 6.30-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	No	1	1	1	1	1	1	1	1
59.50-39.50				1	1	1	1	1	1	1
T2	Yes	No	1	1	1	1	1	1	1	1
39.50-19.50				1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1
19.50-13.10				1	1	1	1	1	1	1
T4 13.10-6.30	Yes	No	0.5	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T5 6.30-0.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 59.50-39.50	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 39.50-19.50	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 19.50-13.10	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 13.10-6.30	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 6.30-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 59.50-39.50	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T2 39.50-19.50	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T3 19.50-13.10	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T4 13.10-6.30	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T5 6.30-0.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 59.50-39.50	Flange	0.8750 A325N	4	0.5000 A325N	2	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T2 39.50-19.50	Flange	0.8750 A325N	4	0.5000 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T3 19.50-13.10	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.7500 A325N	1	0.6250 A325N	0
T4 13.10-6.30	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0
T5 6.30-0.00	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.5000 A325N	1	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon Proposed)	C	Yes	Ar (CfAe)	52.00 - 0.00	1.0000	-0.38	12	6	1.9800	1.9800		1.04
7/8	B	No	Ar (Leg)	59.50 - 0.00	0.0000	0	1	1	1.1100	1.1100		0.54

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	59.50-39.50	A	0.000	0.000	0.000	0.000	0.00
		B	1.850	0.000	0.000	0.000	0.01
		C	14.225	0.000	0.000	0.000	0.16
T2	39.50-19.50	A	0.000	0.000	0.000	0.000	0.00
		B	1.850	0.000	0.000	0.000	0.01
		C	21.650	0.000	0.000	0.000	0.25
T3	19.50-13.10	A	0.000	0.000	0.000	0.000	0.00
		B	0.592	0.000	0.000	0.000	0.00
		C	6.928	0.000	0.000	0.000	0.08
T4	13.10-6.30	A	0.000	0.000	0.000	0.000	0.00
		B	0.629	0.000	0.000	0.000	0.00
		C	7.361	0.000	0.000	0.000	0.08
T5	6.30-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.583	0.000	0.000	0.000	0.00
		C	6.820	0.000	0.000	0.000	0.08

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	59.50-39.50	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		3.517	0.000	0.000	0.000	0.03
		C		22.142	0.000	0.000	0.000	0.38
T2	39.50-19.50	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		3.517	0.000	0.000	0.000	0.03
		C		33.317	0.000	0.000	0.000	0.61
T3	19.50-13.10	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		1.125	0.000	0.000	0.000	0.01
		C		10.661	0.000	0.000	0.000	0.20
T4	13.10-6.30	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		1.196	0.000	0.000	0.000	0.01
		C		11.328	0.000	0.000	0.000	0.21
T5	6.30-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		1.108	0.000	0.000	0.000	0.01
		C		10.495	0.000	0.000	0.000	0.19

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	59.50-39.50	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.710	1.751	0.541	0.815
T2	39.50-19.50	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	1.136	2.802	0.825	1.242
T3	19.50-13.10	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.252	0.663	0.248	0.373
T4	13.10-6.30	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.249	0.658	0.248	0.373

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T5	6.30-0.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.679	1.037	1.560

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	59.50-39.50	4.7460	3.8971	5.3796	4.3468
T2	39.50-19.50	6.7026	5.6222	7.4115	6.1458
T3	19.50-13.10	7.6924	6.4235	8.5333	7.0493
T4	13.10-6.30	8.3243	6.8877	9.2455	7.5708
T5	6.30-0.00	6.2940	5.1453	6.6275	5.3432

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
18-ft Doppler	C	None		0.0000	68.50	No Ice	203.47	203.47	2.00
						1/2" Ice	205.47	205.47	4.40
Doppler Platform	C	None		0.0000	60.00	No Ice	0.00	0.00	1.00
						1/2" Ice	0.00	0.00	1.30
Doppler Platform Support	A	None		0.0000	57.00	No Ice	3.17	3.17	0.10
						1/2" Ice	3.87	3.87	0.14
Doppler Platform Support	B	None		0.0000	57.00	No Ice	3.17	3.17	0.10
						1/2" Ice	3.87	3.87	0.14
Doppler Platform Support	C	None		0.0000	57.00	No Ice	3.17	3.17	0.10
						1/2" Ice	3.87	3.87	0.14
13-ft Face Mount Frame	B	From Face	0.50	0.0000	55.00	No Ice	6.50	6.50	0.30
			0.00			1/2" Ice	7.80	7.80	0.35
			0.00						
13-ft Face Mount Frame	A	From Face	0.50	0.0000	55.00	No Ice	6.50	6.50	0.30
			0.00			1/2" Ice	7.80	7.80	0.35
			0.00						
LPA-80063-6CF	B	From Face	0.50	0.0000	55.00	No Ice	10.31	9.01	0.03
			6.00			1/2" Ice	10.87	9.55	0.10
			0.00						
LPA-171063-8CF	B	From Face	0.50	0.0000	55.00	No Ice	3.69	3.69	0.01
			4.00			1/2" Ice	4.06	4.06	0.04
			0.00						
APX75-866514-CT8	B	From Face	0.50	0.0000	55.00	No Ice	9.77	4.71	0.03
			0.00			1/2" Ice	10.38	5.21	0.08
			0.00						
LPA-171063-8CF	B	From Face	0.50	0.0000	55.00	No Ice	3.69	3.69	0.01
			-4.00			1/2" Ice	4.06	4.06	0.04
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LPA-80063-6CF	B	From Face	0.50 -6.00 0.00	0.0000	55.00	No Ice 1/2" Ice	10.31 10.87	9.01 9.55	0.03 0.10
LPA-80080-6CF	A	From Face	0.50 -8.75 0.00	0.0000	55.00	No Ice 1/2" Ice	4.33 4.76	9.09 9.64	0.02 0.07
LPA-171063-8CF	A	From Face	0.50 -6.75 0.00	0.0000	55.00	No Ice 1/2" Ice	3.69 4.06	3.69 4.06	0.01 0.04
BXA-70080-6CF	A	From Face	0.50 -2.75 0.00	0.0000	55.00	No Ice 1/2" Ice	5.77 6.22	4.56 5.00	0.02 0.05
LPA-171063-8CF	A	From Face	0.50 1.25 0.00	0.0000	55.00	No Ice 1/2" Ice	3.69 4.06	3.69 4.06	0.01 0.04
LPA-80080-6CF	A	From Face	0.50 3.25 0.00	0.0000	55.00	No Ice 1/2" Ice	4.33 4.76	9.09 9.64	0.02 0.07

Tower Pressures - No Ice

$G_H = 1.202$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % 	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 59.50-39.50	49.50	1.123	18	158.333	A	6.344	21.642	13.333	47.64	0.000	0.000
					B	6.344	23.492		44.69	0.000	0.000
					C	5.802	35.157		32.55	0.000	0.000
T2 39.50-19.50	29.50	1	16	158.333	A	6.042	21.642	13.333	48.16	0.000	0.000
					B	6.042	23.492		45.15	0.000	0.000
					C	5.217	42.156		28.15	0.000	0.000
T3 19.50-13.10	16.30	1	16	52.903	A	1.812	6.217	4.275	53.24	0.000	0.000
					B	1.812	6.809		49.59	0.000	0.000
					C	1.565	12.893		29.57	0.000	0.000
T4 13.10-6.30	9.70	1	16	60.920	A	1.987	6.638	4.541	52.65	0.000	0.000
					B	1.987	7.267		49.07	0.000	0.000
					C	1.739	13.750		29.32	0.000	0.000
T5 6.30-0.00	3.15	1	16	60.936	A	7.126	4.210	4.210	37.14	0.000	0.000
					B	7.126	4.792		35.32	0.000	0.000
					C	6.089	11.029		24.59	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.202$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 59.50-39.50	49.50	1.123	14	0.5000	160.000	A	6.344	30.282	16.667	45.50	0.000	0.000
						B	6.344	33.799		41.52	0.000	0.000
						C	5.529	50.673		29.66	0.000	0.000
T2 39.50-19.50	29.50	1	12	0.5000	160.000	A	6.042	30.282	16.667	45.88	0.000	0.000
						B	6.042	33.799		41.83	0.000	0.000
						C	4.800	60.797		25.41	0.000	0.000
T3 19.50-13.10	16.30	1	12	0.5000	53.437	A	1.812	8.707	5.344	50.80	0.000	0.000
						B	1.812	9.833		45.89	0.000	0.000
						C	1.440	18.706		26.53	0.000	0.000
T4 13.10-6.30	9.70	1	12	0.5000	61.487	A	1.987	9.319	5.676	50.21	0.000	0.000
						B	1.987	10.515		45.40	0.000	0.000
						C	1.614	19.989		26.28	0.000	0.000
T5 6.30-0.00	3.15	1	12	0.5000	61.462	A	7.126	8.185	5.262	34.37	0.000	0.000
						B	7.126	9.292		32.05	0.000	0.000
						C	5.565	18.001		22.33	0.000	0.000

Tower Pressure - Service

$G_H = 1.202$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 59.50-39.50	49.50	1.123	7	158.333	A	6.344	21.642	13.333	47.64	0.000	0.000
					B	6.344	23.492		44.69	0.000	0.000
					C	5.802	35.157		32.55	0.000	0.000
T2 39.50-19.50	29.50	1	6	158.333	A	6.042	21.642	13.333	48.16	0.000	0.000
					B	6.042	23.492		45.15	0.000	0.000
					C	5.217	42.156		28.15	0.000	0.000
T3 19.50-13.10	16.30	1	6	52.903	A	1.812	6.217	4.275	53.24	0.000	0.000
					B	1.812	6.809		49.59	0.000	0.000
					C	1.565	12.893		29.57	0.000	0.000
T4 13.10-6.30	9.70	1	6	60.920	A	1.987	6.638	4.541	52.65	0.000	0.000
					B	1.987	7.267		49.07	0.000	0.000
					C	1.739	13.750		29.32	0.000	0.000
T5 6.30-0.00	3.15	1	6	60.936	A	7.126	4.210	4.210	37.14	0.000	0.000
					B	7.126	4.792		35.32	0.000	0.000
					C	6.089	11.029		24.59	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.17	1.58	A	0.177	2.675	0.586	1	1	19.025	1.44	72.08	C
59.50-39.50			B	0.188	2.635	0.588	1	1	20.160			
			C	0.259	2.412	0.604	1	1	27.042			
T2	0.26	1.52	A	0.175	2.682	0.586	1	1	18.715	1.41	70.51	C
39.50-19.50			B	0.187	2.642	0.588	1	1	19.849			
			C	0.299	2.298	0.616	1	1	31.170			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T3	0.08	0.39	A	0.152	2.765	0.582	1	1	5.429	0.44	68.55	C
19.50-13.10			B	0.163	2.724	0.584	1	1	5.786			
			C	0.273	2.369	0.608	1	1	9.405			
T4 13.10-6.30	0.09	0.42	A	0.142	2.803	0.58	1	1	5.839	0.48	70.41	C
			B	0.152	2.764	0.582	1	1	6.215			
			C	0.254	2.425	0.603	1	1	10.030			
T5 6.30-0.00	0.08	0.57	A	0.186	2.643	0.588	1	1	9.600	0.59	94.06	C
			B	0.196	2.611	0.59	1	1	9.951			
			C	0.281	2.348	0.61	1	1	12.820			
Sum Weight:	0.68	4.48						OTM	126.62 kip-ft	4.36		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.17	1.58	A	0.177	2.675	0.586	0.825	1	17.915	1.39	69.37	C
59.50-39.50			B	0.188	2.635	0.588	0.825	1	19.050			
			C	0.259	2.412	0.604	0.825	1	26.026			
T2	0.26	1.52	A	0.175	2.682	0.586	0.825	1	17.658	1.37	68.44	C
39.50-19.50			B	0.187	2.642	0.588	0.825	1	18.792			
			C	0.299	2.298	0.616	0.825	1	30.257			
T3	0.08	0.39	A	0.152	2.765	0.582	0.825	1	5.112	0.43	66.55	C
19.50-13.10			B	0.163	2.724	0.584	0.825	1	5.468			
			C	0.273	2.369	0.608	0.825	1	9.131			
T4 13.10-6.30	0.09	0.42	A	0.142	2.803	0.58	0.825	1	5.491	0.46	68.27	C
			B	0.152	2.764	0.582	0.825	1	5.867			
			C	0.254	2.425	0.603	0.825	1	9.726			
T5 6.30-0.00	0.08	0.57	A	0.186	2.643	0.588	0.825	1	8.353	0.54	86.24	C
			B	0.196	2.611	0.59	0.825	1	8.704			
			C	0.281	2.348	0.61	0.825	1	11.754			
Sum Weight:	0.68	4.48						OTM	122.22 kip-ft	4.19		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.17	1.58	A	0.177	2.675	0.586	0.8	1	17.756	1.38	68.98	C
59.50-39.50			B	0.188	2.635	0.588	0.8	1	18.891			
			C	0.259	2.412	0.604	0.8	1	25.881			
T2	0.26	1.52	A	0.175	2.682	0.586	0.8	1	17.507	1.36	68.15	C
39.50-19.50			B	0.187	2.642	0.588	0.8	1	18.641			
			C	0.299	2.298	0.616	0.8	1	30.127			
T3	0.08	0.39	A	0.152	2.765	0.582	0.8	1	5.067	0.42	66.27	C
19.50-13.10			B	0.163	2.724	0.584	0.8	1	5.423			
			C	0.273	2.369	0.608	0.8	1	9.092			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T4 13.10-6.30	0.09	0.42	A	0.142	2.803	0.58	0.8	1	5.441	0.46	67.97	C
			B	0.152	2.764	0.582	0.8	1	5.818			
			C	0.254	2.425	0.603	0.8	1	9.682			
T5 6.30-0.00	0.08	0.57	A	0.186	2.643	0.588	0.8	1	8.174	0.54	85.12	C
			B	0.196	2.611	0.59	0.8	1	8.526			
			C	0.281	2.348	0.61	0.8	1	11.602			
Sum Weight:	0.68	4.48						OTM	121.59 kip-ft	4.17		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.17	1.58	A	0.177	2.675	0.586	0.85	1	18.073	1.40	69.76	C
59.50-39.50			B	0.188	2.635	0.588	0.85	1	19.208			
			C	0.259	2.412	0.604	0.85	1	26.171			
T2	0.26	1.52	A	0.175	2.682	0.586	0.85	1	17.809	1.37	68.74	C
39.50-19.50			B	0.187	2.642	0.588	0.85	1	18.943			
			C	0.299	2.298	0.616	0.85	1	30.388			
T3	0.08	0.39	A	0.152	2.765	0.582	0.85	1	5.157	0.43	66.84	C
19.50-13.10			B	0.163	2.724	0.584	0.85	1	5.514			
			C	0.273	2.369	0.608	0.85	1	9.170			
T4 13.10-6.30	0.09	0.42	A	0.142	2.803	0.58	0.85	1	5.541	0.47	68.58	C
			B	0.152	2.764	0.582	0.85	1	5.917			
			C	0.254	2.425	0.603	0.85	1	9.769			
T5 6.30-0.00	0.08	0.57	A	0.186	2.643	0.588	0.85	1	8.531	0.55	87.36	C
			B	0.196	2.611	0.59	0.85	1	8.882			
			C	0.281	2.348	0.61	0.85	1	11.906			
Sum Weight:	0.68	4.48						OTM	122.85 kip-ft	4.21		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.41	2.19	A	0.229	2.502	0.597	1	1	24.414	1.35	67.59	C
59.50-39.50			B	0.251	2.435	0.602	1	1	26.694			
			C	0.351	2.169	0.633	1	1	37.601			
T2	0.64	2.11	A	0.227	2.508	0.596	1	1	24.099	1.35	67.42	C
39.50-19.50			B	0.249	2.44	0.602	1	1	26.376			
			C	0.41	2.045	0.656	1	1	44.666			
T3	0.21	0.56	A	0.197	2.607	0.59	1	1	6.948	0.42	65.55	C
19.50-13.10			B	0.218	2.537	0.594	1	1	7.655			
			C	0.377	2.111	0.642	1	1	13.458			
T4 13.10-6.30	0.22	0.60	A	0.184	2.651	0.587	1	1	7.460	0.46	67.17	C
			B	0.203	2.585	0.591	1	1	8.202			
			C	0.351	2.168	0.633	1	1	14.267			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T5 6.30-0.00	0.20	0.89	A	0.249	2.44	0.602	1	1	12.050	0.53	84.44	C
			B	0.267	2.387	0.606	1	1	12.761			
			C	0.383	2.098	0.645	1	1	17.176			
Sum Weight:	1.68	6.36						OTM	119.63 kip-ft	4.11		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.41	2.19	A	0.229	2.502	0.597	0.825	1	23.304	1.32	65.85	C
59.50-39.50			B	0.251	2.435	0.602	0.825	1	25.584			
			C	0.351	2.169	0.633	0.825	1	36.634			
T2	0.64	2.11	A	0.227	2.508	0.596	0.825	1	23.041	1.32	66.15	C
39.50-19.50			B	0.249	2.44	0.602	0.825	1	25.319			
			C	0.41	2.045	0.656	0.825	1	43.826			
T3	0.21	0.56	A	0.197	2.607	0.59	0.825	1	6.630	0.41	64.32	C
19.50-13.10			B	0.218	2.537	0.594	0.825	1	7.338			
			C	0.377	2.111	0.642	0.825	1	13.206			
T4 13.10-6.30	0.22	0.60	A	0.184	2.651	0.587	0.825	1	7.112	0.45	65.84	C
			B	0.203	2.585	0.591	0.825	1	7.854			
			C	0.351	2.168	0.633	0.825	1	13.984			
T5 6.30-0.00	0.20	0.89	A	0.249	2.44	0.602	0.825	1	10.803	0.50	79.65	C
			B	0.267	2.387	0.606	0.825	1	11.514			
			C	0.383	2.098	0.645	0.825	1	16.202			
Sum Weight:	1.68	6.36						OTM	116.85 kip-ft	4.00		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.41	2.19	A	0.229	2.502	0.597	0.8	1	23.145	1.31	65.60	C
59.50-39.50			B	0.251	2.435	0.602	0.8	1	25.426			
			C	0.351	2.169	0.633	0.8	1	36.495			
T2	0.64	2.11	A	0.227	2.508	0.596	0.8	1	22.890	1.32	65.97	C
39.50-19.50			B	0.249	2.44	0.602	0.8	1	25.168			
			C	0.41	2.045	0.656	0.8	1	43.706			
T3	0.21	0.56	A	0.197	2.607	0.59	0.8	1	6.585	0.41	64.15	C
19.50-13.10			B	0.218	2.537	0.594	0.8	1	7.293			
			C	0.377	2.111	0.642	0.8	1	13.170			
T4 13.10-6.30	0.22	0.60	A	0.184	2.651	0.587	0.8	1	7.062	0.45	65.65	C
			B	0.203	2.585	0.591	0.8	1	7.805			
			C	0.351	2.168	0.633	0.8	1	13.944			
T5 6.30-0.00	0.20	0.89	A	0.249	2.44	0.602	0.8	1	10.625	0.50	78.97	C
			B	0.267	2.387	0.606	0.8	1	11.335			
			C	0.383	2.098	0.645	0.8	1	16.063			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
Sum Weight:	1.68	6.36						OTM	116.46 kip-ft	3.99		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.41	2.19	A	0.229	2.502	0.597	0.85	1	23.462	1.32	66.10	C
59.50-39.50			B	0.251	2.435	0.602	0.85	1	25.743			
			C	0.351	2.169	0.633	0.85	1	36.772			
T2	0.64	2.11	A	0.227	2.508	0.596	0.85	1	23.192	1.33	66.33	C
39.50-19.50			B	0.249	2.44	0.602	0.85	1	25.470			
			C	0.41	2.045	0.656	0.85	1	43.946			
T3	0.21	0.56	A	0.197	2.607	0.59	0.85	1	6.676	0.41	64.50	C
19.50-13.10			B	0.218	2.537	0.594	0.85	1	7.383			
			C	0.377	2.111	0.642	0.85	1	13.242			
T4 13.10-6.30	0.22	0.60	A	0.184	2.651	0.587	0.85	1	7.161	0.45	66.03	C
			B	0.203	2.585	0.591	0.85	1	7.904			
			C	0.351	2.168	0.633	0.85	1	14.024			
T5 6.30-0.00	0.20	0.89	A	0.249	2.44	0.602	0.85	1	10.981	0.51	80.34	C
			B	0.267	2.387	0.606	0.85	1	11.692			
			C	0.383	2.098	0.645	0.85	1	16.341			
Sum Weight:	1.68	6.36						OTM	117.25 kip-ft	4.02		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.17	1.58	A	0.177	2.675	0.586	1	1	19.025	0.56	28.16	C
59.50-39.50			B	0.188	2.635	0.588	1	1	20.160			
			C	0.259	2.412	0.604	1	1	27.042			
T2	0.26	1.52	A	0.175	2.682	0.586	1	1	18.715	0.55	27.54	C
39.50-19.50			B	0.187	2.642	0.588	1	1	19.849			
			C	0.299	2.298	0.616	1	1	31.170			
T3	0.08	0.39	A	0.152	2.765	0.582	1	1	5.429	0.17	26.78	C
19.50-13.10			B	0.163	2.724	0.584	1	1	5.786			
			C	0.273	2.369	0.608	1	1	9.405			
T4 13.10-6.30	0.09	0.42	A	0.142	2.803	0.58	1	1	5.839	0.19	27.50	C
			B	0.152	2.764	0.582	1	1	6.215			
			C	0.254	2.425	0.603	1	1	10.030			
T5 6.30-0.00	0.08	0.57	A	0.186	2.643	0.588	1	1	9.600	0.23	36.74	C
			B	0.196	2.611	0.59	1	1	9.951			
			C	0.281	2.348	0.61	1	1	12.820			
Sum Weight:	0.68	4.48						OTM	49.46 kip-ft	1.70		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.17	1.58	A	0.177	2.675	0.586	0.825	1	17.915	0.54	27.10	C
59.50-39.50			B	0.188	2.635	0.588	0.825	1	19.050			
			C	0.259	2.412	0.604	0.825	1	26.026			
T2	0.26	1.52	A	0.175	2.682	0.586	0.825	1	17.658	0.53	26.74	C
39.50-19.50			B	0.187	2.642	0.588	0.825	1	18.792			
			C	0.299	2.298	0.616	0.825	1	30.257			
T3	0.08	0.39	A	0.152	2.765	0.582	0.825	1	5.112	0.17	26.00	C
19.50-13.10			B	0.163	2.724	0.584	0.825	1	5.468			
			C	0.273	2.369	0.608	0.825	1	9.131			
T4 13.10-6.30	0.09	0.42	A	0.142	2.803	0.58	0.825	1	5.491	0.18	26.67	C
			B	0.152	2.764	0.582	0.825	1	5.867			
			C	0.254	2.425	0.603	0.825	1	9.726			
T5 6.30-0.00	0.08	0.57	A	0.186	2.643	0.588	0.825	1	8.353	0.21	33.69	C
			B	0.196	2.611	0.59	0.825	1	8.704			
			C	0.281	2.348	0.61	0.825	1	11.754			
Sum Weight:	0.68	4.48						OTM	47.74 kip-ft	1.64		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.17	1.58	A	0.177	2.675	0.586	0.8	1	17.756	0.54	26.95	C
59.50-39.50			B	0.188	2.635	0.588	0.8	1	18.891			
			C	0.259	2.412	0.604	0.8	1	25.881			
T2	0.26	1.52	A	0.175	2.682	0.586	0.8	1	17.507	0.53	26.62	C
39.50-19.50			B	0.187	2.642	0.588	0.8	1	18.641			
			C	0.299	2.298	0.616	0.8	1	30.127			
T3	0.08	0.39	A	0.152	2.765	0.582	0.8	1	5.067	0.17	25.89	C
19.50-13.10			B	0.163	2.724	0.584	0.8	1	5.423			
			C	0.273	2.369	0.608	0.8	1	9.092			
T4 13.10-6.30	0.09	0.42	A	0.142	2.803	0.58	0.8	1	5.441	0.18	26.55	C
			B	0.152	2.764	0.582	0.8	1	5.818			
			C	0.254	2.425	0.603	0.8	1	9.682			
T5 6.30-0.00	0.08	0.57	A	0.186	2.643	0.588	0.8	1	8.174	0.21	33.25	C
			B	0.196	2.611	0.59	0.8	1	8.526			
			C	0.281	2.348	0.61	0.8	1	11.602			
Sum Weight:	0.68	4.48						OTM	47.50 kip-ft	1.63		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.17	1.58	A	0.177	2.675	0.586	0.85	1	18.073	0.54	27.25	C
59.50-39.50			B	0.188	2.635	0.588	0.85	1	19.208			
			C	0.259	2.412	0.604	0.85	1	26.171			
T2	0.26	1.52	A	0.175	2.682	0.586	0.85	1	17.809	0.54	26.85	C
39.50-19.50			B	0.187	2.642	0.588	0.85	1	18.943			
			C	0.299	2.298	0.616	0.85	1	30.388			
T3	0.08	0.39	A	0.152	2.765	0.582	0.85	1	5.157	0.17	26.11	C
19.50-13.10			B	0.163	2.724	0.584	0.85	1	5.514			
			C	0.273	2.369	0.608	0.85	1	9.170			
T4 13.10-6.30	0.09	0.42	A	0.142	2.803	0.58	0.85	1	5.541	0.18	26.79	C
			B	0.152	2.764	0.582	0.85	1	5.917			
			C	0.254	2.425	0.603	0.85	1	9.769			
T5 6.30-0.00	0.08	0.57	A	0.186	2.643	0.588	0.85	1	8.531	0.21	34.12	C
			B	0.196	2.611	0.59	0.85	1	8.882			
			C	0.281	2.348	0.61	0.85	1	11.906			
Sum Weight:	0.68	4.48						OTM	47.99 kip-ft	1.65		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	1.63					
Bracing Weight	2.85					
Total Member Self-Weight	4.48			0.91	-2.05	
Total Weight	9.25			0.91	-2.05	
Wind 0 deg - No Ice		0.16	-11.18	-567.78	-10.72	1.60
Wind 30 deg - No Ice		5.65	-9.63	-492.65	-291.81	1.70
Wind 45 deg - No Ice		7.89	-7.90	-404.23	-406.90	1.60
Wind 60 deg - No Ice		9.58	-5.63	-288.42	-494.17	1.40
Wind 90 deg - No Ice		11.03	-0.16	-7.76	-566.56	0.77
Wind 120 deg - No Ice		9.60	5.45	277.75	-489.86	-0.08
Wind 135 deg - No Ice		7.67	7.67	393.79	-394.65	-0.53
Wind 150 deg - No Ice		5.38	9.48	485.81	-276.80	-0.93
Wind 180 deg - No Ice		-0.16	10.98	564.57	6.61	-1.50
Wind 210 deg - No Ice		-5.65	9.63	494.47	287.70	-1.70
Wind 225 deg - No Ice		-7.89	7.90	406.05	402.79	-1.60
Wind 240 deg - No Ice		-9.75	5.73	292.76	494.42	-1.52
Wind 270 deg - No Ice		-11.03	0.16	9.58	562.45	-0.77
Wind 300 deg - No Ice		-9.43	-5.36	-273.41	481.40	0.10
Wind 315 deg - No Ice		-7.67	-7.67	-391.97	390.54	0.53
Wind 330 deg - No Ice		-5.38	-9.48	-483.99	272.69	0.93
Member Ice	1.88					
Total Weight Ice	15.51			3.26	-5.02	
Wind 0 deg - Ice		0.12	-9.42	-459.23	-11.67	1.82
Wind 30 deg - Ice		4.76	-8.14	-398.52	-240.66	2.05
Wind 45 deg - Ice		6.66	-6.67	-326.50	-334.54	1.97
Wind 60 deg - Ice		8.10	-4.75	-232.15	-405.82	1.76
Wind 90 deg - Ice		9.32	-0.12	-3.38	-464.78	1.03
Wind 120 deg - Ice		8.09	4.60	228.75	-401.93	0.02
Wind 135 deg - Ice		6.49	6.50	323.62	-325.14	-0.52
Wind 150 deg - Ice		4.56	8.02	398.40	-229.15	-1.02
Wind 180 deg - Ice		-0.12	9.29	462.56	1.62	-1.75
Wind 210 deg - Ice		-4.76	8.14	405.04	230.61	-2.05

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 225 deg - Ice		-6.66	6.67	333.01	324.49	-1.97
Wind 240 deg - Ice		-8.21	4.81	240.25	398.52	-1.84
Wind 270 deg - Ice		-9.32	0.12	9.90	454.74	-1.03
Wind 300 deg - Ice		-7.98	-4.54	-220.64	389.13	-0.01
Wind 315 deg - Ice		-6.49	-6.50	-317.10	315.10	0.52
Wind 330 deg - Ice		-4.56	-8.02	-391.88	219.10	1.02
Total Weight	9.25			0.91	-2.05	
Wind 0 deg - Service		0.06	-4.37	-223.02	-3.35	0.62
Wind 30 deg - Service		2.21	-3.76	-193.67	-113.15	0.67
Wind 45 deg - Service		3.08	-3.08	-159.13	-158.10	0.63
Wind 60 deg - Service		3.74	-2.20	-113.89	-192.19	0.55
Wind 90 deg - Service		4.31	-0.06	-4.26	-220.47	0.30
Wind 120 deg - Service		3.75	2.13	107.27	-190.51	-0.03
Wind 135 deg - Service		3.00	3.00	152.60	-153.32	-0.21
Wind 150 deg - Service		2.10	3.70	188.54	-107.28	-0.36
Wind 180 deg - Service		-0.06	4.29	219.31	3.43	-0.58
Wind 210 deg - Service		-2.21	3.76	191.93	113.23	-0.67
Wind 225 deg - Service		-3.08	3.08	157.39	158.18	-0.63
Wind 240 deg - Service		-3.81	2.24	113.13	193.98	-0.59
Wind 270 deg - Service		-4.31	0.06	2.51	220.55	-0.30
Wind 300 deg - Service		-3.68	-2.09	-108.03	188.89	0.04
Wind 315 deg - Service		-3.00	-3.00	-154.34	153.40	0.21
Wind 330 deg - Service		-2.10	-3.70	-190.28	107.36	0.36

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp

Comb. No.	Description
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	59.5 - 39.5	Leg	Max Tension	5	23.95	0.29	-0.68
			Max. Compression	13	-27.56	0.80	-0.17
			Max. Mx	6	19.54	-1.01	0.09
			Max. My	3	-23.10	-0.38	0.97
			Max. Vy	14	1.67	-0.15	0.25
			Max. Vx	10	-1.67	0.25	0.44
		Diagonal	Max Tension	11	6.32	0.00	0.00
			Max. Compression	3	-6.38	0.00	0.00
			Max. Mx	20	3.08	0.06	0.00
			Max. My	22	-0.04	0.00	-0.00
			Max. Vy	20	-0.03	0.00	0.00
			Max. Vx	22	-0.00	0.00	0.00
		Horizontal	Max Tension	5	0.88	0.00	0.00
			Max. Compression	13	-0.86	0.00	0.00
			Max. Mx	30	0.10	-0.05	0.00
			Max. My	20	0.34	0.00	0.00
			Max. Vy	30	0.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Top Girt	Max Tension	5	1.94	0.00	0.00
			Max. Compression	13	-1.88	0.00	0.00
			Max. Mx	18	0.02	-0.07	0.00
			Max. My	19	0.72	0.00	-0.00
			Max. Vy	18	0.04	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T2	39.5 - 19.5	Leg	Max Tension	5	50.27	0.21	-0.89
			Max. Compression	13	-55.20	0.87	-0.46
			Max. Mx	14	35.09	1.16	0.21
			Max. My	17	-39.89	0.31	1.12
			Max. Vy	7	0.36	-0.80	-0.49
			Max. Vx	2	-0.33	-0.02	0.94
		Diagonal	Max Tension	11	7.19	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	3	-7.25	0.00	0.00
			Max. Mx	20	5.20	0.06	0.00
			Max. My	22	-0.23	0.00	-0.00
			Max. Vy	20	-0.03	0.00	0.00
			Max. Vx	22	-0.00	0.00	0.00
		Horizontal	Max Tension	13	0.96	0.00	0.00
			Max. Compression	13	-0.96	0.00	0.00
			Max. Mx	18	0.10	-0.05	0.00
			Max. My	20	0.68	0.00	0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T3	19.5 - 13.1	Leg	Max Tension	5	55.96	0.27	0.58
			Max. Compression	13	-61.33	0.76	0.15
			Max. Mx	17	-51.51	0.87	-0.02
			Max. My	13	-61.28	-0.30	-0.70
			Max. Vy	12	-0.19	0.83	0.09
			Max. Vx	31	-0.15	0.36	0.28
		Diagonal	Max Tension	9	3.64	0.00	0.00
			Max. Compression	17	-3.69	0.00	0.00
			Max. Mx	20	2.92	0.05	0.00
			Max. My	21	-1.25	0.00	-0.00
			Max. Vy	20	-0.02	0.00	0.00
			Max. Vx	21	0.00	0.00	0.00
		Horizontal	Max Tension	5	1.54	0.00	0.00
			Max. Compression	13	-1.81	0.00	0.00
			Max. Mx	18	0.09	-0.05	0.00
			Max. My	30	0.89	0.00	0.00
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T4	13.1 - 6.3	Leg	Max Tension	5	59.97	0.17	-0.58
			Max. Compression	13	-65.72	0.19	-0.25
			Max. Mx	20	-47.83	0.28	-0.01
			Max. My	4	-20.68	-0.09	-0.72
			Max. Vy	19	-0.09	0.26	-0.28
			Max. Vx	5	0.20	-0.03	-0.71
		Diagonal	Max Tension	17	4.09	0.00	0.00
			Max. Compression	14	-4.10	0.00	0.00
			Max. Mx	29	3.11	0.06	0.00
			Max. My	19	0.31	0.00	-0.00
			Max. Vy	29	-0.02	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Horizontal	Max Tension	13	1.14	0.00	0.00
			Max. Compression	13	-1.14	0.00	0.00
			Max. Mx	18	0.08	-0.07	0.00
			Max. My	20	0.83	0.00	0.00
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T5	6.3 - 0	Leg	Max Tension	5	61.35	0.26	0.47
			Max. Compression	13	-67.58	1.26	0.09
			Max. Mx	13	-67.54	1.26	0.09
			Max. My	6	-57.75	-0.20	-0.72
			Max. Vy	13	-0.52	1.26	0.09
			Max. Vx	5	-0.29	-0.03	-0.71
		Diagonal	Max Tension	6	2.78	0.12	0.00
			Max. Compression	14	-2.85	0.00	0.00
			Max. Mx	13	-1.95	-0.16	3
			Max. My	30	-1.98	-0.12	0.00
			Max. Vy	13	-0.05	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
		Horizontal	Max Tension	14	2.63	-0.02	-0.01
			Max. Compression	17	-2.89	-0.02	-0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	5	0.61	-0.06	-0.00
			Max. My	22	-0.55	0.01	-0.01
			Max. Vy	22	-0.03	-0.04	-0.01
			Max. Vx	22	0.00	0.00	0.00
		Redund Horz 1 Bracing	Max Tension	13	1.17	0.00	0.00
			Max. Compression	13	-1.17	0.00	0.00
			Max. Mx	26	0.86	-0.00	0.00
			Max. My	28	0.87	0.00	0.00
			Max. Vy	26	0.00	0.00	0.00
			Max. Vx	28	-0.00	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	13	0.98	0.00	0.00
			Max. Compression	13	-0.98	0.00	0.00
			Max. Mx	30	0.83	-0.00	0.00
			Max. My	19	0.33	0.00	0.00
			Max. Vy	30	0.00	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	13	71.44	6.18	-3.39
	Max. H_x	13	71.44	6.18	-3.39
	Max. H_z	4	-62.90	-5.40	3.15
	Min. Vert	5	-65.00	-5.67	3.11
	Min. H_x	5	-65.00	-5.67	3.11
	Min. H_z	13	71.44	6.18	-3.39
Leg B	Max. Vert	7	70.07	-5.92	-3.50
	Max. H_x	15	-62.79	5.41	3.20
	Max. H_z	16	-60.48	5.13	3.28
	Min. Vert	15	-62.79	5.41	3.20
	Min. H_x	7	70.07	-5.92	-3.50
	Min. H_z	8	67.18	-5.56	-3.52
Leg A	Max. Vert	2	70.63	0.02	6.96
	Max. H_x	14	1.94	0.67	0.09
	Max. H_z	2	70.63	0.02	6.96
	Min. Vert	10	-64.09	-0.01	-6.38
	Min. H_x	6	4.01	-0.66	0.41
	Min. H_z	10	-64.09	-0.01	-6.38

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear$_x$ K	Shear$_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	9.25	-0.00	-0.00	0.91	-2.05	0.00
Dead+Wind 0 deg - No Ice	9.25	0.16	-11.18	-567.91	-10.74	1.60
Dead+Wind 30 deg - No Ice	9.25	5.65	-9.63	-492.86	-291.94	1.71
Dead+Wind 45 deg - No Ice	9.25	7.89	-7.89	-404.41	-407.08	1.61
Dead+Wind 60 deg - No Ice	9.25	9.58	-5.63	-288.57	-494.40	1.40

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 90 deg - No Ice	9.25	11.02	-0.16	-7.78	-566.78	0.78
Dead+Wind 120 deg - No Ice	9.25	9.60	5.45	277.79	-489.97	-0.08
Dead+Wind 135 deg - No Ice	9.25	7.67	7.67	393.94	-394.80	-0.53
Dead+Wind 150 deg - No Ice	9.25	5.38	9.48	485.99	-276.90	-0.94
Dead+Wind 180 deg - No Ice	9.25	-0.16	10.98	564.82	6.63	-1.51
Dead+Wind 210 deg - No Ice	9.25	-5.65	9.63	494.68	287.83	-1.71
Dead+Wind 225 deg - No Ice	9.25	-7.89	7.89	406.24	402.97	-1.61
Dead+Wind 240 deg - No Ice	9.25	-9.75	5.73	292.85	494.54	-1.52
Dead+Wind 270 deg - No Ice	9.25	-11.02	0.16	9.61	562.66	-0.77
Dead+Wind 300 deg - No Ice	9.25	-9.43	-5.35	-273.51	481.60	0.11
Dead+Wind 315 deg - No Ice	9.25	-7.67	-7.67	-392.12	390.69	0.54
Dead+Wind 330 deg - No Ice	9.25	-5.38	-9.48	-484.17	272.78	0.94
Dead+Ice+Temp	15.51	-0.00	-0.00	3.27	-5.04	-0.00
Dead+Wind 0 deg+Ice+Temp	15.51	0.12	-9.42	-459.96	-11.71	1.83
Dead+Wind 30 deg+Ice+Temp	15.51	4.76	-8.14	-399.22	-241.10	2.06
Dead+Wind 45 deg+Ice+Temp	15.51	6.66	-6.67	-327.09	-335.15	1.99
Dead+Wind 60 deg+Ice+Temp	15.51	8.10	-4.75	-232.58	-406.56	1.77
Dead+Wind 90 deg+Ice+Temp	15.51	9.32	-0.12	-3.41	-465.60	1.04
Dead+Wind 120 deg+Ice+Temp	15.51	8.09	4.60	229.10	-402.58	0.02
Dead+Wind 135 deg+Ice+Temp	15.51	6.49	6.50	324.18	-325.72	-0.53
Dead+Wind 150 deg+Ice+Temp	15.51	4.55	8.02	399.08	-229.55	-1.03
Dead+Wind 180 deg+Ice+Temp	15.51	-0.12	9.29	463.39	1.63	-1.77
Dead+Wind 210 deg+Ice+Temp	15.51	-4.76	8.14	405.76	231.02	-2.07
Dead+Wind 225 deg+Ice+Temp	15.51	-6.66	6.67	333.62	325.07	-1.99
Dead+Wind 240 deg+Ice+Temp	15.51	-8.21	4.81	240.66	399.17	-1.85
Dead+Wind 270 deg+Ice+Temp	15.51	-9.32	0.12	9.94	455.51	-1.04
Dead+Wind 300 deg+Ice+Temp	15.51	-7.98	-4.54	-221.00	389.78	-0.00
Dead+Wind 315 deg+Ice+Temp	15.51	-6.49	-6.50	-317.64	315.63	0.53
Dead+Wind 330 deg+Ice+Temp	15.51	-4.55	-8.02	-392.55	219.46	1.03
Dead+Wind 0 deg - Service	9.25	0.06	-4.37	-221.29	-5.45	0.63
Dead+Wind 30 deg - Service	9.25	2.21	-3.76	-191.97	-115.30	0.67
Dead+Wind 45 deg - Service	9.25	3.08	-3.08	-157.42	-160.27	0.63
Dead+Wind 60 deg - Service	9.25	3.74	-2.20	-112.17	-194.38	0.55
Dead+Wind 90 deg - Service	9.25	4.31	-0.06	-2.48	-222.65	0.30
Dead+Wind 120 deg - Service	9.25	3.75	2.13	109.07	-192.65	-0.03
Dead+Wind 135 deg - Service	9.25	2.99	3.00	154.44	-155.48	-0.21
Dead+Wind 150 deg - Service	9.25	2.10	3.70	190.40	-109.42	-0.37
Dead+Wind 180 deg - Service	9.25	-0.06	4.29	221.19	1.34	-0.59
Dead+Wind 210 deg - Service	9.25	-2.21	3.76	193.79	111.18	-0.67
Dead+Wind 225 deg - Service	9.25	-3.08	3.08	159.24	156.16	-0.63
Dead+Wind 240 deg - Service	9.25	-3.81	2.24	114.95	191.93	-0.60
Dead+Wind 270 deg - Service	9.25	-4.31	0.06	4.31	218.54	-0.30
Dead+Wind 300 deg - Service	9.25	-3.68	-2.09	-106.29	186.87	0.04
Dead+Wind 315 deg - Service	9.25	-2.99	-3.00	-152.62	151.36	0.21
Dead+Wind 330 deg - Service	9.25	-2.10	-3.70	-188.57	105.30	0.37

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-9.25	0.00	0.00	9.25	0.00	0.000%
2	0.16	-9.25	-11.18	-0.16	9.25	11.18	0.005%
3	5.65	-9.25	-9.63	-5.65	9.25	9.63	0.006%
4	7.89	-9.25	-7.90	-7.89	9.25	7.89	0.006%
5	9.58	-9.25	-5.63	-9.58	9.25	5.63	0.006%
6	11.03	-9.25	-0.16	-11.02	9.25	0.16	0.006%
7	9.60	-9.25	5.45	-9.60	9.25	-5.45	0.005%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
8	7.67	-9.25	7.67	-7.67	9.25	-7.67	0.005%
9	5.38	-9.25	9.48	-5.38	9.25	-9.48	0.006%
10	-0.16	-9.25	10.98	0.16	9.25	-10.98	0.006%
11	-5.65	-9.25	9.63	5.65	9.25	-9.63	0.006%
12	-7.89	-9.25	7.90	7.89	9.25	-7.89	0.005%
13	-9.75	-9.25	5.73	9.75	9.25	-5.73	0.005%
14	-11.03	-9.25	0.16	11.02	9.25	-0.16	0.006%
15	-9.43	-9.25	-5.36	9.43	9.25	5.35	0.006%
16	-7.67	-9.25	-7.67	7.67	9.25	7.67	0.006%
17	-5.38	-9.25	-9.48	5.38	9.25	9.48	0.005%
18	0.00	-15.51	0.00	0.00	15.51	0.00	0.000%
19	0.12	-15.51	-9.42	-0.12	15.51	9.42	0.000%
20	4.76	-15.51	-8.14	-4.76	15.51	8.14	0.000%
21	6.66	-15.51	-6.67	-6.66	15.51	6.67	0.001%
22	8.10	-15.51	-4.75	-8.10	15.51	4.75	0.001%
23	9.32	-15.51	-0.12	-9.32	15.51	0.12	0.000%
24	8.09	-15.51	4.60	-8.09	15.51	-4.60	0.000%
25	6.49	-15.51	6.50	-6.49	15.51	-6.50	0.000%
26	4.56	-15.51	8.02	-4.55	15.51	-8.02	0.000%
27	-0.12	-15.51	9.29	0.12	15.51	-9.29	0.000%
28	-4.76	-15.51	8.14	4.76	15.51	-8.14	0.000%
29	-6.66	-15.51	6.67	6.66	15.51	-6.67	0.000%
30	-8.21	-15.51	4.81	8.21	15.51	-4.81	0.001%
31	-9.32	-15.51	0.12	9.32	15.51	-0.12	0.000%
32	-7.98	-15.51	-4.54	7.98	15.51	4.54	0.004%
33	-6.49	-15.51	-6.50	6.49	15.51	6.50	0.000%
34	-4.56	-15.51	-8.02	4.55	15.51	8.02	0.000%
35	0.06	-9.25	-4.37	-0.06	9.25	4.37	0.003%
36	2.21	-9.25	-3.76	-2.21	9.25	3.76	0.003%
37	3.08	-9.25	-3.08	-3.08	9.25	3.08	0.003%
38	3.74	-9.25	-2.20	-3.74	9.25	2.20	0.003%
39	4.31	-9.25	-0.06	-4.31	9.25	0.06	0.003%
40	3.75	-9.25	2.13	-3.75	9.25	-2.13	0.003%
41	3.00	-9.25	3.00	-2.99	9.25	-3.00	0.003%
42	2.10	-9.25	3.70	-2.10	9.25	-3.70	0.003%
43	-0.06	-9.25	4.29	0.06	9.25	-4.29	0.003%
44	-2.21	-9.25	3.76	2.21	9.25	-3.76	0.003%
45	-3.08	-9.25	3.08	3.08	9.25	-3.08	0.003%
46	-3.81	-9.25	2.24	3.81	9.25	-2.24	0.003%
47	-4.31	-9.25	0.06	4.31	9.25	-0.06	0.003%
48	-3.68	-9.25	-2.09	3.68	9.25	2.09	0.003%
49	-3.00	-9.25	-3.00	2.99	9.25	3.00	0.003%
50	-2.10	-9.25	-3.70	2.10	9.25	3.70	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00005311
2	Yes	4	0.00000001	0.00095882
3	Yes	4	0.00000001	0.00095018
4	Yes	4	0.00000001	0.00094785
5	Yes	4	0.00000001	0.00094925
6	Yes	4	0.00000001	0.00095863
7	Yes	4	0.00000001	0.00096025
8	Yes	4	0.00000001	0.00095644

9	Yes	4	0.00000001	0.00095111
10	Yes	4	0.00000001	0.00094908
11	Yes	4	0.00000001	0.00095751
12	Yes	4	0.00000001	0.00096003
13	Yes	4	0.00000001	0.00095834
14	Yes	4	0.00000001	0.00094979
15	Yes	4	0.00000001	0.00094876
16	Yes	4	0.00000001	0.00095326
17	Yes	4	0.00000001	0.00095821
18	Yes	4	0.00000001	0.00009520
19	Yes	5	0.00000001	0.00012669
20	Yes	5	0.00000001	0.00012569
21	Yes	5	0.00000001	0.00012543
22	Yes	5	0.00000001	0.00012567
23	Yes	5	0.00000001	0.00012704
24	Yes	5	0.00000001	0.00012737
25	Yes	5	0.00000001	0.00012683
26	Yes	5	0.00000001	0.00012608
27	Yes	5	0.00000001	0.00012562
28	Yes	5	0.00000001	0.00012664
29	Yes	5	0.00000001	0.00012695
30	Yes	5	0.00000001	0.00012675
31	Yes	5	0.00000001	0.00012538
32	Yes	4	0.00000001	0.00099981
33	Yes	5	0.00000001	0.00012564
34	Yes	5	0.00000001	0.00012637
35	Yes	4	0.00000001	0.00094264
36	Yes	4	0.00000001	0.00094052
37	Yes	4	0.00000001	0.00094008
38	Yes	4	0.00000001	0.00094096
39	Yes	4	0.00000001	0.00094475
40	Yes	4	0.00000001	0.00094485
41	Yes	4	0.00000001	0.00094327
42	Yes	4	0.00000001	0.00094082
43	Yes	4	0.00000001	0.00093923
44	Yes	4	0.00000001	0.00094154
45	Yes	4	0.00000001	0.00094216
46	Yes	4	0.00000001	0.00094097
47	Yes	4	0.00000001	0.00093743
48	Yes	4	0.00000001	0.00093715
49	Yes	4	0.00000001	0.00093914
50	Yes	4	0.00000001	0.00094146

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	59.5 - 39.5	1.284	37	0.1482	0.0033
T2	39.5 - 19.5	0.636	37	0.1257	0.0032
T3	19.5 - 13.1	0.156	37	0.0697	0.0022
T4	13.1 - 6.3	0.067	46	0.0467	0.0061
T5	6.3 - 0	0.006	46	0.0224	0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
68.50	18-ft Doppler	37	1.284	0.1482	0.0033	122672
60.00	Doppler Platform	37	1.284	0.1482	0.0033	122672
57.00	Doppler Platform Support	37	1.200	0.1463	0.0036	122672
55.00	13-ft Face Mount Frame	37	1.132	0.1447	0.0038	122672

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	59.5 - 39.5	3.276	4	0.3779	0.0096
T2	39.5 - 19.5	1.624	13	0.3207	0.0098
T3	19.5 - 13.1	0.399	13	0.1781	0.0075
T4	13.1 - 6.3	0.172	13	0.1193	0.0163
T5	6.3 - 0	0.014	13	0.0574	0.0022

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
68.50	18-ft Doppler	4	3.276	0.3779	0.0096	48176
60.00	Doppler Platform	4	3.276	0.3779	0.0096	48176
57.00	Doppler Platform Support	4	3.061	0.3731	0.0104	48176
55.00	13-ft Face Mount Frame	4	2.890	0.3691	0.0110	48176

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	59.5	Leg	A325N	0.8750	4	5.99	26.46	0.226 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3.19	4.12	0.774 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.5000	1	0.88	4.12	0.213 ✓	1.333	Bolt Shear
		Top Girt	A325N	0.6250	2	0.97	6.44	0.151 ✓	1.333	Bolt Shear
T2	39.5	Leg	A325N	0.8750	4	12.57	26.46	0.475 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3.62	4.12	0.879 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.5000	1	0.96	4.12	0.232 ✓	1.333	Bolt Shear
T3	19.5	Diagonal	A325N	0.7500	1	3.69	9.28	0.398 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.7500	1	1.81	9.28	0.195 ✓	1.333	Bolt Shear
T4	13.1	Diagonal	A325N	0.7500	1	4.10	9.28	0.442 ✓	1.333	Bolt Shear
		Horizontal	A325N	0.5000	1	1.14	4.12	0.276 ✓	1.333	Bolt Shear

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T5	6.3	Diagonal	A325N	0.7500	1	2.78	6.80	0.409 ✓	1.333	Member Bearing
		Horizontal	A325N	0.5000	1	2.89	8.25	0.351 ✓	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	59.5 - 39.5	P3.5x.226	20.00	5.00	44.9 K=1.00	18.319	2.6795	-27.56	49.09	0.561 ✓
T2	39.5 - 19.5	P3.5x.226	20.00	5.00	44.9 K=1.00	18.319	2.6795	-55.20	49.09	1.125 ✓
T3	19.5 - 13.1	P3.5x.226	6.41	6.41	57.6 K=1.00	17.244	2.6795	-61.33	46.21	1.327 ✓
T4	13.1 - 6.3	P3.5x.226	6.81	6.81	30.6 K=0.50	19.377	2.6795	-65.72	51.92	1.266 ✓
T5	6.3 - 0	P3.5x.226	6.31	3.16	28.3 K=1.00	19.526	2.6795	-67.58	52.32	1.292 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	59.5 - 39.5	P2.5x.203	8.67	8.67	109.8 K=1.00	11.571	1.7040	-6.38	19.72	0.324 ✓
T2	39.5 - 19.5	P2.5x.203	8.67	8.67	109.8 K=1.00	11.571	1.7040	-7.25	19.72	0.368 ✓
T3	19.5 - 13.1	P2x.154	9.81	9.81	149.6 K=1.00	6.676	1.0745	-3.69	7.17	0.514 ✓
T4	13.1 - 6.3	P2x.154	10.60	10.60	161.6 K=1.00	5.722	1.0745	-4.10	6.15	0.668 ✓
T5	6.3 - 0	L3x3x3/16	7.96	7.39	107.2 K=1.14	11.867	1.0900	-2.85	12.94	0.220 ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	59.5 - 39.5	L2 1/2x2 1/2x1/4	7.58	7.02	171.6 K=1.00	5.072	1.1900	-0.86	6.04	0.143 ✓
T2	39.5 - 19.5	L2 1/2x2 1/2x1/4	7.58	7.02	171.6 K=1.00	5.072	1.1900	-0.96	6.04	0.158 ✓
T3	19.5 - 13.1	L3x3x1/4	7.58	6.96	141.0 K=1.00	7.506	1.4400	-1.81	10.81	0.167 ✓
T4	13.1 - 6.3	L3x3x1/4	8.28	7.72	156.5 K=1.00	6.100	1.4400	-1.14	8.78	0.130 ✓
T5	6.3 - 0	2L2x2x3/16	8.97	8.41	120.1 K=1.00	10.270	1.4300	-2.89	14.69	0.197 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	59.5 - 39.5	L3x5x1/4	7.58	6.82	122.1 K=0.99	9.242	1.9400	-1.88	17.93	0.105 ✓

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T5	6.3 - 0	L2x2x3/16	2.24	2.08	91.6 K=1.45	14.013	0.7150	-1.17	10.02	0.117 ✓

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T5	6.3 - 0	L2x2x3/16	3.76	3.46	112.7 K=1.07	11.308	0.7150	-0.98	8.09	0.122 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	59.5 - 39.5	P3.5x.226	20.00	5.00	44.9	21.000	2.6795	23.95	56.27	0.426 ✓
T2	39.5 - 19.5	P3.5x.226	20.00	5.00	44.9	21.000	2.6795	50.27	56.27	0.893 ✓
T3	19.5 - 13.1	P3.5x.226	6.41	6.41	57.6	21.000	2.6795	55.96	56.27	0.995 ✓
T4	13.1 - 6.3	P3.5x.226	6.81	6.81	61.1	21.000	2.6795	59.97	56.27	1.066 ✓
T5	6.3 - 0	P3.5x.226	6.31	3.16	28.3	21.000	2.6795	61.35	56.27	1.090 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	59.5 - 39.5	P2.5x.203	8.67	8.67	109.8	21.000	1.7040	6.32	35.79	0.177 ✓
T2	39.5 - 19.5	P2.5x.203	8.67	8.67	109.8	21.000	1.7040	7.19	35.79	0.201 ✓
T3	19.5 - 13.1	P2x.154	9.81	9.81	149.6	21.000	1.0745	3.64	22.57	0.161 ✓
T4	13.1 - 6.3	P2x.154	10.60	10.60	161.6	21.000	1.0745	4.09	22.57	0.181 ✓
T5	6.3 - 0	L3x3x3/16	7.96	7.39	98.2	29.000	0.6945	2.78	20.14	0.138 ✓

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	59.5 - 39.5	L2 1/2x2 1/2x1/4	7.58	7.02	113.1	29.000	0.7753	0.88	22.48	0.039 ✓
T2	39.5 - 19.5	L2 1/2x2 1/2x1/4	7.58	7.02	113.1	29.000	0.7753	0.96	22.48	0.043 ✓
T3	19.5 - 13.1	L3x3x1/4	7.58	6.96	93.5	29.000	0.9159	1.54	26.56	0.058 ✓
T4	13.1 - 6.3	L3x3x1/4	8.28	7.72	102.6	29.000	0.9628	1.14	27.92	0.041 ✓
T5	6.3 - 0	2L2x2x3/16	8.97	8.41	123.4	29.000	0.8967	2.63	26.00	0.101 ✓

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	59.5 - 39.5	L3x5x1/4	7.58	6.82	101.0	29.000	1.3144	1.94	38.12	0.051 ✓

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T5	6.3 - 0	L2x2x3/16	2.24	2.08	40.4	21.600	0.7150	1.17	15.44	0.076 ✓

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T5	6.3 - 0	L2x2x3/16	3.76	3.46	67.3	21.600	0.7150	0.98	15.44	0.064 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	59.5 - 39.5	Leg	P3.5x.226	1	-27.56	65.43	42.1	Pass
T2	39.5 - 19.5	Leg	P3.5x.226	28	-55.20	65.43	84.4	Pass
T3	19.5 - 13.1	Leg	P3.5x.226	55	-61.33	61.59	99.6	Pass
T4	13.1 - 6.3	Leg	P3.5x.226	64	-65.72	69.21	95.0	Pass
T5	6.3 - 0	Leg	P3.5x.226	73	-67.58	69.75	96.9	Pass
T1	59.5 - 39.5	Diagonal	P2.5x.203	9	-6.38	26.28	24.3 58.0 (b)	Pass
T2	39.5 - 19.5	Diagonal	P2.5x.203	36	-7.25	26.28	27.6 65.9 (b)	Pass
T3	19.5 - 13.1	Diagonal	P2x.154	62	-3.69	9.56	38.6	Pass
T4	13.1 - 6.3	Diagonal	P2x.154	70	-4.10	8.20	50.1	Pass
T5	6.3 - 0	Diagonal	L3x3x3/16	77	-2.85	17.24	16.5 30.7 (b)	Pass
T1	59.5 - 39.5	Horizontal	L2 1/2x2 1/2x1/4	24	-0.86	8.05	10.7 16.0 (b)	Pass
T2	39.5 - 19.5	Horizontal	L2 1/2x2 1/2x1/4	31	-0.96	8.05	11.9 17.4 (b)	Pass
T3	19.5 - 13.1	Horizontal	L3x3x1/4	60	-1.81	14.41	12.5 14.6 (b)	Pass
T4	13.1 - 6.3	Horizontal	L3x3x1/4	67	-1.14	11.71	9.7 20.7 (b)	Pass
T5	6.3 - 0	Horizontal	2L2x2x3/16	83	-2.89	19.58	14.8 26.3 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P_{allow} K	% Capacity	Pass Fail
T1	59.5 - 39.5	Top Girt	L3x5x1/4	4	-1.88	23.90	7.9 11.3 (b)	Pass
T5	6.3 - 0	Redund Horz 1 Bracing	L2x2x3/16	78	-1.17	13.36	8.8	Pass
T5	6.3 - 0	Redund Diag 1 Bracing	L2x2x3/16	79	-0.98	10.78	9.1	Pass
							Summary	
						Leg (T3)	99.6	Pass
						Diagonal (T2)	65.9	Pass
						Horizontal (T5)	26.3	Pass
						Top Girt (T1)	11.3	Pass
						Redund Horz 1 Bracing (T5)	8.8	Pass
						Redund Diag 1 Bracing (T5)	9.1	Pass
						Bolt Checks	65.9	Pass
						RATING =	**99.6**	**Pass**

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Subject:	PIER FOUNDATION
Location:	Talcott Mountain, Avon, CT
Rev. 1: 10/31/12	Prepared by: T.J.L. Checked by: C.F.C. Job No. 12001.CO76

Pier Foundation

Input Data:

Max. Loads at Tower Leg:

Uplift =	Uplift := 65·kips	(User Input from RISATower)
Compression =	Comp := 71·kips	(User Input from RISATower)
Max Shear =	Shear := 7·kips	(User Input from RISATower)

Pier and Pad Properties:

Pier Height =	$P_H := 6 \cdot ft$	(User Input)
Pier Projection Above Grade =	$P_P := 2 \cdot ft$	(User Input)
Pier Width =	$P_w := 4 \cdot ft$	(User Input)

Subgrade Properties:

Concrete Unit Weight =	$\gamma c := 150 \cdot pcf$	(User Input)
Water Unit Weight =	$\gamma w := 62.4 \cdot pcf$	(User Input)
Soil Unit Weight =	$\gamma s := 120 \cdot pcf$	(User Input)
Uplift Angle =	$\psi := 30 \cdot deg$	(User Input)
Soil Bearing Capacity =	$q_u := 4 \cdot ksf$	(User Input)
Concrete Compressive Strength =	$f_c := 3 \cdot ksi$	(User Input)

Check Uplift:

Required Factor of Safety = $F_S := 2$

Volume of Concrete = $V_{Conc} := P_H \cdot P_w^2 = 96 \cdot ft^3$

Mass of Concrete = $Mass_{Conc} := V_{Conc} \cdot \gamma c = 14.4 \cdot kips$

$$ActualFS := \frac{Mass_{Conc}}{Uplift} = 0.22$$

$$Uplift\_Check := if\left(\frac{Mass_{Conc}}{Uplift} \geq F_S, "OK", "Overstressed"\right)$$

Uplift_Check = "Overstressed"

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Subject:	FOUNDATION REINFORCEMENT DESIGN
Location:	Talcott Mountain Avon, CT
Rev. 1: 10/31/12	Prepared by: J.R.M. Checked by: C.F.C.

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 575 \cdot kips$	(User Input from RISATower)
Shear Force =	$S_t := 11 \cdot kip$	(User Input from RISATower)
Axial Force =	$WT_t := 9 \cdot kip$	(User Input from RISATower)
Max Compression Force =	$C_t := 71 \cdot kip$	(User Input from RISATower)
Uplift Force =	$U_t := 65 \cdot kip$	(User Input from RISATower)
Tower Height =	$H_t := 59.5 \cdot ft$	(User Input)
Tower Width =	$W_t := 8.97 \cdot ft$	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)

Mat Data:

Overall Depth of Mat =	$D_f := 3.5 \cdot ft$	(User Input)
Thickness of Mat =	$T_f := 3.5 \cdot ft$	(User Input)
Length of Pier =	$L_p := 0ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 0.0 \cdot ft$	(User Input)
Diameter of Pier =	$d_p := 0.0 \cdot ft$	(User Input)
Foundation Reinforcement Area =	$A_{matreinf} := 310.10ft^2$	(User Input)
Distance From Center of Compression Leg to Extreme Edge of Proposed Mat =	$C_x := 5.75ft$	(User Input)
Distance From Tower/Mat Centroid to Front Edge of Proposed Mat =	$WT_x := 11.25ft$	(User Input)
Distance From Tower/Mat Centroid to Rear Edge of Proposed Mat =	$WTx_2 := 8.38ft$	(User Input)
Distance From Center of Uplift Legs to Extreme Edge of Proposed Mat =	$U_x := 14.00ft$	(User Input)
Section Moment of Area/Inertia of Mat =	$I_{mat} := 8120.4ft^4$	(User Input)
Section Modulus of Mat =	$S_{mat} := \left(\frac{I_{mat}}{WT_x}\right) = 743.03 \cdot ft^3$	(User Input)
Overall Width of Mat From Toe to Rear Edge=	$W_f := 19.63 \cdot ft$	(User Input)
Overall Width of Mat at Toe =	$W_{ftoe} := 6.25ft$	(User Input)
Overturing Moment Factor of Safety Required =	$FS_{reqd} := 2.0$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\theta_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 12000 \cdot psf$	(User Input)	(Note: Allowable soil bearing pressure may be increased by 1/3rd for transient load efffects.
Unit Weight of Soil =	$\gamma_{soil} := 0 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 3.5 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Proposed Mat Reinforcement:

Bar Size =	$BS_{top} := 7$	(User Input)	(Top of Mat)
Bar Diameter =	$d_{btop} := 0.875 \cdot in$	(User Input)	(Top of Mat)
Bar Size =	$BS_{bot} := 7$	(User Input)	(Bottom of Mat)
Bar Diameter =	$d_{bbot} := 0.875 \cdot in$	(User Input)	(Bottom of Mat)
Clear Cover of Reinforcement =	$Cvr_{Mat} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{Mat} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{Mat} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{Mat} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{Mat} := 1.0$	(User Input)	(ACI-2008 12.2.4)

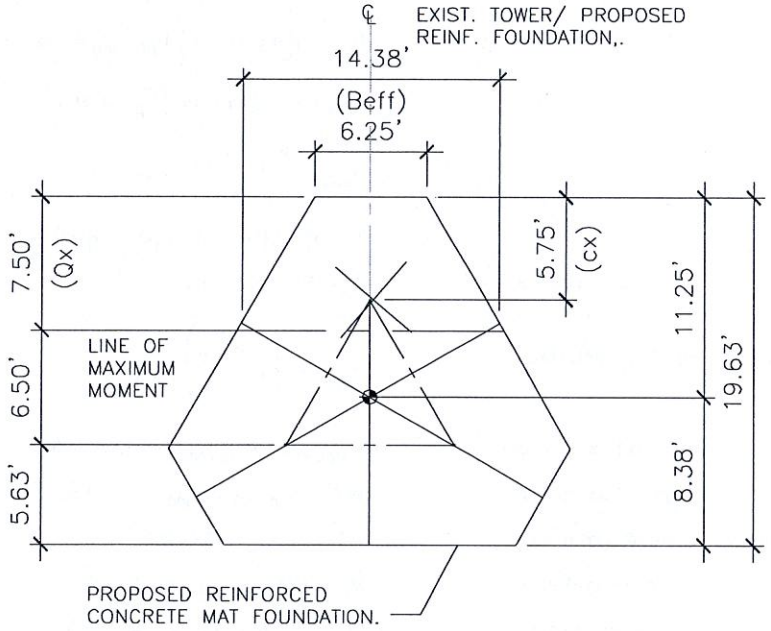
Calculated Factors:

Mat Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.6 \cdot in^2$

Mat Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.6 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\theta_s)}{1 - \sin(\theta_s)} = 3$

Load Factor = $LF := \begin{cases} 1.333 & \text{if } H_t \le 700\cdot ft \\ 1.7 & \text{if } H_t \ge 1200\cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft}\right)\cdot 0.4 & \text{otherwise} \end{cases}$ = 1.33



PLAN

Area: 310.100242
Perimeter: 67.852540
Bounding box: X: -11.308757 -- 11.308757
Y: -8.333333 -- 11.254008
Centroid: X: 0.000000
Y: 0.000000
Moments of inertia: X: 8120.374659
Y: 8120.374659
Product of inertia: XY: 0.000000
Radii of gyration: X: 5.117254
Y: 5.117254
Principal moments and X-Y directions about centroid:
I: 8120.374659 along [0.006003 0.999982]
J: 8120.374659 along [-0.999982 0.006003]

Proposed Reinforced Foundation Geometry:

Stability of Mat:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 0 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 0 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 0$ $A_p := W_{ftoe} \cdot T_p = 0$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 0 \cdot kip$

Volume of Existing Concrete Piers Within Mat = $V_{pier} := 3 \cdot \left(T_f \cdot \frac{d_p^2 \cdot \pi}{4} \right) = 0 \cdot ft^3$

Volume of Proposed Mat = $V_{matreinf} := A_{matreinf} \cdot T_f = 1085.35 \cdot ft^3$

Weight of Concrete Mat = $WT_c := V_{matreinf} \gamma_{conc} = 162.8 \cdot kips$

Total Weight of Concrete Mat and Tower = $WT_{tot} := WT_c = 162.8 \cdot kips$

Overturning Moment = $M_{ot} := OM + S_t \cdot (T_f) = 613.5 \cdot kip \cdot ft$

Required Moment = $M_{design} := M_{ot} \cdot FS_{reqd} = 1227 \cdot kip \cdot ft$

Resisting Moment without Anchors = $M_r := (WT_{tot}) \cdot WT_x = 1779 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.9$

$OverTurning\_Moment\_Check := if(FS \geq FS_{reqd}, "Okay", "Provide Anchorage")$

$OverTurning\_Moment\_Check = "Okay"$

Reinforced Concrete Mat Shear and Moment Calculations:

Mat Dead Load = $WT_{tot} = 162.8 \cdot kips$

Equivalent Soil Reaction Occuring at Base of Foundation = $Q := C_t + WT_{tot} - U_t = 168.8 \cdot kips$

Summing Moments About Toe of Mat Foundation to Find Distance of Soil Reaction (Qx) =

$$M := \left[\left(C_t \cdot C_x\right) + \left(WT_{tot} \cdot WT_x\right) - \left(U_t \cdot U_x\right)\right] - S_t \cdot \left(T_f + L_{pag}\right) = 1270.31 \cdot kip \cdot ft$$

$$Q_x := \frac{M}{Q} = 7.53 \cdot ft$$

Qx > Cx Therefore Shear and Moment Calculations Are As Follows:

$C_x = 5.75 \cdot ft$

$V1_A := -C_t = -71 \cdot kips$

$V2_A := V1_A + Q = 97.8 \cdot kips$

$V3_A := V2_A - WT_{tot} = -65 \cdot kips$

$V4_A := V3_A + U_t = 0 \cdot kips$

$$M1_A := -\left[\frac{S_t}{2} \cdot \left(T_f + L_{pag}\right)\right] = -19.25 \cdot kip \cdot ft$$

$M2_A := M1_A + V1_A \cdot \left(Q_x - C_x\right) = -145.3 \cdot kip \cdot ft$

$M3_A := M2_A + V2_A \cdot \left(WT_x - Q_x\right) = 187.56 \cdot kip \cdot ft$

$M4_A := M3_A + V3_A \cdot \left(U_x - WT_x\right) = 19.25 \cdot kip \cdot ft$

$$M5_A := M4_A - \left[\frac{S_t}{2} \cdot \left(T_f + L_{pag}\right)\right] = 0 \cdot kip \cdot ft$$

$M_1 := \left|M1_A\right| = 19.25 \cdot kip \cdot ft$

$M_2 := \left|M2_A\right| = 145.3 \cdot kip \cdot ft$

$M_3 := \left|M3_A\right| = 187.56 \cdot kip \cdot ft$

$M_4 := \left|M4_A\right| = 19.25 \cdot kip \cdot ft$

$M_5 := \left|M5_A\right| = 0 \cdot kip \cdot ft$

$$M_{max} := \max\begin{pmatrix} M_1 \\ M_2 \\ M_3 \\ M_4 \\ M_5 \\ 0 \\ 0 \\ 0 \end{pmatrix} = 187.56 \cdot kip \cdot ft$$

Mat Steel Reinforcement Design:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

Design Moment = $M_n := \left(\frac{LF}{\phi_m}\right) \cdot M_{max} = 277.8 \cdot kip \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$b_{eff} := 171in$ (User Input) Effective width taken at point of maximum moment through triangular mat foundation.

$d := T_f - Cvr_{Mat} - d_{bbot} = 38.13 \cdot in$

$$A_{st} := \frac{M_n}{(0.9 f_y \cdot d)} = 1.62 \cdot in^2$$

$$a := \frac{A_{st} \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.17 \cdot in$$

$$A_{st} := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 1.46 \cdot in^2$$

$$\rho := \frac{A_{st}}{b_{eff} d} = 0.00022$$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \ge 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$

(ACI -2008 7.12.2.1)

Determine Bottom Bars:

$$As := \begin{cases} A_{st} & \text{if } \rho > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot b_{eff} \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 5.87 \cdot in^2$$

Quantity of Rebar Required = $Nbar_{reqd} := \frac{As}{A_{bbot}} = 9.8$ $Nbar_{prov} := 14$

Rebar Spacing = $B_s := \left(\frac{b_{eff} - 2 \cdot Cvr_{Mat} - d_{bbot}}{Nbar_{prov}}\right) - d_{bbot} = 10.8 \cdot in$

(USE #7 @12" o.c. min.
Area of steel =
0.60in^2*14 = 8.40in^2

Soil Bearing Pressure:

Distance to Kern = $X_k := \frac{W_f}{3} = 6.54$

If Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Distance of Equivalent Soil Reaction From Toe = $a := Q_x = 7.53 \cdot ft$

$Eccentricity\_Check := if\left(a > X_k, "InsideMiddleThird", "OutsideMiddleThird"\right)$

$Eccentricity\_Check = "InsideMiddleThird"$

Total Load = $P_{total} := Q = 169 \cdot kip$

For Equilibrium Total Soil Reacton Shall Equal Total Downward Dead Load

Maximum Pressure in Mat = $P_{max} := \frac{P_{total}}{A_{matreinf}} + \frac{P_{total} \cdot \left(WT_x - Q_x\right) \cdot WT_x}{I_{mat}} = 1.32 \cdot ksf$

$Max\_Pressure\_Check := if\left(P_{max} < q_s, "Okay", "No Good"\right)$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{P_{total}}{A_{matreinf}} - \frac{P_{total} \cdot \left(WT_x - Q_x\right) \cdot WT_x}{I_{mat}} = -0.23 \cdot ksf$

$Min\_Pressure\_Check := if\left[\left(P_{min} \geq 0\right) \cdot \left(P_{min} < q_s\right), "Okay", "No Good"\right]$

$Min\_Pressure\_Check = "No Good"$

If Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced as Follows:-

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 5.57$

Area Under Mat Subjected to Triangular Pressure Distribution = $A_{pressure} := a \cdot \left(\frac{a}{\tan(60 \cdot deg)}\right) + W_{ftoe} \cdot (a) = 79.73 \cdot ft^2$

Total Pressure Within Triangular Pressure Diagram = $P_a := \frac{2 \cdot P_{total}}{3 \cdot A_{pressure}} = 1.41 \cdot ksf$

Adjusted Soil Pressure = $q_{adj} := if\left(a \leq X_k, P_a, P_{max}\right) = 1.32 \cdot ksf$

$Pressure\_Check := if\left(q_{adj} < q_s, "Okay", "No Good"\right)$

$Pressure\_Check = "Okay"$

DESIGN BASIS:

1. GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.

2. TIA/EIA-222-F-1996 "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".

3. DESIGN CRITERIA

   WIND LOAD: (TIA/EIA-222-F-1996)
   BASIC WIND SPEED (V) = 80 MPH (FASTEST MILE).

   WIND LOAD: (2005 CT STATE BUILDING CODE APPENDIX K)
   BASIC WIND SPEED (V) = 95 MPH (3-SECOND GUST)
   EQUIVALENT TO (V) = 77.5 MPH (FASTEST MILE).

   TIA/EIA-222-F-1996 WIND SPEED CONTROLS

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.

2. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.

3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.

4. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.

5. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.

6. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.

7. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.

8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH OWNER.

9. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.

10. THE CONTRACTOR SHALL LIMIT THE DURATION OF ANY FOUNDATION MODIFICATION WORK. THE EXISTING FOUNDATION WITHIN THE SHOWN LIMITS IS STABLE FOR WIND SPEEDS LESS THAN 50MPH WITHOUT ICE LOADING. IF HIGHER WIND SPEED OR ICE EVENT IS EXPECTED, THE EXCAVATION AREA SHALL BE FILLED WITH COMPACT FILL MATERIAL.

11. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

MODIFICATION INSPECTIONS

1. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.

2. INSPECTION AND TESTING OF CONCRETE WORK SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, PAID BY THE OWNER, AND APPROVED BY THE ENGINEER. THE INSPECTOR SHALL OBSERVE CONDITION OF SOILS AND FORMWORK BEFORE FOOTINGS ARE PLACED, SIZE, SPACING AND LOCATION OF REINFORCEMENT, AND PLACEMENT OF CONCRETE.

3. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.

4. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

DESIGNED BY:	JRM
DRAWN BY:	DEB
CHK'D BY:	CFC

NO.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/31/12	DEB	CFC	ISSUED FOR CLIENT REVIEW

PROFESSIONAL ENGINEER — CHRISTOPHER F. CLOUTIER — LICENSED — CONNECTICUT

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Prepared in cooperation with [illegible]

TALCOTT MOUNTAIN
324 MONTEVIDEO ROAD
AVON, CT 06001

DATE:	10/26/12
SCALE:	AS SHOWN
JOB NO.	12001.C076

DESIGN BASIS, GENERAL & MOD. INSPECTIONS NOTES

SHEET NO.
N-1
Sheet No. 1 of 2

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. ALL RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED OFF SITE AND BE LEGALLY DISPOSED, AT NO ADDITIONAL COST.
4. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE EQUIPMENT AND TOWER AREAS.
5. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
6. THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
7. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
8. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
9. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

EARTHWORK NOTES

1. COMPACTED GRAVEL FILL SHALL BE FURNISHED AND PLACED AS A FOUNDATION FOR STRUCTURES, WHERE SHOWN ON THE CONTRACT DRAWINGS OR DIRECTED BY THE ENGINEER.
2. CRUSHED STONE FILL SHALL BE PLACED IN 12" MAX. LIFTS AND CONSOLIDATED USING A HAND OPERATED VIBRATORY PLATE COMPACTOR WITH A MINIMUM OF 2 PAQSSES OF COMPACTOR PER LIFT.
3. COMPACTED GRAVEL FILL TO BE WELL GRADED BANK RUN GRAVEL MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1 ½"	100
No. 4	40–70
No. 100	5–20
No. 200	4–8

4. CRUSHED STONE TO BE UNIFORMLY GRADED, CLEAN, HARD PROCESS AGGREGATE MEETING THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
1"	100
¾"	90–100
½"	0–15
⅜"	0–5

5. SELECT BACKFILL FOR FOUNDATION WALLS SHALL BE FREE OF ORGANIC MATERIAL, TOPSOIL, DEBRIS AND BOULDERS LARGER THAN 6".
6. GRAVEL AND GRANULAR FILL SHALL BE INSTALLED IN 10" MAX. LIFTS. COMPACTED TO 95% MIN. AT MAX. DRY DENSITY.
7. NON WOVEN GEOTEXTILE FOR SEPARATION PURPOSES SHALL BE MIRAFI 140N, OR ENGINEER APPROVED EQUAL.

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CHK'D BY:	CFC

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SITE AND EARTHWORK NOTES

SHEET NO.
N-2
Sheet No. 2 of 2

CONCRETE CONSTRUCTION NOTES

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE FOLLOWING STANDARDS:

   ACI 211 – STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL AND HEAVYWEIGHT CONCRETE.

   ACI 301 – SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS.

   ACI 302 – GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION

   ACI 304 – RECOMMENDED PRACTICE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.

   ACI 306.1 STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING

   ACI 318 – BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE.

2. CONCRETE SHALL DEVELOP COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:

SLABS ON GRADE	4,000 PSI
ALL OTHER CONCRETE	3,000 PSI

   - PORTLAND CEMENT: ASTM C150, TYPE II, (540 LBS/CUBIC YARD)
   - AGGREGATE: ASTM C33, No. 67, TYPICAL
   - WATER: POTABLE WITH MAXIMUM WATER CEMENT RATIO OF .55
   - SLUMP: 3" TO 4"
   - ADMIXTURES: USE AIR ENTRAINING AGENT CONFORMING TO ASTM C260 WITH 4 TO 6% TOTAL AIR. USE WATER REDUCING AGENT CONFORMING TO ASTM C494, TYPE A, IN ALL CONCRETE. CALCIUM CHLORIDE MAY NOT BE USED TO ACCELERATE THE CONCRETE SETTING TIME.

3. REINFORCING STEEL SHALL BE 60,000 PSI YIELD STRENGTH.

4. WELDED WIRE FABRIC SHALL CONFORM TO ASTM– A–185.

5. ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, MUST FOLLOW THE LATEST ACI CODE AND LATEST ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".

6. CONCRETE COVER OVER REINFORCING SHALL CONFORM TO THE FOLLOWING, UNLESS OTHERWISE SHOWN:

CONCRETE CAST AGAINST & PERMANENTLY EXPOSED TO EARTH:	3 INCHES
CONCRETE EXPOSED TO EARTH OR WEATHER:	
#6 THROUGH #18 BARS	2 INCHES
#5 BAR, W31 OR D31 WIRE & SMALLER	1½ INCHES
CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH THE GROUND:	
#14 THROUGH #18 BARS	1½ INCHES
#11 BAR AND SMALLER	¾ INCHES

7. NO STEEL WIRE, METAL FORM TIES, OR ANY OTHER METAL SHALL REMAIN WITHIN THE REQUIRED COVER OF ANY CONCRETE SURFACE.

8. ALL REINFORCEMENT SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED. SPLICES SHALL BE WELL STAGGERED. ADDITIONAL BARS AND SPECIAL BENDING DETAILS ARE REQUIRED AT INTERSECTING WALLS AND AT JOINTS. SUCH DETAILS SHALL COMPLY WITH ACI 315 RECOMMENDATIONS UNLESS OTHERWISE SHOWN.

9. NO TACK WELDING OF REINFORCING WILL BE PERMITTED.

10. NO CALCIUM CHLORIDE OR ADMIXTURES CONTAINING MORE THAN 1% CHLORIDE BY WEIGHT OF ADMIXTURE SHALL BE USED IN THE CONCRETE.

11. UNLESS OTHERWISE NOTED, ALL LAP SPLICES SHALL BE 48 BAR DIAMETERS.

12. SLAB ON GRADE FINISHES:

    EXTERIOR SLAB: NON–SLIP BROOM FINISH
    INTERIOR SLAB: STEEL TROWEL FINISH

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CONCRETE CONSTRUCTION NOTES

SHEET NO.
N-3
Sheet No. 3 of 3

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".

10. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

11. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

12. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

13. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.

14. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.

15. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.

16. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

17. FABRICATE BEAMS WITH MILL CAMBER UP.

18. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

19. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

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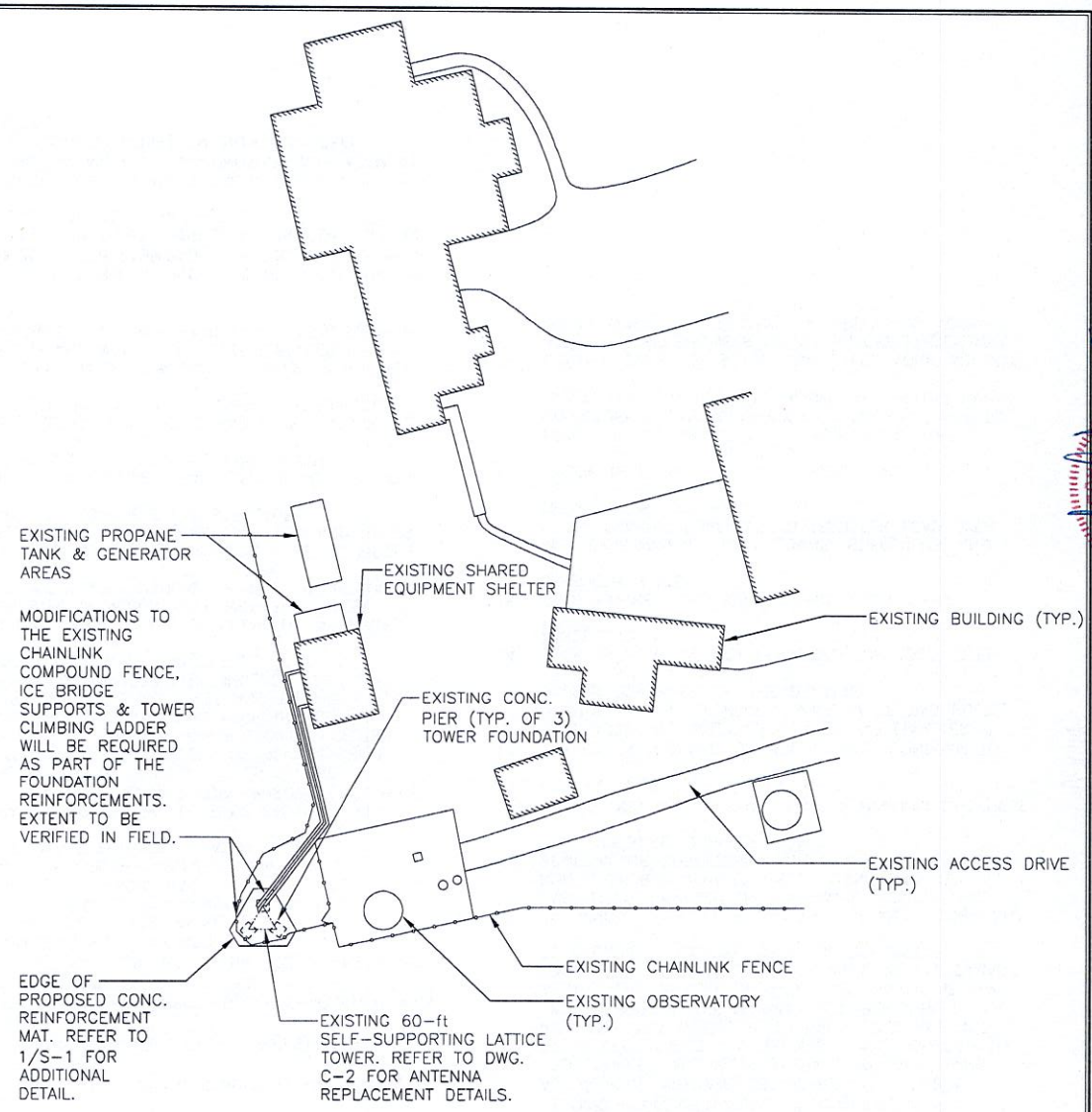
STRUCTURAL STEEL NOTES

SHEET NO.
N-4
Sheet No. 4 of 9



1 / C-1 **SITE KEY PLAN**

SCALE: 1" = 40'

NORTH

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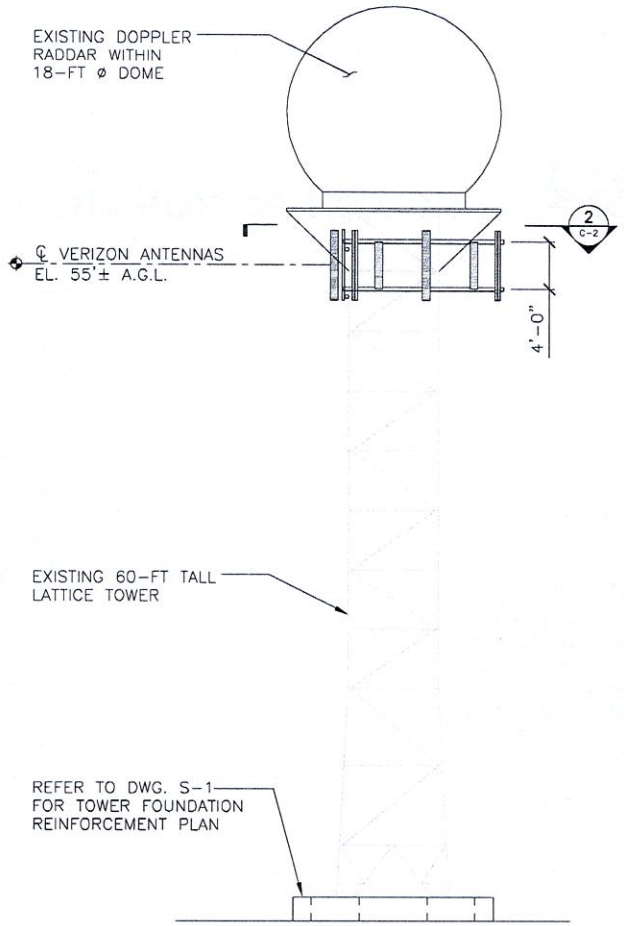
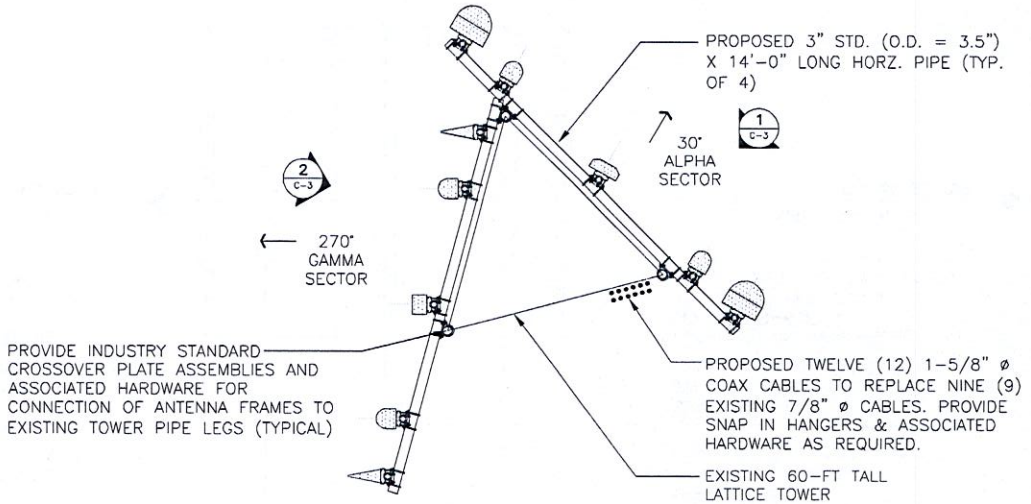
SITE KEY PLAN

SHEET NO.
C-1
Sheet No. 2 of 9



1 / C-2 TOWER ELEVATION - PROPOSED

SCALE: 1" = 10'-0"



2 / C-2 TOWER PLAN - PROPOSED

SCALE: 1/4" = 1'-0"

TRUE NORTH

NOTE

EXISTING SIX (6) PANEL ANTENNAS AND RELATED MOUNTS TO BE REMOVED

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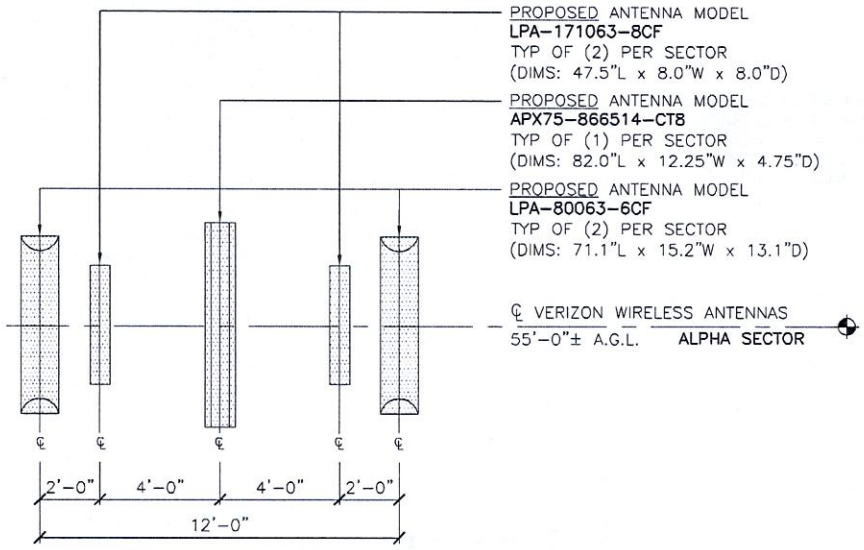
TOWER ELEVATION AND PLAN

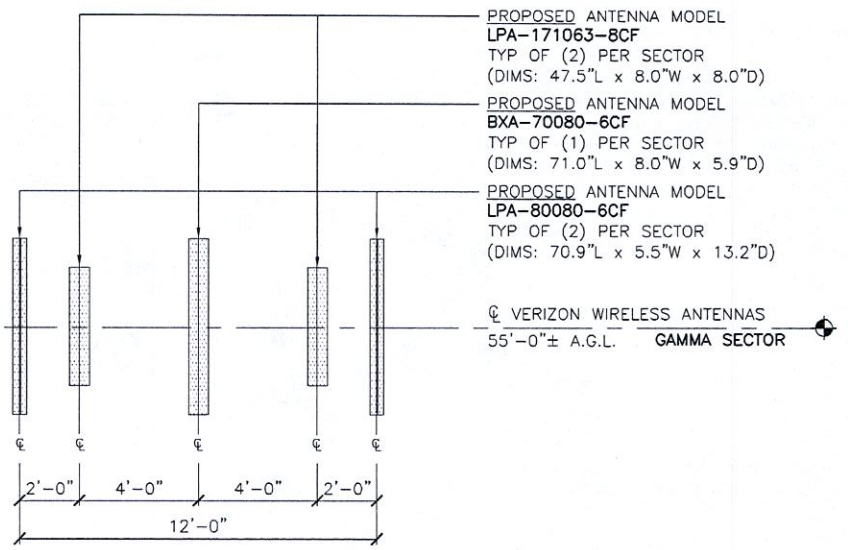
SHEET NO. C-2

Sheet No. 6 of 9



1 / C-3 **MOUNTING CONFIGURATION - PROPOSED** (ALPHA SECTOR)

SCALE: 1/4" = 1'-0"



2 / C-3 **MOUNTING CONFIGURATION - PROPOSED** (GAMMA SECTOR)

SCALE: 1/4" = 1'-0"

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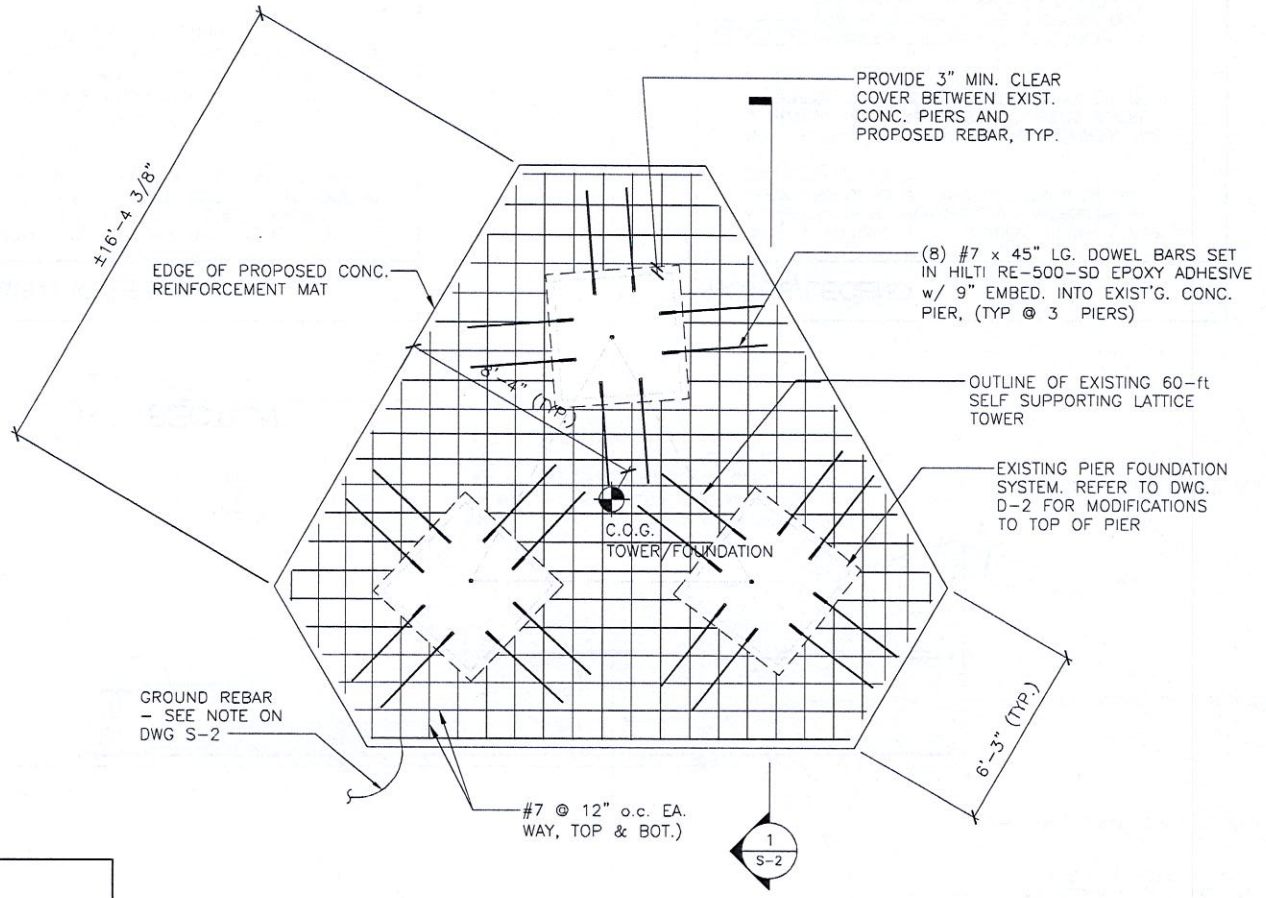
ANTENNA CONFIGURATIONS

SHEET NO.
C-3
Sheet No. 7 of 9



NOTE
BOTTOM LEVEL OF REINFORCING STEEL SHOWN ON PLAN ABOVE. TOP LEVEL TO BE CONTINUOUS OVER EXISTING CONC. PIERS. REFER TO 1/S-2 FOR CLARIFICATION.

1 / S-1A **FOUNDATION REINF. PLAN**

SCALE: 1/4" = 1'-0"

NORTH

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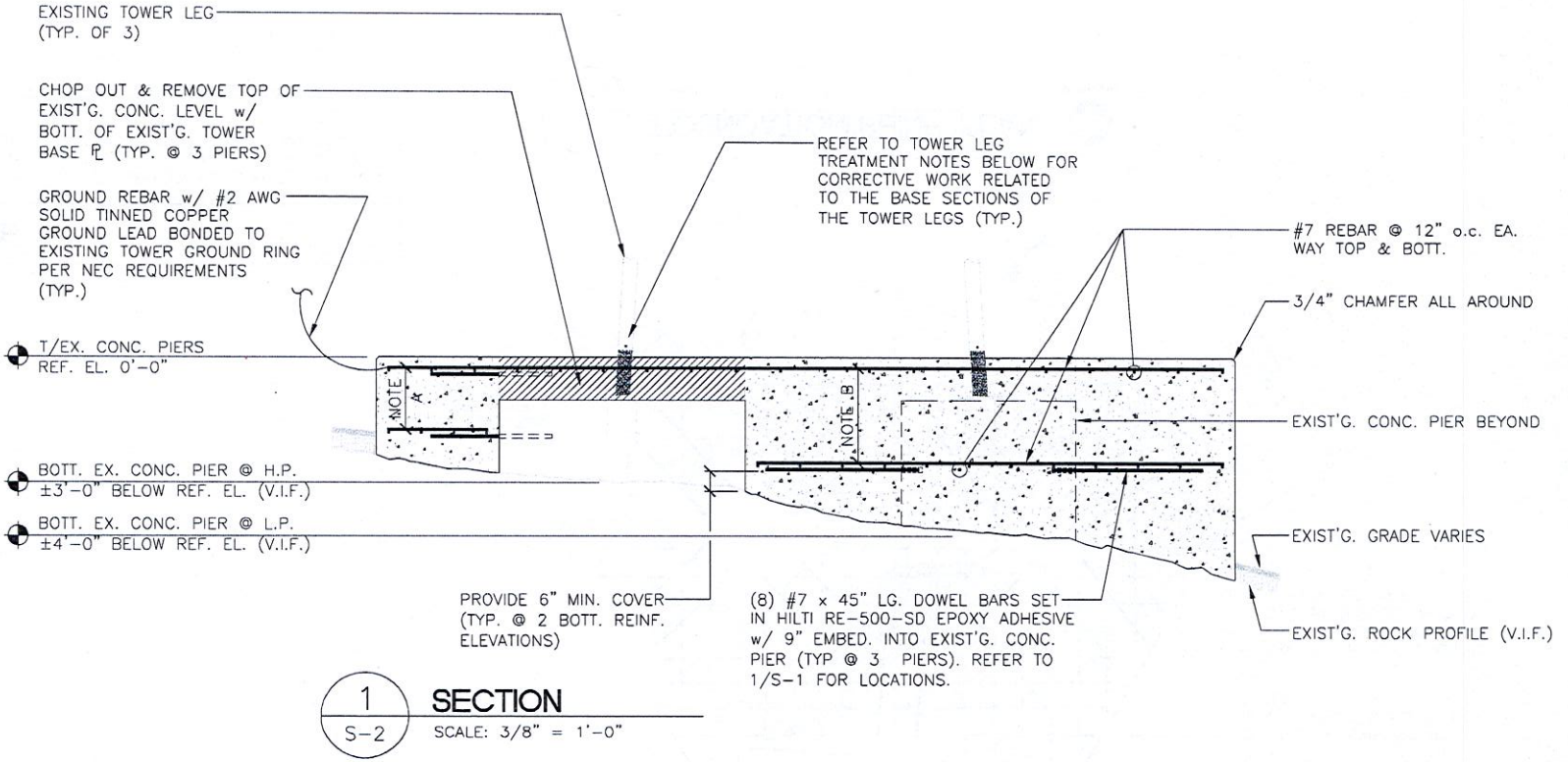
FOUNDATION REINFORCEMENT PLAN

SHEET NO.
S-1
Sheet No. 1 of 3



1 / S-2 **SECTION**

SCALE: 3/8" = 1'-0"

EXIST'G. TOWER LEG TREATMENT NOTES

1. PRIOR TO PROCEEDING WITH FOUNDATION WORK CONTACT THE ENGINEER OF RECORD FOR VERIFICATION OF EXISTING TOWER ANCHORAGE ONCE EXPOSED. PROTECT ALL EMBEDED TOWER STEEL WITH KARNAK 83AF FIBERED DAMPROOFING SOLVENT BASED ASPHALT COMPOUND (www.karnakcorp.com, TEL: 800.526.4236). PRIOR TO PLACEMENT OF CONCRETE (TYPICAL).
2. PRESSURE INJECT BOTTOM OF TOWER LEGS TO 3" ABOVE CONC. FOUNDATION SOLID w/ MASTER BUILDERS MASTER FLOW 928 STRUCTURAL NON-SHRINK GROUT (5,000 PSI MIN.) OR APPROVED EQUAL. VERIFY PIPE LEGS ARE CLEAN OF DEBRIS (IE. DIRT, INSECTS, BEES NESTS, ETC.) BY FLUSHING WITH WATER (IE. DIRT, INSECTS, BEES NESTS, ETC.) PRIOR TO GROUT INJECTION.
3. PROVIDE 1/2" WEEP HOLE ABOVE GROUT.

NOTES/LEGEND

1. NOTE A: PROVIDE 1'-6" SPACING BETWEEN TOP & BOTTOM REINFORCING STEEL LAYERS WHERE THICKNESS OF CONC. MAT IS LESS THAN OR EQUAL TO 3'-0".
2. NOTE B: PROVIDE 2'-2" SPACING BETWEEN TOP & BOTTOM REINFORCING STEEL LAYERS WHERE THICKNESS OF CONCRETE MAT IS GREATER THAN 3'-0".

INDICATES TOP ±1'-0" OF EXISTING CONCRETE PIER TO BE CHOPPED OUT AND REMOVED FLUSH WITH BOTTOM OF EXISTING TOWER BASE PLATE

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FOUNDATION REINFORCEMENT SECTION

SHEET NO. S-2
Sheet No. 2 of 3

SITE NAME	TALCOTT MTN CT	ECP - CELL #	8	133
LATITUDE	41-48-41.90 N	LONGITUDE	72-47-55.50 W	
Additional Comments: 2012 LTE One-For-One site. NOT YET COMPLETE		SAVE BUTTON		
		STRUCTURE TYPE	TBD	

700 Mhz - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	eNodeB		eNodeB
ANTENNA TYPE	APX75-866514-T8		BXA-70080-6CF-EDIN-6
QTY OF ANTENNAS PER FACE	1		1
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	3		5
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0 HD		Cellular Modcell 4.0 HD
ANTENNA TYPE	ALP6011		ALP11008
QTY OF ANTENNAS PER FACE	2		2
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	30		12
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0 HD		Cellular Modcell 4.0 HD
ANTENNA TYPE	LPA-80063-6CF-EDIN-10		LPA-80080-6CF-EDIN-6
QTY OF ANTENNAS PER FACE	2		2
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	3		5
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
DIPLEX WITH LTE CABLE			

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0 HD		PCS Modcell 4.0 HD
ANTENNA TYPE	932LG65VTE-M_2		932LG65VTE-M_2
QTY OF ANTENNAS PER FACE	1		1
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	5		5
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

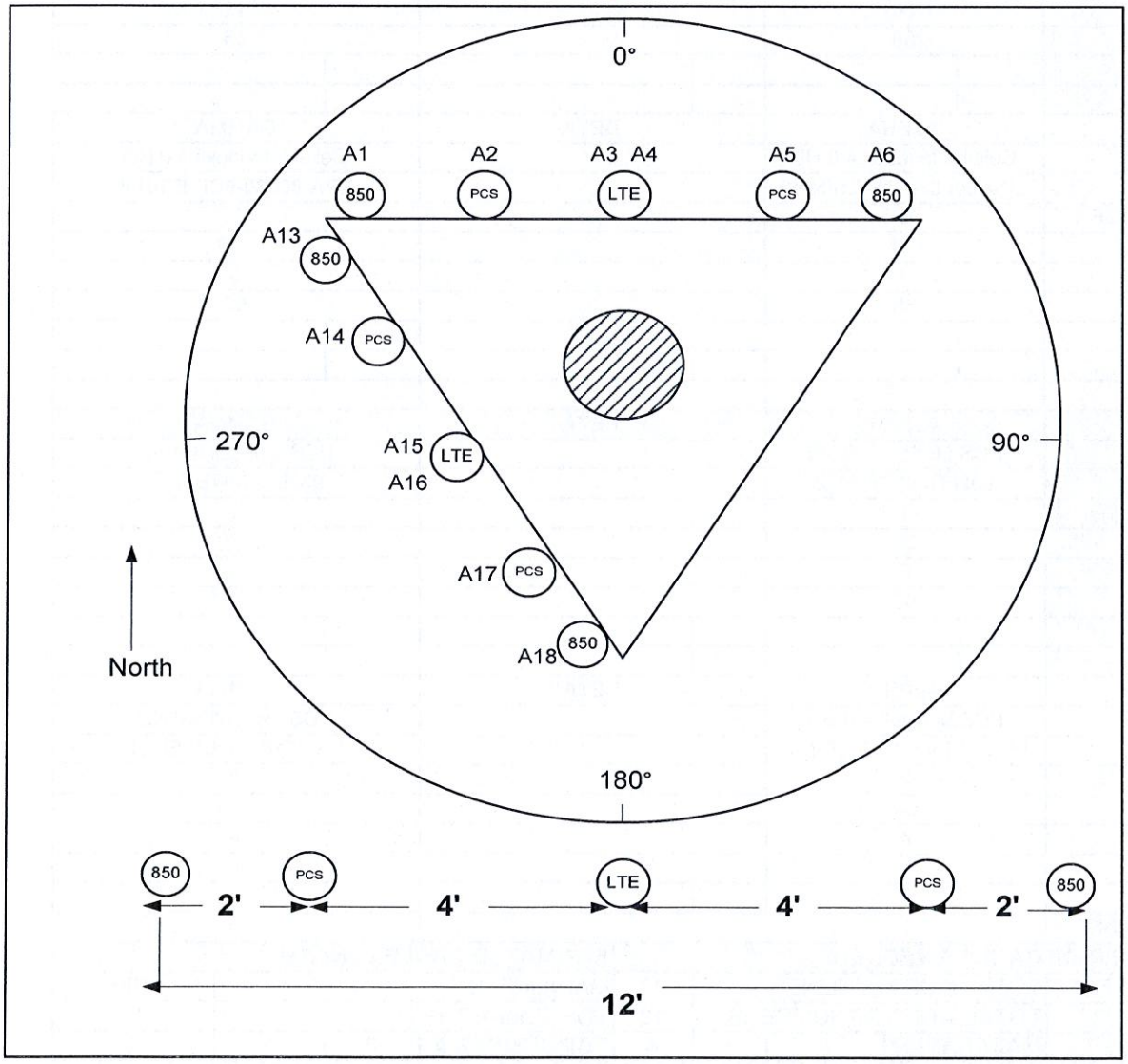
1900 PCS - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0 HD		PCS Modcell 4.0 HD
ANTENNA TYPE	LPA-171063-8CF-EDIN-2		LPA-171063-8CF-EDIN-2
QTY OF ANTENNAS PER FACE	2		2
ORIENTATION (DEG)	30		270
DOWN TILT (MECH/DEG)	4		4
RAD CTR (FT AGL)	55		55
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE			

NUMBER OF CABLE'S NEEDED					ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES		12	MAINLINE (FT)			100
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS		12	TOP JUMPER (FT)			12
Equipment Cable Ordering		MAIN CABLE	8 +	4	TOP JUMPER #	8	+	4

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F / AWS-Band	700 Mhz C - E	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975 / 2145-21	TX - 746-757	PCS (Watts)	16
RX - 824-835,845-846.5 MHz	RX - 1890-1895 / 1745-17	RX - 776-787	LTE (Watts)	40

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED					A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE					A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE					A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE					A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE					A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED					A18	800	Tx6/Rx1	GREEN/GREEN
RF ENGINEER				RF MANAGER				INITIALS			DATE
Prepared By: Jay Latorre				Steve Weatherbee				JL			5/18/2012

Site Configuration



Product Data Sheet **APX75-866514-CT8**

Optimizer® Dual Polarized Antenna, 698-896, 65deg, 16.1dBi, 2m, FET, 8deg

Product Description

Wideband antenna for dense networks where site aspect is essential.

Features/Benefits

- **Wideband performance 698-896 MHz**
- **High sidelobe suppression**
- **Null fill**
- **Dual polarization**
- **High front-to-back ratio**

Technical Specifications

Electrical Specifications

Frequency Range, MHz	698-896
Horizontal Beamwidth, deg	66 +/-5
Vertical Beamwidth, deg	9-12
Gain, dBi (dBd)	16.1 (14)
1st Upper Sidelobe Suppression, dB	>18
Upper Sidelobe Suppression, dB	>18
Front-To-Back Ratio, dB	>30
Polarization	Slant +/-45 degrees
VSWR	1.40:1
Isolation between Ports, dB	>30
3rd Order IMP @ 2 x 43 dBm, dBc	>150
Impedance, Ohms	50
Maximum Power Input, W	500
Lightning Protection	Chassis Ground
Connector Type/Location	(2) 7-16 Long Neck DIN Female/Bottom

Mechanical Specifications

Dimensions - HxWxD, mm (in)	2082.8 x 311.2 x 120.7 (82 x 12.25 x 4.75)
Weight w/o Mtg Hardware, kg (lb)	14.0 (30.8)
Survival/Rated Wind Speed, km/h (mph)	200 (125) / 160 (100)
Radome Material/Color	ASA Plastic/Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Radiating Element Material	Brass
Reflector Material	Aluminum

Ordering Information

Mounting Hardware	APM40-3
Mounting Pipe Diameter, mm (in)	60-120 (2.36-4.72)
Mounting Hardware Weight, kg (lb)	5.4 (11.9)

Amphenol ANTENNA SOLUTIONS

BXA-70080-6CF-EDIN-X

X-Pol | FET Panel | 80° | 13.5 dBd

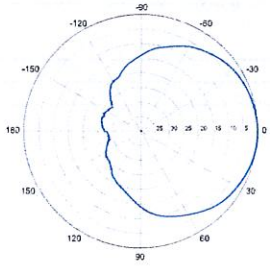
Replace "X" with desired electrical downtilt.

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	82°	80°
Vertical beamwidth	12°	10°
Gain	13.0 dBd (15.1 dBi)	13.5 dBd (15.6 dBi)
Electrical downtilt (X)	0, 2, 4, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.6 dB
Front-to-back ratio (+/-30°)	-26.9 dB	-25.6 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -30 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 204 x 151 mm	71.0 x 8.0 x 5.9 in
Depth with z-brackets	191 mm	7.5 in
Weight without mounting brackets	8.2 kg	18 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.37 m^2 Side: 0.27 m^2	Front: 3.9 ft^2 Side: 2.9 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 531 N Side: 475 N	Front: 119 lbf Side: 104 lbf

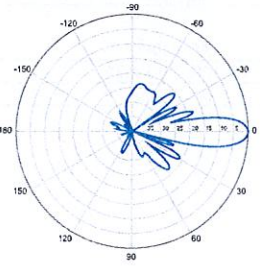
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70080-6CF-EDIN-X-FP		

BXA-70080-6CF-EDIN-X



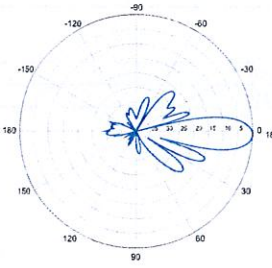
Horizontal | 750 MHz

BXA-70080-6CF-EDIN-0



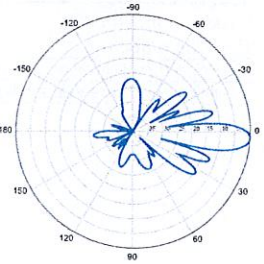
0° | Vertical | 750 MHz

BXA-70080-6CF-EDIN-2

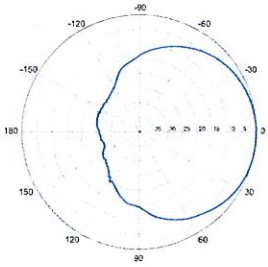


2° | Vertical | 750 MHz

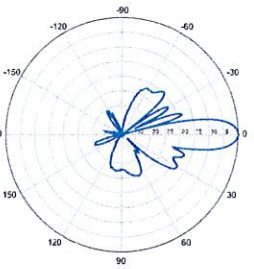
BXA-70080-6CF-EDIN-4



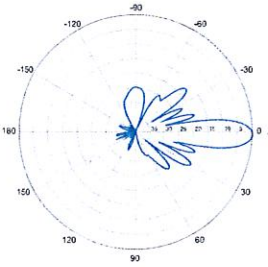
4° | Vertical | 750 MHz



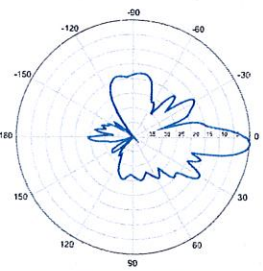
Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz



4° | Vertical | 850 MHz

Amphenol ANTENNA SOLUTIONS

LPA-80063-6CF-EDIN-X

V-Pol | Log Periodic | 63° | 14.5 dBd

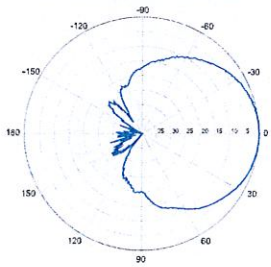
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics		
Frequency bands	806-960 MHz	
Polarization	Vertical	
Horizontal beamwidth	63°	
Vertical beamwidth	10°	
Gain	14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.4:1	
Null fill	5% (-26.02 dB)	
Input power	500 W	
Lightning protection	Direct Ground	
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1805 x 385 x 332 mm	71.1 x 15.2 x 13.1 in
Depth of antenna with z-bracket	372 mm	14.6 in
Weight without mounting brackets	12.3 kg	27 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.70 m² Side: 0.59 m²	Front: 7.5 ft² Side: 6.3 ft²
Wind load @ 161 km/hr (100 mph)	Front: 885 N Side: 757 N	Front: 199 lbf Side: 170 lbf

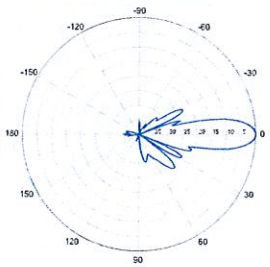
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit (0-20°)	21700000	50-102 mm 2.0-4.0 in	11 kg 25 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80063-6CF-EDIN-X



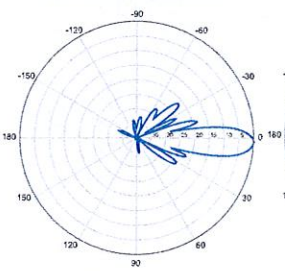
Horizontal

LPA-80063-6CF-EDIN-0



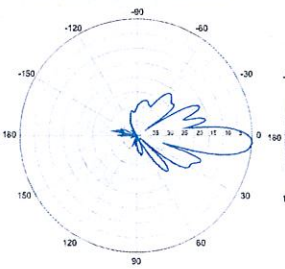
0° | Vertical

LPA-80063-6CF-EDIN-2



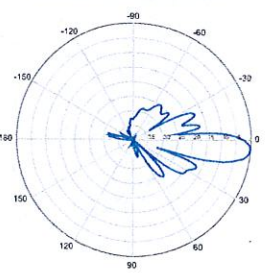
2° | Vertical

LPA-80063-6CF-EDIN-4



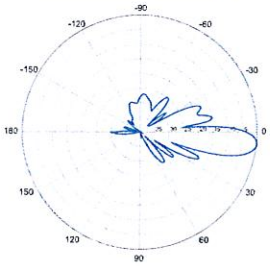
4° | Vertical

LPA-80063-6CF-EDIN-5



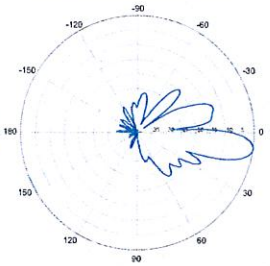
5° | Vertical

LPA-80063-6CF-EDIN-6



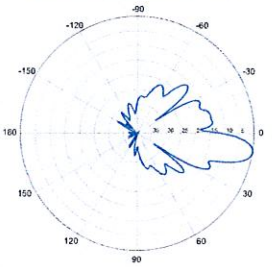
6° | Vertical

LPA-80063-6CF-EDIN-8



8° | Vertical

LPA-80063-6CF-EDIN-10



10° | Vertical

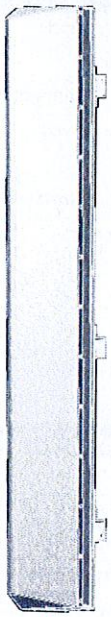
Amphenol ANTENNA SOLUTIONS

LPA-80080-6CF-EDIN-X

V-Pol | Log Periodic | 80° | 14.0 dBd

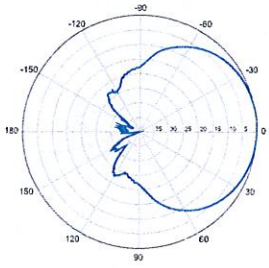
Replace "X" with desired electrical downtilt.

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



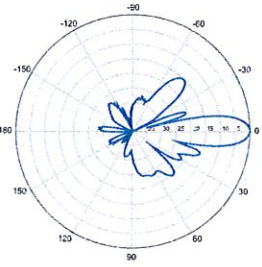
Electrical Characteristics				
Frequency bands	806-960 MHz			
Polarization	Vertical			
Horizontal beamwidth	80°			
Vertical beamwidth	10°			
Gain	14.0 dBd (16.1 dBi)			
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.4:1			
Upper sidelobe suppression (0°)	-22.6 dB			
Null fill	10% (-20.0 dB)			
Input power	500 W			
Lightning protection	Direct Ground			
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1800 x 140 x 335 mm		70.9 x 5.5 x 13.2 in	
Depth of antenna with z-bracket	375 mm		14.8 in	
Weight without mounting brackets	9.5 kg		21.0 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.25 m²	Side: 0.61 m²	Front: 2.7 ft²	Side: 6.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 415 N	Side: 878 N	Front: 93 lbf	Side: 198 lbf
Mounting Options	**Part Number**	**Fits Pipe Diameter**		**Weight**
3-Point Mounting & Downtilt Bracket Kit (0-20°)	21700000	50-102 mm 2.0-4.0 in		11 kg 25 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.			

LPA-80080-6CF-EDIN-X



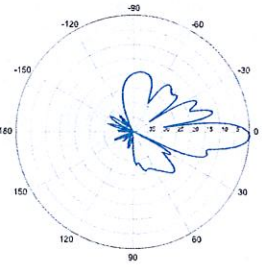
Horizontal | 750 MHz

LPA-80080-6CF-EDIN-0



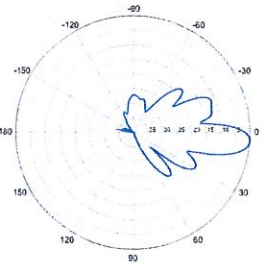
0° | Vertical

LPA-80080-6CF-EDIN-2



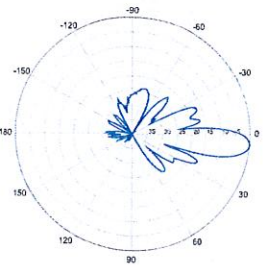
2° | Vertical

LPA-80080-6CF-EDIN-4



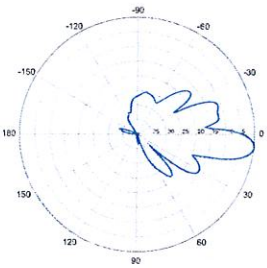
4° | Vertical

LPA-80080-6CF-EDIN-5



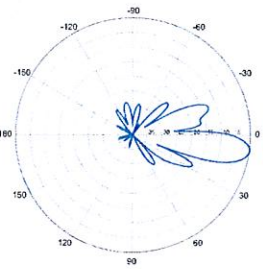
5° | Vertical

LPA-80080-6CF-EDIN-6



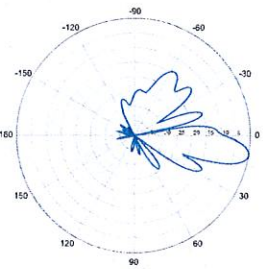
6° | Vertical

LPA-80080-6CF-EDIN-8



8° | Vertical

LPA-80080-6CF-EDIN-10



10° | Vertical

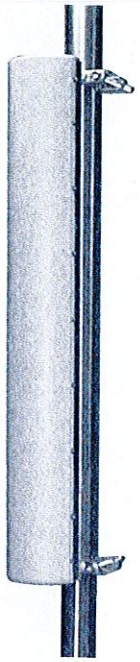
Amphenol ANTENNA SOLUTIONS

LPA-171063-8CF-EDIN-X

V-Pol | Log Periodic | 63° | 17.0-17.5 dBi

Replace "X" with desired electrical downtilt.

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

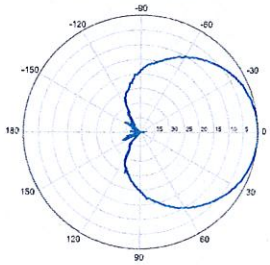


Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1755 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	Vertical		
Horizontal beamwidth	61°	63°	60°
Vertical beamwidth	6°	7°	6°
Gain	14.9 dBd (17.0 dBi)	15.4 dBd (17.5 dBi)	14.9 dBd (17.0 dBi)
Electrical downtilt (X)	0, 2		
Impedance	50Ω		
VSWR	≤ 1.5:1		
Null fill	5% (-26.02 dB)		
Input power	250 W		
Lightning protection	Direct Ground		
Connector(s)	1 Port / EDIN or NE / Female / Center (Back)		

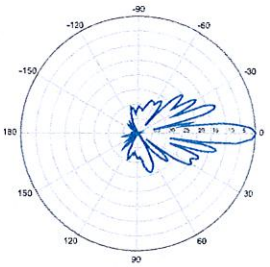
Mechanical Characteristics		
Dimensions Length x Width x Depth	1207 x 203 x 203 mm	47.5 x 8.0 x 8.0 in
Weight without mounting brackets	5.2 kg	11.5 lbs
Survival wind speed	>201 km/hr	>125 mph
Wind area	Front: 0.20 m² Side: 0.27 m²	Front: 2.2 ft² Side: 2.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 246 N Side: 323 N	Front: 55.3 lbf Side: 72.7 lbf

Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5.0 lbs
2-Point Mounting and Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	2.3 kg 5.0 lbs

1710-1880 MHz

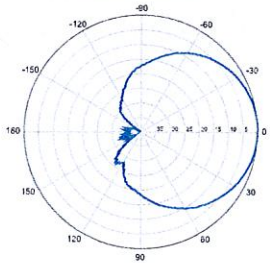


Horizontal

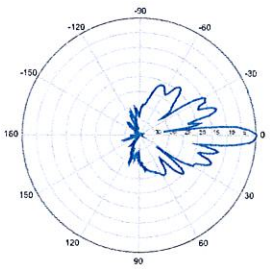


0° | Vertical

1850-1990 MHz

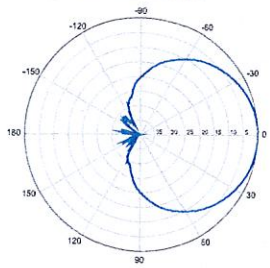


Horizontal

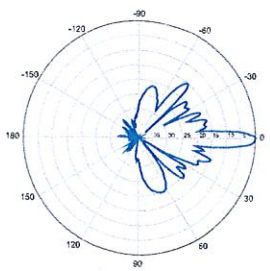


0° | Vertical

1920-2170 MHz



Horizontal



0° | Vertical

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

November 7, 2012

The Honorable Mark W. Zacchio
Chairman Town Council
Town of Avon
60 West Main Street
Avon, CT 06001-3743

RE: **EM-VER-004-121106** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Talcott Mountain Science Center, 324 Montevideo Road, Avon, Connecticut.

Dear Chairman Town Council Zacchio:

The Connecticut Siting Council (Council) received a request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72. A copy of which has already been provided to you.

If you have any questions or comments regarding the proposal, please call me or inform the Council by November 26, 2012.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts
Executive Director

LR/jbw

c: Brandon Robertson, Town Manager, Town of Avon
Steven V. Kushner, Town Planner, Town of Avon

CONNECTICUT SITING COUNCIL

ROBINSON & COLE LLP

ORIGINAL

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SITING COUNCIL

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

June 14, 2013

David Martin
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Cellco Partnership d/b/a Verizon Wireless**
EM-VER-025-121004 – 1119 Summit Road, Cheshire, CT
EM-VER-165-120924 – 55 King Road, Suffield, CT
EM-VER-004-121106 – 324 Montevideo Road, Avon, CT

Dear Mr. Martin:

As a condition of the acknowledgement for each of the above-referenced exempt modification filings, Cellco was required to provide the Council with a letter stating that the recommendations specified in the structural report were implemented. Attached are Tower Modification Certification Letters verifying that these conditions have been satisfied. All construction associated with these modifications has now been completed.

If you have any questions please do not hesitate to contact me or Rachel Mayo.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Sandy M. Carter
Brian Ragozzine
Mark Gauger

12294466-v1

CENTEK engineering

Centered on Solutions℠

June 12, 2013

Mr. Mark Gauger
Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

Re: Existing Telecommunications Facility Tower Modification Certification Letter

Project:	**Verizon ~ Cheshire 2** 1119 Summit Road Cheshire, CT
Tower Owner:	**Crown Castle USA Inc.** 349 West Commercial Street Suite 2630 East Rochester, NY 14445
Engineer:	**Paul J. Ford and Company** 250 E. Broad Street, Suite 1500, Columbus, OH 43215

Centek Project No.: 13008.017

Dear Mr. Gauger,

We are providing this "Existing Telecommunications Facility Tower Modification Certification Letter" with regard to the antenna upgrade by Verizon Wireless at the above referenced project.

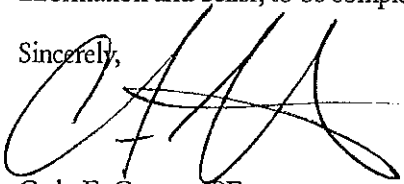
The following are the basis for substantiating compliance with the tower modification documents prepared by Paul J. Ford and Company (Paul J. Ford and Company Project Number: 37512-1657BP SabreR1):

- Review of the Paul J. Ford and Company Structural Analysis dated 07/31/2012.
- Review of the Paul J. Ford and Company Modification Drawings S-1B, S-2B, S-3B, S-4B, and S-5B, dated 06/19/2012.
- Review of the Tower Engineering Professionals Modification Inspection Report dated 05/20/2013.
- Field observations by Centek Engineering personnel on 06/04/2013 of the completed modifications.

With the completed modifications, the tower and foundation do not exceed 100 percent of their post-construction structural rating.

The work under this Contract has been reviewed and found, to the Engineer's best knowledge, information and belief, to be completed in general compliance with the documents referenced above.

Sincerely,



Carlo F. Centore, PE
Principal ~Structural Engineer

CC: Rachel Mayo, Tim Parks, Aleksey Tyurin

CENTEK engineering

Centered on Solutions℠

June 12, 2013

Mr. Mark Gauger
Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

Re: Existing Telecommunications Facility Tower Modification Certification Letter

Project:	**Verizon ~ Suffield South** 55 King Spring Road Windsor Locks, CT
Tower Owner:	**King Spring LLC.** 55 King Spring Road Windsor Locks, CT
Engineer:	**Centek Engineering** 63-2 North Branford Road, Branford, CT 06405

Centek Project No.: 13008.026

Dear Mr. Gauger,

We are providing this "Existing Telecommunications Facility Tower Modification Certification Letter" with regard to the antenna upgrade by Verizon Wireless at the above referenced project.

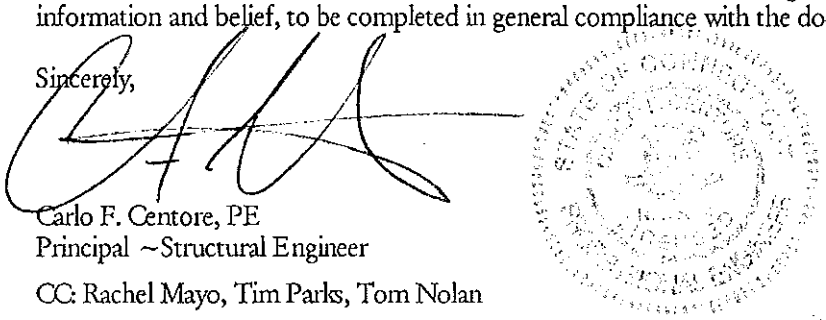
The following are the basis for substantiating compliance with the tower modification documents prepared by this office (Centek Engineering Project Number: 12001.CO91):

- Review of the Centek Engineering Structural Analysis dated 08/10/2012.
- Review of the Centek Engineering Modification Drawings N-1, N-2, S-1 & S-2, dated 08/06/2012 Rev-A.
- Review of steel certifications provided by the contractor (Berkshire Wireless).
- Field observations by Centek Engineering personnel on 06/05/2013 of the completed modifications.

With the completed modifications, the tower and foundation do not exceed 100 percent of their post-construction structural rating.

The work under this Contract has been reviewed and found, to the Engineer's best knowledge, information and belief, to be completed in general compliance with the documents referenced above.

Sincerely,



Carlo F. Centore, PE
Principal ~Structural Engineer

CC: Rachel Mayo, Tim Parks, Tom Nolan

CENTEK engineering

Centered on Solutions℠

June 12, 2013

Mr. Mark Gauger
Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

Re: Existing Telecommunications Facility Tower Modification Certification Letter

Project:	**Verizon ~ Talcott Mountain** 324 Montevideo Drive Avon, CT
Tower Owner:	**Talcott Mountain Science Center** 324 Montevideo Drive Avon, CT
Engineer:	**Centek Engineering** 63-2 North Branford Road, Branford, CT 06405

Centek Project No.: 13008.027

Dear Mr. Gauger,

We are providing this "Existing Telecommunications Facility Tower Modification Certification Letter" with regard to the antenna upgrade by Verizon Wireless at the above referenced project.

The following are the basis for substantiating compliance with the tower modification documents prepared by this office (Centek Engineering Project Number: 12001.CO76):

- Review of the Centek Engineering Structural Analysis dated 10/31/2012 Rev-1.
- Review of the Centek Engineering Modification Drawings N-1 thru N-4, C-1 thru C-3 and S-1 & S-2, dated 10/31/2012 Rev-0.
- Review of the Centek Engineering Final Report of Special Inspections dated 04/08/2013.
- Field observations by Centek Engineering personnel on 03/26/2013 of the completed modifications.

With the completed modifications, the tower and foundation do not exceed 100 percent of their post-construction structural rating.

The work under this Contract has been reviewed and found, to the Engineer's best knowledge, information and belief, to be completed in general compliance with the documents referenced above.

Sincerely,

Carlo F. Centore, PE
Principal ~Structural Engineer

CC: Rachel Mayo, Tim Parks, Aleksey Tyurin

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com