ROBINSON & COLE LLP

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

February 14, 2013

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

Re: **EM-VER-017-120904 – Cellco Partnership d/b/a Verizon Wireless**
32 Valley Street, Bristol, Connecticut

Dear Mr. Martin:

On September 21, 2012, the Siting Council acknowledged receipt of Cellco's notice of intent to modify its telecommunications facility at 32 Valley Street in Bristol. The modification involved the replacement of certain antennas.

As a condition of the acknowledgement, Cellco was required to provide the Council with a letter stating that the recommendations specified in the structural report were implemented. Attached is a Tower Modification Certification Letter verifying that this condition has 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

CENTEK engineering

Centered on Solutions℠

February 11, 2013

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

Re: Existing Telecommunications Facility Tower Modification Certification Letter

Project:	**Verizon ~ Bristol** 32 Valley Street Bristol, CT
Tower Owner:	**Carpenter Realty** 67 Race Street Bristol, CT
Engineer:	**Centek Engineering** 63-2 North Branford Road Branford, CT

Centek Project No.: 12005.CO38

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.

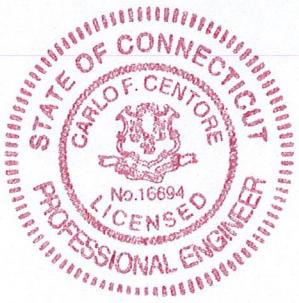
The following are the basis for substantiating compliance with the design documents prepared by this office:

- Review of the Centek reinforcement drawings N1-S1 dated 6/7/2012.
- Field observations by Centek personnel of reinforcement installation on 1/30/2013 which determined all reinforcements were installed according to the reinforcement design drawings prepared by this office dated 6/7/2012.

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

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

September 21, 2012

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

RE: **EM-VER-017-120904** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 32 Valley Street, Bristol, 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:

- The tower shall be reinforced in accordance with the modifications outlined in the drawings included in Section 4 of the Structural Analysis prepared by Centek Engineering dated June 7, 2012 , and stamped by Carlo Centore;
- Prior to 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 and foundation will 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 less 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 August 30, 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
Executive Director

LR/CDM/jbw

c: The Honorable Arthur J. Ward, Mayor, City of Bristol
William J. Veits, Planner Commission Chairman, City of Bristol
Carpenter Realty

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
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www.ct.gov/csc

September 6, 2012

The Honorable Arthur J. Ward
Mayor
City of Bristol
City Hall
111 North Main Street
P.O.Box 114
Bristol, CT 06010-0114

RE: **EM-VER-017-120904** Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 32 Valley Street, Bristol, Connecticut.

Dear Mayor Ward:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by September 20, 2012.

Thank you for your cooperation and consideration.

Very truly yours,

LRoberts

Linda Roberts
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: William J. Veits, Planner Commission Chairman, City of Bristol

ROBINSON & COL

EM-VER-017-120904

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

August 30, 2012

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

Re: **Notice of Exempt Modification – Antenna Swap**
32 Valley Street, Bristol, Connecticut

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains fifteen (15) wireless telecommunications antennas on an existing tower on the roof of a building at 32 Valley Street in Bristol. Six (6) of Cellco's antennas are mounted at a centerline height of 110 feet above ground level and nine (9) antennas are mounted at a centerline height of 100 feet above ground level. The tower and building are owned by Carpenter Realty. The Council approved Cellco's shared use of this roof-top tower in 1992. Cellco now intends to replace its fifteen (15) antennas with six (6) model LPA-171063-8CF PCS antennas at the 110-foot level; and four (4) model LPA-80080-4CF cellular antennas; two (2) model LPA-80063-4CF cellular antennas; and three (3) model BXA-70063-6CF LTE antennas at the 100-foot level. Attached behind Tab 1 are the specifications for the 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 Arthur J. Ward, Mayor for the City of Bristol. A copy of this letter is also being sent to Carpenter Realty, the owner of the property on which the building and tower are located.

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

1. The proposed modifications will not result in an increase in the height of the existing tower.

2. The proposed modifications will 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.

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 power density table for Cellco's modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower, with certain structural reinforcements, can support Cellco's proposed facility modifications. (See 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:
Arthur J. Ward, Bristol Mayor
Carpenter Realty
Sandy M. Carter

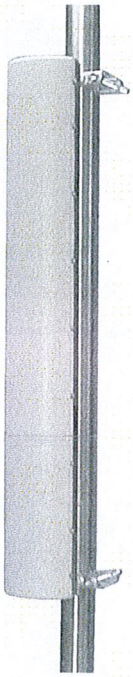
Amphenol ANTENNA SOLUTIONS

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.

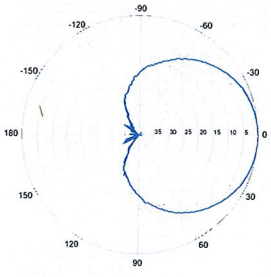


Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1755 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	Vertical		
Horizontal beamwidth	61°	63°	60°
Vertical beamwidth	6°	7°	6°
Gain	14.9 dBd (17.0 dBi)	15.4 dBd (17.5 dBi)	14.9 dBd (17.0 dBi)
Electrical downtilt (X)	0, 2		
Impedance	50Ω		
VSWR	≤ 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)		

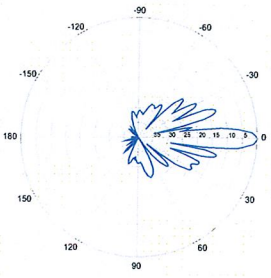
Mechanical Characteristics		
Dimensions Length x Width x Depth	1207 x 203 x 203 mm	47.5 x 8.0 x 8.0 in
Weight without mounting brackets	5.2 kg	11.5 lbs
Survival wind speed	>201 km/hr	>125 mph
Wind area	Front: 0.20 m² Side: 0.27 m²	Front: 2.2 ft² Side: 2.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 246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

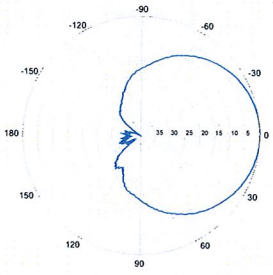


Horizontal



0° | Vertical

1850-1990 MHz



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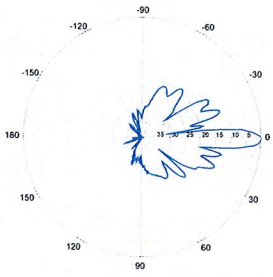
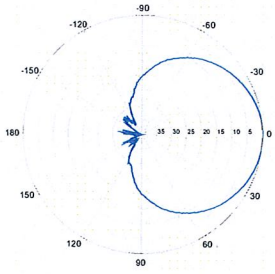
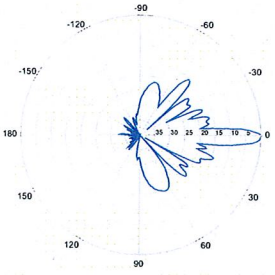


0° | Vertical

1920-2170 MHz



Horizontal

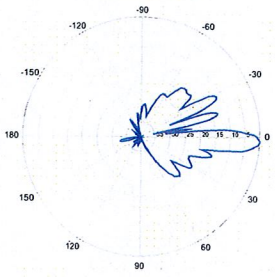


0° | Vertical

LPA-171063-8CF-EDIN-X

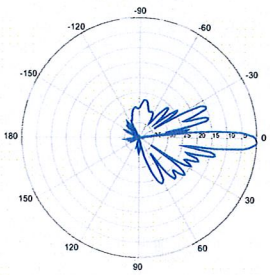
V-Pol | Log Periodic | 63° | 17.0-17.5 dBi

1710-1880 MHz



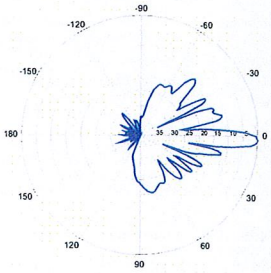
2° | Vertical

1850-1990 MHz



2° | Vertical

1920-2170 MHz



2° | Vertical

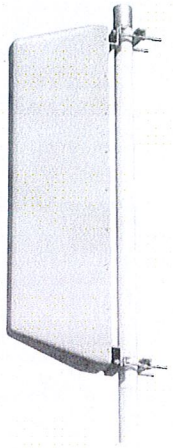
Amphenol ANTENNA SOLUTIONS

LPA-80080-4CF-EDIN-X

V-Pol | Log Periodic | 80° | 12.5 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.

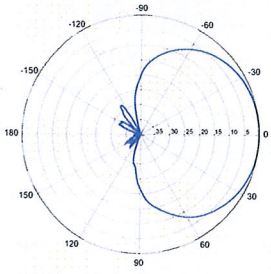


Electrical Characteristics	
Frequency bands	806-960 MHz
Polarization	Vertical
Horizontal beamwidth	80°
Vertical beamwidth	15°
Gain	12.5 dBd (14.6 dBi)
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10, 12, 14
Impedance	50Ω
VSWR	≤1.4:1
Upper sidelobe suppression (0°)	-14.2 dB
Front-to-back ratio (+/-30°)	-34.7 dB
Null fill	15% (-16.48 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	1200 x 140 x 335 mm	47.2 x 5.5 x 13.2 in
Depth of antenna with z-bracket	375 mm	14.8 in
Weight without mounting brackets	5.4 kg	12 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.17 m² Side: 0.40 m²	Front: 1.8 ft² Side: 4.3 ft²
Wind load @ 161 km/hr (100 mph)	Front: 254 N Side: 574 N	Front: 57 lbf Side: 129 lbf

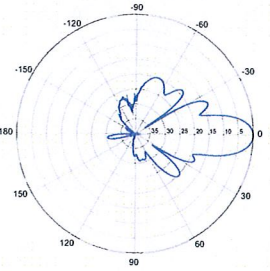
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit (0-20°)	21699999	50-102 mm 2.0-4.0 in	5.4 kg 12 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80080-4CF-EDIN-X



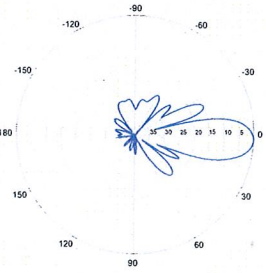
Horizontal

LPA-80080-4CF-EDIN-0



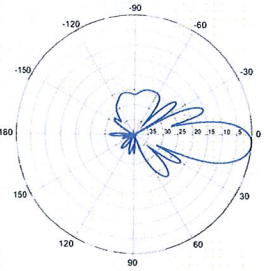
0° | Vertical

LPA-80080-4CF-EDIN-2



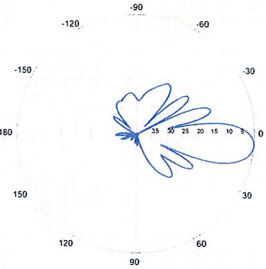
2° | Vertical

LPA-80080-4CF-EDIN-4



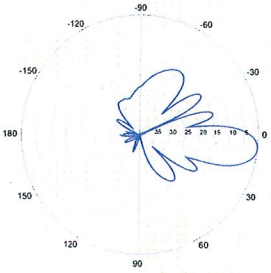
2° | Vertical

LPA-80080-4CF-EDIN-5



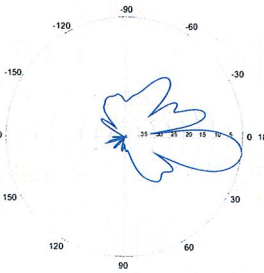
5° | Vertical

LPA-80080-4CF-EDIN-6



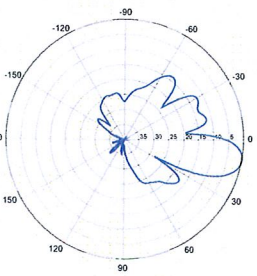
6° | Vertical

LPA-80080-4CF-EDIN-8



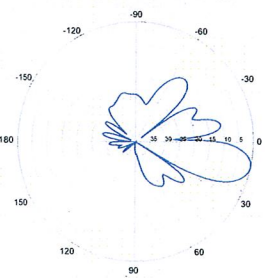
8° | Vertical

LPA-80080-4CF-EDIN-10



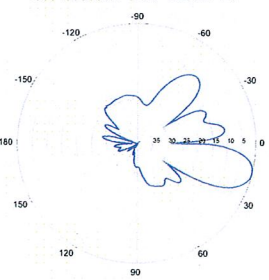
10° | Vertical

LPA-80080-4CF-EDIN-12



12° | Vertical

LPA-80080-4CF-EDIN-14



14° | Vertical

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

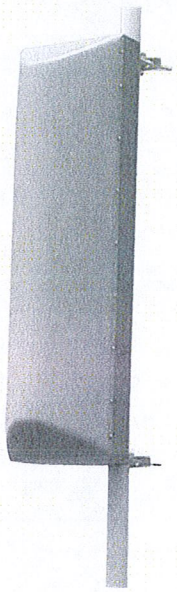
Amphenol ANTENNA SOLUTIONS

LPA-80063-4CF-EDIN-X

V-Pol | Log Periodic | 63° | 13.0 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.

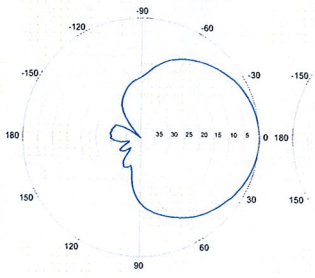


Electrical Characteristics	
Frequency bands	806-960 MHz
Polarization	Vertical
Horizontal beamwidth	63°
Vertical beamwidth	15°
Gain	13.0 dBd (15.1 dBi)
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10, 12, 14
Impedance	50Ω
VSWR	≤1.4:1
Upper sidelobe suppression (0°)	-15.7 dB
Front-to-back ratio (+/-30°)	-31.7 dB
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	1205 x 385 x 332 mm	47.4 x 15.2 x 13.1 in
Depth of antenna with z-bracket	372 mm	14.6 in
Weight without mounting brackets	9.1 kg	20 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.46 m² Side: 0.39 m²	Front: 5.0 ft² Side: 4.2 ft²
Wind load @ 161 km/hr (100 mph)	Front: 660 N Side: 550 N	Front: 149 lbf Side: 124 lbf

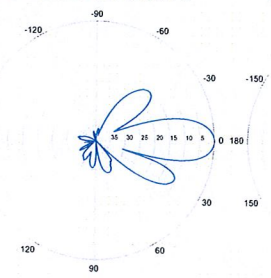
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit (0-20°)	21699999	50-102 mm 2.0-4.0 in	5.4 kg 12 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80063-4CF-EDIN-X



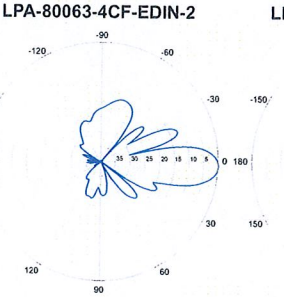
Horizontal

LPA-80063-4CF-EDIN-0



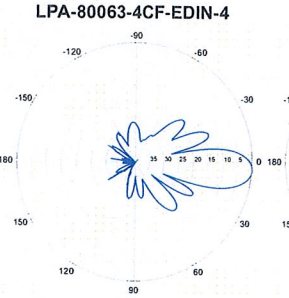
0° | Vertical

LPA-80063-4CF-EDIN-2



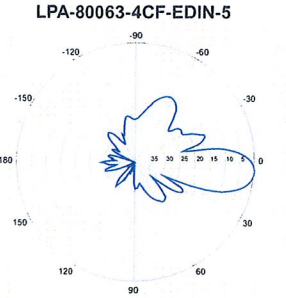
2° | Vertical

LPA-80063-4CF-EDIN-4



4° | Vertical

LPA-80063-4CF-EDIN-5



5° | Vertical

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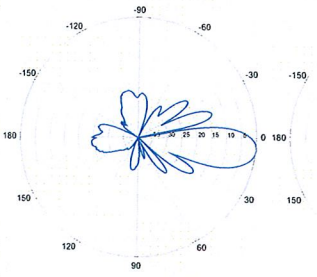

6° | Vertical

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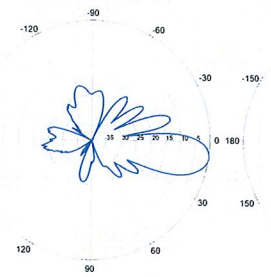
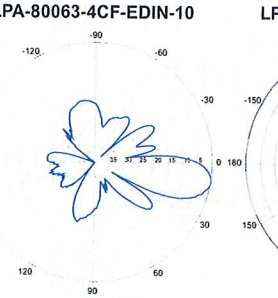


8° | Vertical

LPA-80063-4CF-EDIN-10



10° | Vertical

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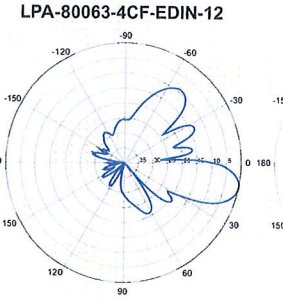
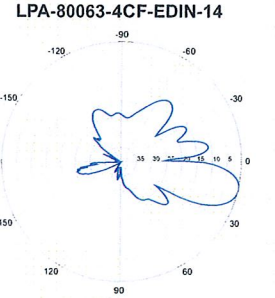


12° | Vertical

LPA-80063-4CF-EDIN-14



14° | Vertical

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

Amphenol ANTENNA SOLUTIONS

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

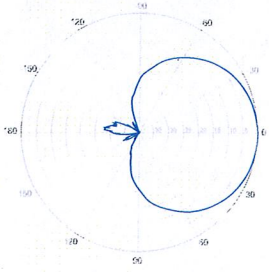
Replace "X" with desired electrical downtilt.

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

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

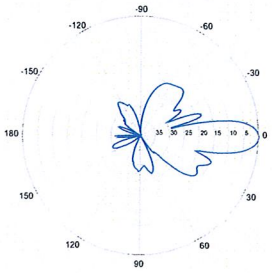
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



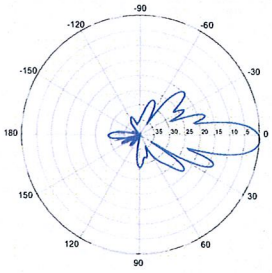
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

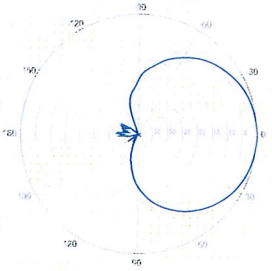


0° | Vertical | 750 MHz

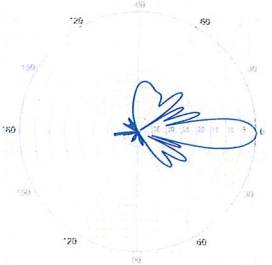
BXA-70063-6CF-EDIN-2



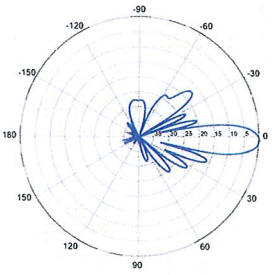
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz

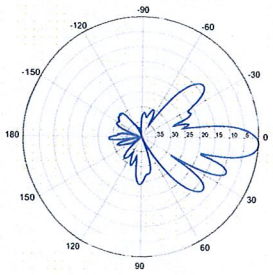


2° | Vertical | 850 MHz

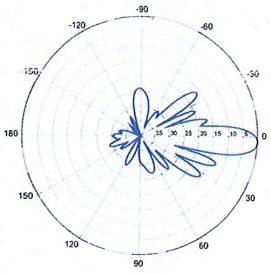
BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3

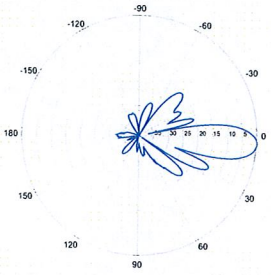


3° | Vertical | 750 MHz

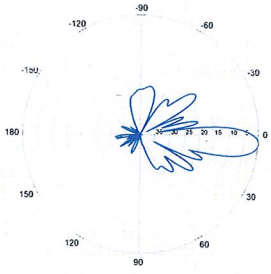


3° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-4

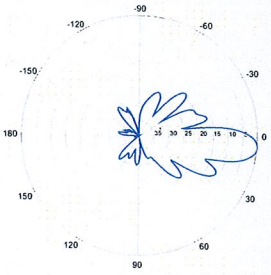


4° | Vertical | 750 MHz

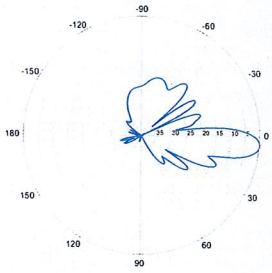


4° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-5



5° | Vertical | 750 MHz



5° | Vertical | 850 MHz

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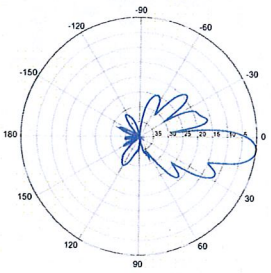
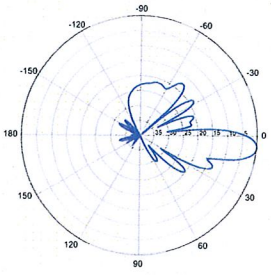


6° | Vertical | 750 MHz



6° | Vertical | 850 MHz

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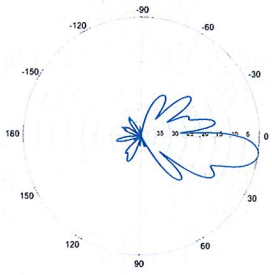
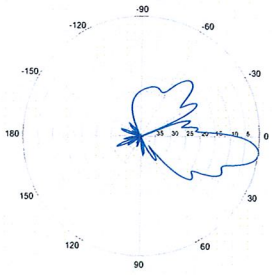
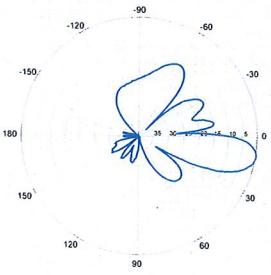


8° | Vertical | 750 MHz

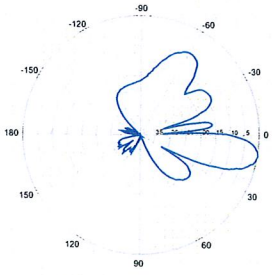


8° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-10



10° | Vertical | 750 MHz



10° | Vertical | 850 MHz

Site Name: BRISTOL, CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW PCS	1970	11	262	2879.471	110	0.0856	1.0	8.56%
VZW Cellular	869	9	265	2380.962	100	0.0856	0.579333333	14.78%
VZW AWS	2145	1	636	635.511	110	0.0189	1.0	1.89%
VZW 700	698	1	863	863.4754	100	0.0311	0.465333333	6.67%

Total Percentage of Maximum Permissible Exposure 31.90%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used.

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

40-ft Existing Rohn Lattice Tower

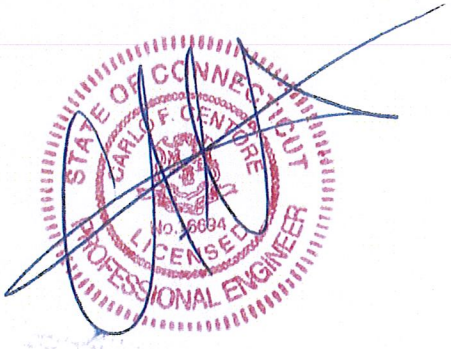
Proposed Verizon Wireless
Antenna Installation

Verizon Site Ref: Bristol

32 Valley Street
Bristol, CT

Centek Project No. 12001.CO41

Date: June 7, 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

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 Bristol, CT.

The host tower is a 40-ft, three-section, three legged, self-supporting lattice tower originally designed and manufactured by Rohn Industries, attached to a structural steel platform located on the roof of the host building. The tower geometry, structure member sizes and anchor bolt properties were obtained from a previous structural analysis report prepared by Walker Engineering, Inc. job no. 0308-321 dated August 14, 2003. The platform geometry and structure member sizes were obtained from the platform modification drawings prepared by L&W Engineering drawing no. S-1 thru S-3 dated January 28, 1992 and construction drawings prepared by Centek Engineering dated January 19, 2004. Antenna and appurtenance information were obtained from the aforementioned Walker Engineering structural analysis report, visual verification from grade by Centek personnel on May 24, 2012 and a Verizon RF data sheet.

The tower is made up of three (3) vertical sections consisting of ASTM A572-50 steel pipe legs and ASTM A36 steel angle diagonal and horizontal bracing. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 8.56-ft.

Verizon proposes the replacement of fifteen (15) existing panel antennas with fifteen (15) proposed panel antennas. 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:

- VERIZON (Existing to Remain):
  Antennas: Three (3) 4-ft panel antennas on three (3) 13' wireless frames with a RAD center elevation of 100-ft above grade level (27.5-ft ATB).
  Coax Cables: Eighteen (18) 1-5/8" ∅ coax cables (face mounted). Refer to Coax Feedline Plan in Section 3 of this report for configuration.

- **VERIZON (Existing to Remove):**
  Antennas: Six (6) Decibel DB948F85T2E-M panel antennas leg mounted with a RAD center elevation of 110-ft above grade level (37.5-ft ATB) and nine (9) 4-ft panel antennas on three (3) 13' wireless frames with a RAD center elevation of 100-ft above grade level (27.5-ft ATB).

- **VERIZON (Proposed):**
  Antennas: Six (6) Antel LPA-171063-8CF leg mounted with a RAD center elevation of 110-ft above grade level (37.5-ft ATB) and three (3) Antel BXA-70063-6CF, four (4) Antel LPA-80080-4CF, two (2) Antel LPA-80063-4CF panel antennas on three (3) 13' wireless frames with a RAD center elevation of 100-ft above grade level (27.5-ft ATB).

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]*
	Bristol; 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; 95 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 **with the proposed tower reinforcements outlined in Section 4 of this report** were found to be within allowable limits. In Load Case 1, per RISATower "Section Capacity Table", this tower was found to be at **128.1%** (Diagonal T3) of its total capacity without reinforcement and **95.3%** (Diagonal T2) with the proposed reinforcements.

Component / Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T3)	0.0'-20.0' (72.5'-92.5' AGL)	43.0%	**PASS**
Diagonal (T2)	20.0'-30.0' (92.5'-102.5' AGL)	95.3%	**PASS**
Top Girt (T3)	0.0'-20.0' (72.5'-92.5' AGL)	18.7%	**PASS**

Steel Support Frame and Anchors

The existing steel support frame consists of W12 horizontal beams and W8 vertical columns attached to the existing host building. Tower legs are connected to the steel support frame W beam flanges by means of four (4) 5/8"∅, ASTM A325 bolts per leg.

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

Location	Vector	Proposed Reactions
Base	Shear	7 kips
	Compression	3 kips
	Moment	164 kip-ft
Leg	Compression	23 kips
	Uplift	20 kips
	Shear	4 kips

- The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	24.8%	**PASS**

- The steel support frame was found to be within allowable limits.

Component	Design Limit	Stress Ratio (percentage of capacity)	Result
W12 Beam	Bending	79.1%	**PASS**
W8 Column	Bending	27.0%	**PASS**

Conclusion

This analysis shows that with the implementation of the reinforcements outlined in drawings N-1 through N-2 and S-1, marked Revision #0, dated 6/7/12 located within Section 4 of this report, the subject tower **is adequate** to support the proposed modified Verizon antenna configuration.

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 16694
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Timothy J. Lynn, EIT
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 provide 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.

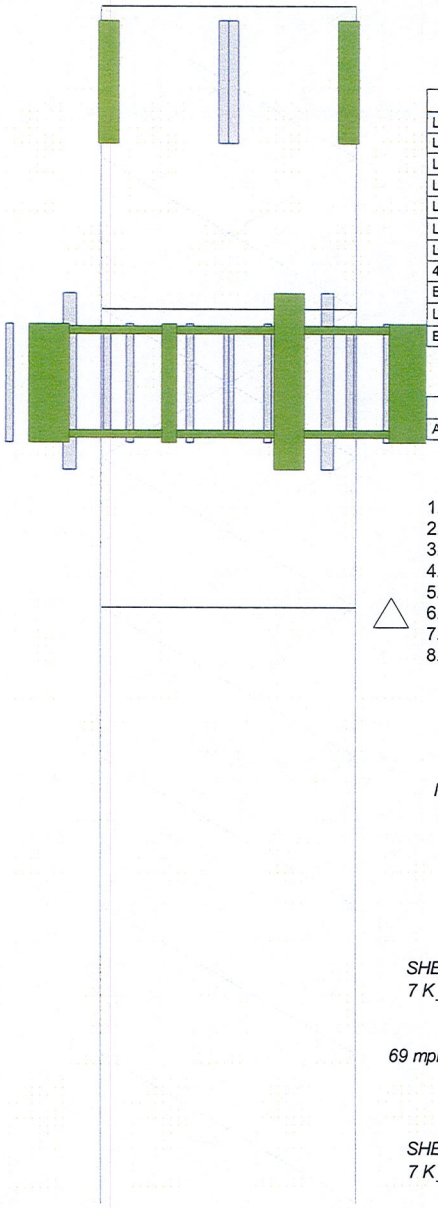
Section	T1	T2	T3
Legs	P2.5x.203		
Leg Grade	A572-50		
Diagonals	L1 1/2x1 1/2x1/8		L2x2x3/16
Diagonal Grade	A36		
Top Girts	L1 1/2x1 1/2x1/8		
Face Width (ft)	8.5625		
# Panels @ (ft)	8 @ 5		
Weight (K)	0.4	0.4	1.0

112.5 ft

102.5 ft

92.5 ft

72.5 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
LPA-171063-8CF (Verizon - Proposed)	110	LPA-80080-4CF (Verizon - Proposed)	100
LPA-171063-8CF (Verizon - Proposed)	110	LPA-80063/4CF (Verizon - Proposed)	100
LPA-171063-8CF (Verizon - Proposed)	110	48"x6"x8" Panel (Verizon - Existing)	100
LPA-171063-8CF (Verizon - Proposed)	110	BXA-70063/6CF (Verizon - Proposed)	100
LPA-171063-8CF (Verizon - Proposed)	110	LPA-80063-4CF (Verizon - Proposed)	100
LPA-171063-8CF (Verizon - Proposed)	110	LPA-80080/4CF (Verizon - Proposed)	100
LPA-80080/4CF (Verizon - Proposed)	100	48"x6"x8" Panel (Verizon - Existing)	100
48"x6"x8" Panel (Verizon - Existing)	100	13-ft Wireless Frame (Verizon - Proposed)	100
BXA-70063/6CF (Verizon - Proposed)	100	13-ft Wireless Frame (Verizon - Proposed)	100
LPA-80080-4CF (Verizon - Proposed)	100	13-ft Wireless Frame (Verizon - Proposed)	100
BXA-70063/6CF (Verizon - Proposed)	100		

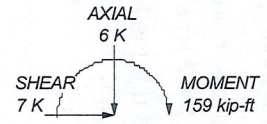
MATERIAL STRENGTH

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

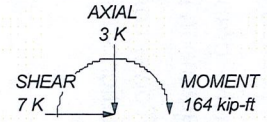
TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 95.3%

MAX. CORNER REACTIONS AT BASE:
DOWN: 23 K
UPLIFT: -20 K
SHEAR: 4 K



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



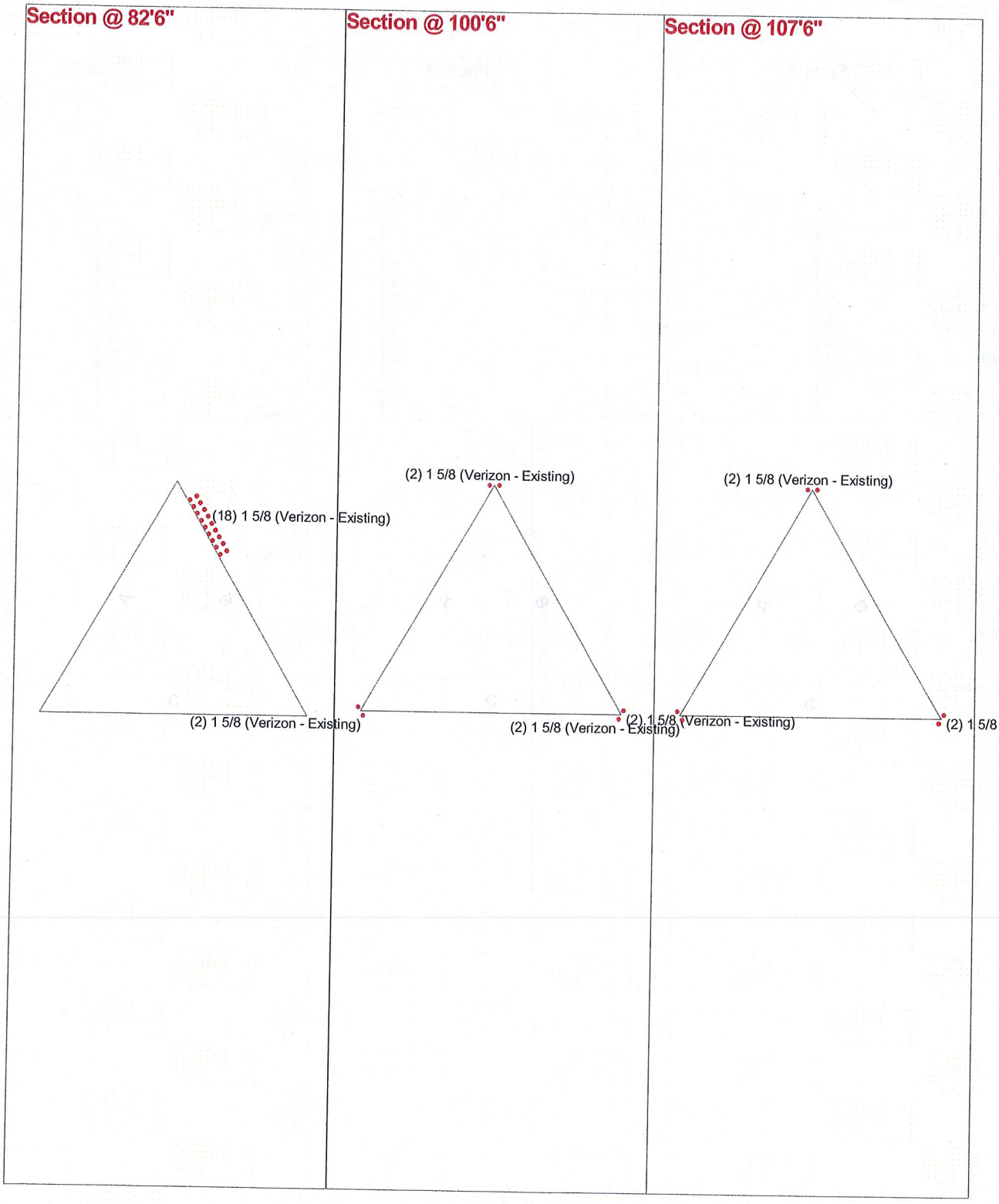
TORQUE 2 kip-ft
REACTIONS - 80 mph WIND

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

Job: 12001.CO41 - Bristol		
Project: 40' Lattice Tower - 32 Valley St. Bristol, CT		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 06/07/12	Scale: NTS
Path: J:\Jobs\1200100.WIP\CO41 - Bristol\Calcs\ERI Files\40' Lattice Tower Bristol, CT.eri		Dwg No. E-1

Feedline Plan
72'6" - 112'6"

_____ Round _____ Flat _____ App In Face _____ App Out Face



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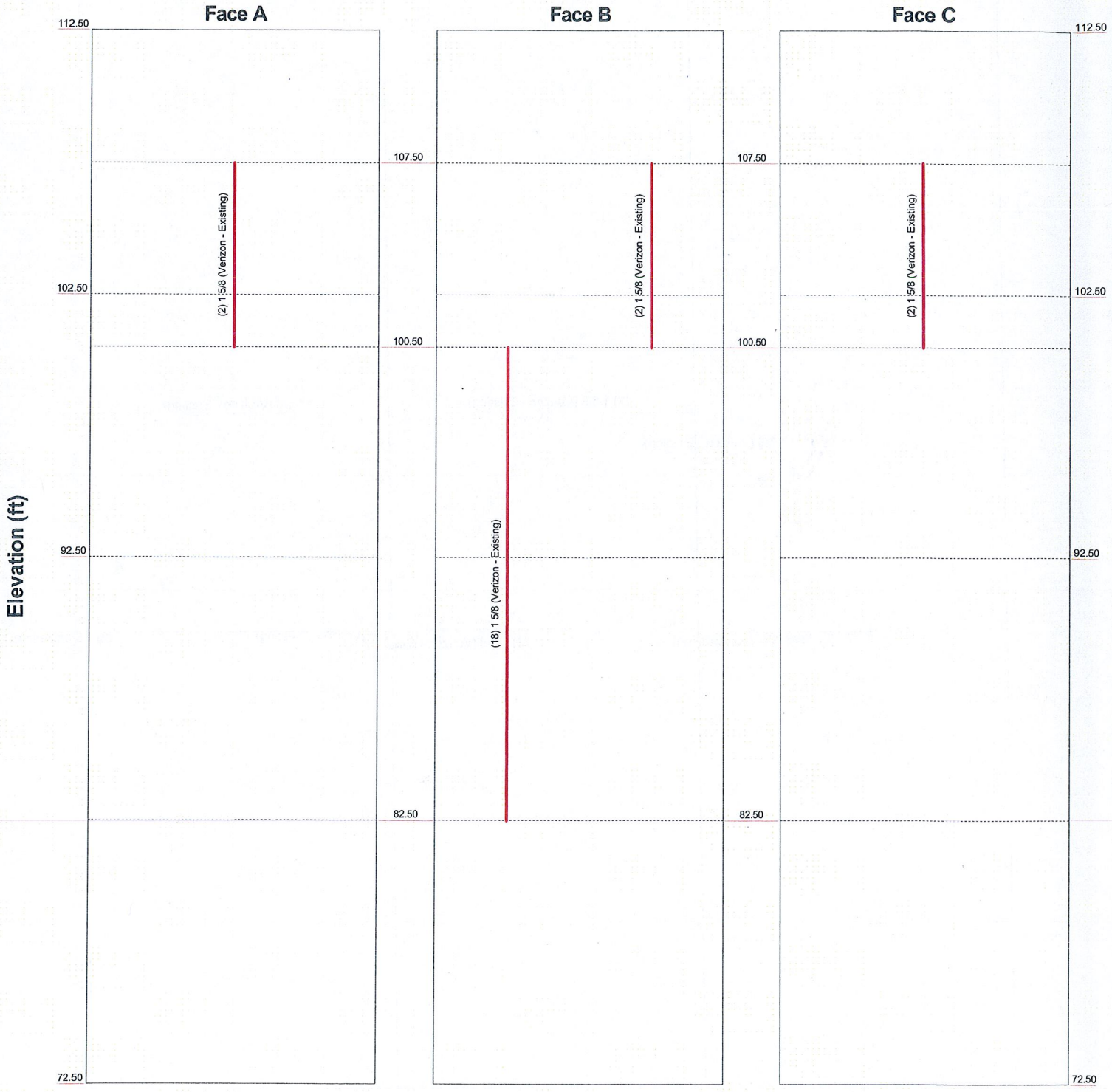
Project: ***40' Lattice Tower - 32 Valley St. Bristol, CT***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 06/06/12	Scale: NTS
Path: J:\Jobs\1200100.WI\CO41 - Bristol\Calcs\ERI Files\40' Lattice Tower Bristol, CT.er		Dwg No. E-7

Feedline Distribution Chart
72'6" - 112'6"

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



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Job: ***12001.CO41 - Bristol***		
Project: ***40' Lattice Tower - 32 Valley St. Bristol, CT***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 06/06/12	Scale: NTS
Path: J:\Jobs\12001\00.WICO41 - Bristol\Calcs\ERI Files\40' Lattice Tower Bristol, CT.er		Dwg No. E-7

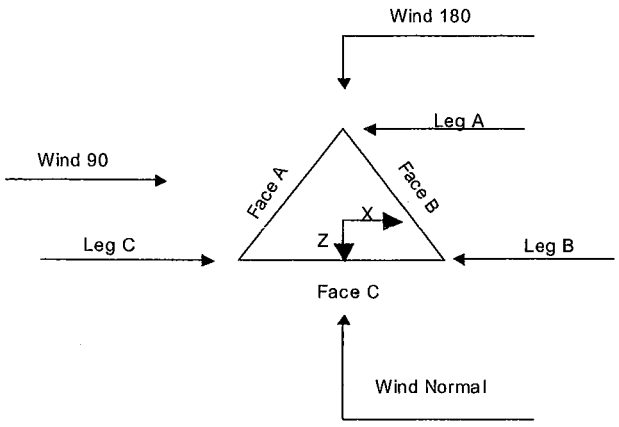
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 112.50 ft above the ground line.
The base of the tower is set at an elevation of 72.50 ft above the ground line.
The face width of the tower is 8.56 ft at the top and 8.56 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.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
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	112.50-102.50			8.56	1	10.00
T2	102.50-92.50			8.56	1	10.00
T3	92.50-72.50			8.56	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	112.50-102.50	5.00	X Brace	No	Yes	0.0000	0.0000
T2	102.50-92.50	5.00	X Brace	No	Yes	0.0000	0.0000
T3	92.50-72.50	5.00	X Brace	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 112.50-102.50	Pipe	P2.5x.203	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T2 102.50-92.50	Pipe	P2.5x.203	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T3 92.50-72.50	Pipe	P2.5x.203	A572-50 (50 ksi)	Single Angle	L2x2x3/16	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 112.50-102.50	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T2 102.50-92.50	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T3 92.50-72.50	Single Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T1 112.50-102.50	Solid Round		A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T2 102.50-92.50	Solid Round		A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T3 92.50-72.50	Solid Round		A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 112.50-102.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 102.50-92.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 92.50-72.50	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	Legs	X Brace Diags X Y	K Brace Diags X Y	K Factors[1] Single Diags X Y	K Factors[1] Girts X Y	K Factors[1] Horiz. X Y	K Factors[1] Sec. Horiz. X Y	K Factors[1] Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
112.50-102.50				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
102.50-92.50				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
92.50-72.50				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 Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
112.50-102.50														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
102.50-92.50														
T3 92.50-72.50	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1	Flange	0.6250	4	0.5000	1	0.5000	1	0.3750	0	0.6250	0	0.5000	1	0.6250	0
112.50-102.50		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2	Flange	0.6250	4	0.5000	1	0.5000	1	0.3750	0	0.6250	0	0.5000	1	0.6250	0
102.50-92.50		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 92.50-72.50	Flange	0.6250	4	0.5000	1	0.5000	1	0.3750	0	0.6250	0	0.5000	1	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

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 - Existing)	B	Yes	Ar (CfAe)	100.50 - 82.50	0.0000	-0.3	18	9	1.0000	1.9800		1.04
1 5/8 (Verizon - Existing)	A	No	Ar (Leg)	107.50 - 100.50	0.0000	0	2	1	1.9800	1.9800		1.04
1 5/8 (Verizon - Existing)	B	No	Ar (Leg)	107.50 - 100.50	0.0000	0	2	1	1.9800	1.9800		1.04
1 5/8 (Verizon - Existing)	C	No	Ar (Leg)	107.50 - 100.50	0.0000	0	2	1	1.9800	1.9800		1.04

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	112.50-102.50	A	1.650	0.000	0.000	0.000	0.01
		B	1.650	0.000	0.000	0.000	0.01
		C	1.650	0.000	0.000	0.000	0.01
T2	102.50-92.50	A	0.660	0.000	0.000	0.000	0.00
		B	12.540	0.000	0.000	0.000	0.15
		C	0.660	0.000	0.000	0.000	0.00
T3	92.50-72.50	A	0.000	0.000	0.000	0.000	0.00
		B	14.850	0.000	0.000	0.000	0.19
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	112.50-102.50	A	0.500	2.483	0.000	0.000	0.000	0.03
		B		2.483	0.000	0.000	0.000	0.03
		C		2.483	0.000	0.000	0.000	0.03
T2	102.50-92.50	A	0.500	0.993	0.000	0.000	0.000	0.01
		B		2.980	15.893	0.000	0.000	0.47
		C		0.993	0.000	0.000	0.000	0.01
T3	92.50-72.50	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		2.483	19.867	0.000	0.000	0.58
		C		0.000	0.000	0.000	0.000	0.00

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	112.50-102.50	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
		C	0.000	0.000	0.000	0.000
T2	102.50-92.50	A	0.000	0.000	0.000	0.000
		B	0.000	0.839	0.836	1.259
		C	0.000	0.000	0.000	0.000
T3	92.50-72.50	A	0.000	0.000	0.000	0.000
		B	0.000	0.956	1.239	1.865
		C	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	112.50-102.50	0.0000	0.0000	0.0000	0.0000
T2	102.50-92.50	3.0503	-10.5008	2.5414	-8.7489
T3	92.50-72.50	2.0121	-6.9267	1.7456	-6.0092

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LPA-80080/4CF	A	From Face	2.50	0.0000	100.00	No Ice		2.62	6.06	0.01
(Verizon - Proposed)			6.00			1/2" Ice		2.92	6.45	0.05
			0.00							
48"x6"x8" Panel	A	From Face	2.50	0.0000	100.00	No Ice		2.87	3.73	0.03
(Verizon - Existing)			2.00			1/2" Ice		3.18	4.10	0.06
			0.00							
BXA-70063/6CF	A	From Face	2.50	0.0000	100.00	No Ice		7.73	4.16	0.02
(Verizon - Proposed)			-2.00			1/2" Ice		8.27	4.60	0.06
			0.00							
LPA-80080-4CF	A	From Face	2.50	0.0000	100.00	No Ice		2.62	6.06	0.01
(Verizon - Proposed)			-6.00			1/2" Ice		2.92	6.45	0.05
			0.00							
LPA-171063-8CF	A	From Face	0.00	0.0000	110.00	No Ice		3.69	3.69	0.01
(Verizon - Proposed)			-4.00			1/2" Ice		4.06	4.06	0.04
			0.00							
LPA-171063-8CF	A	From Face	0.00	0.0000	110.00	No Ice		3.69	3.69	0.01
(Verizon - Proposed)			4.00			1/2" Ice		4.06	4.06	0.04
			0.00							
LPA-80080/4CF	B	From Face	2.50	0.0000	100.00	No Ice		2.62	6.06	0.01
(Verizon - Proposed)			6.00			1/2" Ice		2.92	6.45	0.05
			0.00							
48"x6"x8" Panel	B	From Face	2.50	0.0000	100.00	No Ice		2.87	3.73	0.03
(Verizon - Existing)			2.00			1/2" Ice		3.18	4.10	0.06
			0.00							
BXA-70063/6CF	B	From Face	2.50	0.0000	100.00	No Ice		7.73	4.16	0.02
(Verizon - Proposed)			-2.00			1/2" Ice		8.27	4.60	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	K
LPA-80080-4CF (Verizon - Proposed)	B	From Face	0.00 2.50 -6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
LPA-171063-8CF (Verizon - Proposed)	B	From Face	0.00 0.00 -4.00 0.00	0.0000	110.00	No Ice 1/2" Ice	3.69 4.06	3.69 4.06	0.01 0.04
LPA-171063-8CF (Verizon - Proposed)	B	From Face	0.00 0.00 4.00 0.00	0.0000	110.00	No Ice 1/2" Ice	3.69 4.06	3.69 4.06	0.01 0.04
LPA-80063/4CF (Verizon - Proposed)	C	From Face	0.00 2.50 6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.00 7.41	6.08 6.48	0.02 0.07
48"x6"x8" Panel (Verizon - Existing)	C	From Face	0.00 2.50 2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.87 3.18	3.73 4.10	0.03 0.06
BXA-70063/6CF (Verizon - Proposed)	C	From Face	0.00 2.50 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
LPA-80063-4CF (Verizon - Proposed)	C	From Face	0.00 2.50 -6.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.00 7.41	6.04 6.43	0.02 0.07
LPA-171063-8CF (Verizon - Proposed)	C	From Face	0.00 0.00 -4.00 0.00	0.0000	110.00	No Ice 1/2" Ice	3.69 4.06	3.69 4.06	0.01 0.04
LPA-171063-8CF (Verizon - Proposed)	C	From Face	0.00 0.00 4.00 0.00	0.0000	110.00	No Ice 1/2" Ice	3.69 4.06	3.69 4.06	0.01 0.04
13-ft Wireless Frame (Verizon - Proposed)	A	From Face	0.00 1.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	9.00 11.50	9.00 11.50	0.28 0.35
13-ft Wireless Frame (Verizon - Proposed)	B	From Face	0.00 1.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	9.00 11.50	9.00 11.50	0.28 0.35
13-ft Wireless Frame (Verizon - Proposed)	C	From Face	0.00 1.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	9.00 11.50	9.00 11.50	0.28 0.35

Tower Pressures - No Ice

$G_H = 1.234$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1	107.50	1.401	23	88.021	A	5.859	6.442	4.792	38.95	0.000	0.000
112.50-102.50					B	5.859	6.442		38.95	0.000	0.000
					C	5.859	6.442		38.95	0.000	0.000
T2	97.50	1.363	22	88.021	A	5.859	5.452	4.792	42.36	0.000	0.000

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
102.50-92.50					B	5.023	17.332		21.43	0.000	0.000
					C	5.859	5.452		42.36	0.000	0.000
T3 92.50-72.50	82.50	1.299	21	176.042	A	13.891	9.583	9.583	40.82	0.000	0.000
					B	12.652	24.433		25.84	0.000	0.000
					C	13.891	9.583		40.82	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.234$

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	107.50	1.401	17	0.5000	88.854	A	5.859	12.848	6.458	34.52	0.000	0.000
112.50-102.50						B	5.859	12.848		34.52	0.000	0.000
						C	5.859	12.848		34.52	0.000	0.000
T2 102.50-92.50	97.50	1.363	17	0.5000	88.854	A	5.859	11.358	6.458	37.51	0.000	0.000
						B	20.494	12.505		19.57	0.000	0.000
						C	5.859	11.358		37.51	0.000	0.000
T3 92.50-72.50	82.50	1.299	16	0.5000	177.708	A	13.891	20.036	12.917	38.07	0.000	0.000
						B	31.893	21.563		24.16	0.000	0.000
						C	13.891	20.036		38.07	0.000	0.000

Tower Pressure - Service

$G_H = 1.234$

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	107.50	1.401	9	88.021	A	5.859	6.442	4.792	38.95	0.000	0.000
112.50-102.50					B	5.859	6.442		38.95	0.000	0.000
					C	5.859	6.442		38.95	0.000	0.000
T2	97.50	1.363	9	88.021	A	5.859	5.452	4.792	42.36	0.000	0.000
102.50-92.50					B	5.023	17.332		21.43	0.000	0.000
					C	5.859	5.452		42.36	0.000	0.000
T3 92.50-72.50	82.50	1.299	8	176.042	A	13.891	9.583	9.583	40.82	0.000	0.000
					B	12.652	24.433		25.84	0.000	0.000
					C	13.891	9.583		40.82	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	0.03	0.35	A	0.14	2.81	0.58	1	1	9.595	0.76	76.36	C

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
112.50-102.50			B	0.14	2.81	0.58	1	1	9.595			
			C	0.14	2.81	0.58	1	1	9.595			
T2	0.16	0.35	A	0.129	2.852	0.578	1	1	9.013	1.03	103.38	B
102.50-92.50			B	0.254	2.426	0.603	1	1	15.472			
			C	0.129	2.852	0.578	1	1	9.013			
T3	0.19	0.96	A	0.133	2.834	0.579	1	1	19.440	1.82	91.23	B
92.50-72.50			B	0.211	2.561	0.593	1	1	27.132			
			C	0.133	2.834	0.579	1	1	19.440			
Sum Weight:	0.38	1.66						OTM	70.82 kip-ft	3.62		

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	0.03	0.35	A	0.14	2.81	0.58	0.825	1	8.570	0.68	68.20	C
112.50-102.50			B	0.14	2.81	0.58	0.825	1	8.570			
			C	0.14	2.81	0.58	0.825	1	8.570			
T2	0.16	0.35	A	0.129	2.852	0.578	0.825	1	7.987	0.98	97.51	B
102.50-92.50			B	0.254	2.426	0.603	0.825	1	14.593			
			C	0.129	2.852	0.578	0.825	1	7.987			
T3	0.19	0.96	A	0.133	2.834	0.579	0.825	1	17.010	1.68	83.79	B
92.50-72.50			B	0.211	2.561	0.593	0.825	1	24.918			
			C	0.133	2.834	0.579	0.825	1	17.010			
Sum Weight:	0.38	1.66						OTM	65.01 kip-ft	3.33		

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	0.03	0.35	A	0.14	2.81	0.58	0.8	1	8.423	0.67	67.04	C
112.50-102.50			B	0.14	2.81	0.58	0.8	1	8.423			
			C	0.14	2.81	0.58	0.8	1	8.423			
T2	0.16	0.35	A	0.129	2.852	0.578	0.8	1	7.841	0.97	96.67	B
102.50-92.50			B	0.254	2.426	0.603	0.8	1	14.468			
			C	0.129	2.852	0.578	0.8	1	7.841			
T3	0.19	0.96	A	0.133	2.834	0.579	0.8	1	16.662	1.65	82.73	B
92.50-72.50			B	0.211	2.561	0.593	0.8	1	24.601			
			C	0.133	2.834	0.579	0.8	1	16.662			
Sum Weight:	0.38	1.66						OTM	64.18 kip-ft	3.29		

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	0.03	0.35	A	0.14	2.81	0.58	0.85	1	8.716	0.69	69.37	C
112.50-102.50			B	0.14	2.81	0.58	0.85	1	8.716			
			C	0.14	2.81	0.58	0.85	1	8.716			
T2	0.16	0.35	A	0.129	2.852	0.578	0.85	1	8.134	0.98	98.35	B
102.50-92.50			B	0.254	2.426	0.603	0.85	1	14.719			
			C	0.129	2.852	0.578	0.85	1	8.134			
T3	0.19	0.96	A	0.133	2.834	0.579	0.85	1	17.357	1.70	84.85	B
92.50-72.50			B	0.211	2.561	0.593	0.85	1	25.234			
			C	0.133	2.834	0.579	0.85	1	17.357			
Sum Weight:	0.38	1.66						OTM	65.84 kip-ft	3.37		

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	0.08	0.64	A	0.211	2.561	0.593	1	1	13.473	0.73	73.31	C
112.50-102.50			B	0.211	2.561	0.593	1	1	13.473			
			C	0.211	2.561	0.593	1	1	13.473			
T2	0.49	0.64	A	0.194	2.617	0.589	1	1	12.551	1.25	125.04	B
102.50-92.50			B	0.371	2.123	0.64	1	1	28.502			
			C	0.194	2.617	0.589	1	1	12.551			
T3	0.58	1.58	A	0.191	2.627	0.589	1	1	25.684	2.04	102.06	B
92.50-72.50			B	0.301	2.294	0.616	1	1	45.179			
			C	0.191	2.627	0.589	1	1	25.684			
Sum Weight:	1.15	2.86						OTM	77.33 kip-ft	4.02		

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	0.08	0.64	A	0.211	2.561	0.593	0.825	1	12.448	0.68	67.73	C
112.50-102.50			B	0.211	2.561	0.593	0.825	1	12.448			
			C	0.211	2.561	0.593	0.825	1	12.448			
T2	0.49	0.64	A	0.194	2.617	0.589	0.825	1	11.525	1.09	109.30	B
102.50-92.50			B	0.371	2.123	0.64	0.825	1	24.915			
			C	0.194	2.617	0.589	0.825	1	11.525			
T3	0.58	1.58	A	0.191	2.627	0.589	0.825	1	23.253	1.79	89.45	B
92.50-72.50			B	0.301	2.294	0.616	0.825	1	39.597			
			C	0.191	2.627	0.589	0.825	1	23.253			
Sum Weight:	1.15	2.86						OTM	68.92 kip-ft	3.56		

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 112.50-102.50	0.08	0.64	A	0.211	2.561	0.593	0.8	1	12.301	0.67	66.93	C
			B	0.211	2.561	0.593	0.8	1	12.301			
			C	0.211	2.561	0.593	0.8	1	12.301			
T2 102.50-92.50	0.49	0.64	A	0.194	2.617	0.589	0.8	1	11.379	1.07	107.06	B
			B	0.371	2.123	0.64	0.8	1	24.403			
			C	0.194	2.617	0.589	0.8	1	11.379			
T3 92.50-72.50	0.58	1.58	A	0.191	2.627	0.589	0.8	1	22.906	1.75	87.65	B
			B	0.301	2.294	0.616	0.8	1	38.800			
			C	0.191	2.627	0.589	0.8	1	22.906			
Sum Weight:	1.15	2.86						OTM	67.72 kip-ft	3.49		

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 112.50-102.50	0.08	0.64	A	0.211	2.561	0.593	0.85	1	12.594	0.69	68.53	C
			B	0.211	2.561	0.593	0.85	1	12.594			
			C	0.211	2.561	0.593	0.85	1	12.594			
T2 102.50-92.50	0.49	0.64	A	0.194	2.617	0.589	0.85	1	11.672	1.12	111.55	B
			B	0.371	2.123	0.64	0.85	1	25.428			
			C	0.194	2.617	0.589	0.85	1	11.672			
T3 92.50-72.50	0.58	1.58	A	0.191	2.627	0.589	0.85	1	23.600	1.83	91.26	B
			B	0.301	2.294	0.616	0.85	1	40.395			
			C	0.191	2.627	0.589	0.85	1	23.600			
Sum Weight:	1.15	2.86						OTM	70.12 kip-ft	3.63		

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 112.50-102.50	0.03	0.35	A	0.14	2.81	0.58	1	1	9.595	0.30	29.83	C
			B	0.14	2.81	0.58	1	1	9.595			
			C	0.14	2.81	0.58	1	1	9.595			
T2 102.50-92.50	0.16	0.35	A	0.129	2.852	0.578	1	1	9.013	0.40	40.38	B
			B	0.254	2.426	0.603	1	1	15.472			
			C	0.129	2.852	0.578	1	1	9.013			
T3 92.50-72.50	0.19	0.96	A	0.133	2.834	0.579	1	1	19.440	0.71	35.64	B
			B	0.211	2.561	0.593	1	1	27.132			
			C	0.133	2.834	0.579	1	1	19.440			
Sum Weight:	0.38	1.66						OTM	27.66 kip-ft	1.41		

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	0.03	0.35	A	0.14	2.81	0.58	0.825	1	8.570	0.27	26.64	C
112.50-102.50			B	0.14	2.81	0.58	0.825	1	8.570			
			C	0.14	2.81	0.58	0.825	1	8.570			
T2	0.16	0.35	A	0.129	2.852	0.578	0.825	1	7.987	0.38	38.09	B
102.50-92.50			B	0.254	2.426	0.603	0.825	1	14.593			
			C	0.129	2.852	0.578	0.825	1	7.987			
T3	0.19	0.96	A	0.133	2.834	0.579	0.825	1	17.010	0.65	32.73	B
92.50-72.50			B	0.211	2.561	0.593	0.825	1	24.918			
			C	0.133	2.834	0.579	0.825	1	17.010			
Sum Weight:	0.38	1.66						OTM	25.39 kip-ft	1.30		

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	0.03	0.35	A	0.14	2.81	0.58	0.8	1	8.423	0.26	26.19	C
112.50-102.50			B	0.14	2.81	0.58	0.8	1	8.423			
			C	0.14	2.81	0.58	0.8	1	8.423			
T2	0.16	0.35	A	0.129	2.852	0.578	0.8	1	7.841	0.38	37.76	B
102.50-92.50			B	0.254	2.426	0.603	0.8	1	14.468			
			C	0.129	2.852	0.578	0.8	1	7.841			
T3	0.19	0.96	A	0.133	2.834	0.579	0.8	1	16.662	0.65	32.31	B
92.50-72.50			B	0.211	2.561	0.593	0.8	1	24.601			
			C	0.133	2.834	0.579	0.8	1	16.662			
Sum Weight:	0.38	1.66						OTM	25.07 kip-ft	1.29		

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	0.03	0.35	A	0.14	2.81	0.58	0.85	1	8.716	0.27	27.10	C
112.50-102.50			B	0.14	2.81	0.58	0.85	1	8.716			
			C	0.14	2.81	0.58	0.85	1	8.716			
T2	0.16	0.35	A	0.129	2.852	0.578	0.85	1	8.134	0.38	38.42	B
102.50-92.50			B	0.254	2.426	0.603	0.85	1	14.719			
			C	0.129	2.852	0.578	0.85	1	8.134			
T3	0.19	0.96	A	0.133	2.834	0.579	0.85	1	17.357	0.66	33.15	B
92.50-72.50			B	0.211	2.561	0.593	0.85	1	25.234			
			C	0.133	2.834	0.579	0.85	1	17.357			
Sum Weight:	0.38	1.66						OTM	25.72	1.32		

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	plf	
									kip-ft			

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	0.70					
Bracing Weight	0.96					
Total Member Self-Weight	1.66			-1.10	-0.35	
Total Weight	3.17			-1.10	-0.35	
Wind 0 deg - No Ice		0.00	-6.74	-163.94	-0.35	0.57
Wind 30 deg - No Ice		3.12	-5.62	-137.81	-75.93	-0.46
Wind 45 deg - No Ice		4.39	-4.56	-112.13	-106.65	-0.91
Wind 60 deg - No Ice		5.34	-3.20	-79.20	-129.82	-1.30
Wind 90 deg - No Ice		6.25	0.00	-1.10	-151.51	-1.84
Wind 120 deg - No Ice		5.63	3.37	80.32	-135.58	-1.98
Wind 135 deg - No Ice		4.39	4.56	109.93	-106.65	-1.66
Wind 150 deg - No Ice		3.12	5.62	135.60	-75.93	-1.38
Wind 180 deg - No Ice		0.00	6.41	155.09	-0.35	-0.52
Wind 210 deg - No Ice		-3.12	5.62	135.60	75.23	0.46
Wind 225 deg - No Ice		-4.39	4.56	109.93	105.95	0.91
Wind 240 deg - No Ice		-5.63	3.37	80.32	134.88	1.41
Wind 270 deg - No Ice		-6.25	0.00	-1.10	150.82	1.84
Wind 300 deg - No Ice		-5.34	-3.20	-79.20	129.13	1.82
Wind 315 deg - No Ice		-4.39	-4.56	-112.13	105.95	1.66
Wind 330 deg - No Ice		-3.12	-5.62	-137.81	75.23	1.38
Member Ice	1.20					
Total Weight Ice	5.97			-3.44	-1.08	
Wind 0 deg - Ice		0.00	-6.66	-158.57	-1.08	0.56
Wind 30 deg - Ice		3.04	-5.43	-131.54	-72.47	-0.43
Wind 45 deg - Ice		4.25	-4.38	-107.18	-101.19	-0.85
Wind 60 deg - Ice		5.15	-3.07	-76.20	-122.65	-1.19
Wind 90 deg - Ice		6.08	0.00	-3.44	-143.86	-1.73
Wind 120 deg - Ice		5.61	3.33	74.13	-130.97	-1.95
Wind 135 deg - Ice		4.25	4.38	100.31	-101.19	-1.54
Wind 150 deg - Ice		3.04	5.43	124.66	-72.47	-1.30
Wind 180 deg - Ice		0.00	6.13	142.08	-1.08	-0.48
Wind 210 deg - Ice		-3.04	5.43	124.66	70.31	0.43
Wind 225 deg - Ice		-4.25	4.38	100.31	99.04	0.85
Wind 240 deg - Ice		-5.61	3.33	74.13	128.82	1.39
Wind 270 deg - Ice		-6.08	0.00	-3.44	141.71	1.73
Wind 300 deg - Ice		-5.15	-3.07	-76.20	120.50	1.68
Wind 315 deg - Ice		-4.25	-4.38	-107.18	99.04	1.54
Wind 330 deg - Ice		-3.04	-5.43	-131.54	70.31	1.30
Total Weight	3.17			-1.10	-0.35	
Wind 0 deg - Service		0.00	-2.63	-63.51	0.00	0.22
Wind 30 deg - Service		1.22	-2.20	-53.30	-29.52	-0.18
Wind 45 deg - Service		1.71	-1.78	-43.27	-41.52	-0.36
Wind 60 deg - Service		2.09	-1.25	-30.41	-50.58	-0.51
Wind 90 deg - Service		2.44	0.00	0.10	-59.05	-0.72
Wind 120 deg - Service		2.20	1.32	31.90	-52.82	-0.77
Wind 135 deg - Service		1.71	1.78	43.47	-41.52	-0.65
Wind 150 deg - Service		1.22	2.20	53.50	-29.52	-0.54
Wind 180 deg - Service		0.00	2.50	61.11	0.00	-0.20

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 210 deg - Service		-1.22	2.20	53.50	29.52	0.18
Wind 225 deg - Service		-1.71	1.78	43.47	41.52	0.36
Wind 240 deg - Service		-2.20	1.32	31.90	52.82	0.55
Wind 270 deg - Service		-2.44	0.00	0.10	59.05	0.72
Wind 300 deg - Service		-2.09	-1.25	-30.41	50.58	0.71
Wind 315 deg - Service		-1.71	-1.78	-43.27	41.52	0.65
Wind 330 deg - Service		-1.22	-2.20	-53.30	29.52	0.54

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
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

Comb. No.	Description
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	112.5 - 102.5	Leg	Max Tension	15	0.50	0.05	0.02
			Max. Compression	30	-0.85	0.20	-0.13
			Max. Mx	14	-0.13	0.29	0.00
			Max. My	10	-0.43	0.00	-0.31
			Max. Vy	14	-0.14	0.06	0.00
			Max. Vx	2	-0.14	-0.00	0.05
		Diagonal	Max Tension	6	0.40	0.00	0.00
			Max. Compression	7	-0.41	0.00	0.00
			Max. Mx	34	0.36	0.01	0.00
			Max. My	21	-0.14	0.01	0.00
			Max. Vy	34	-0.01	0.01	0.00
			Max. Vx	19	0.00	0.00	0.00
		Top Girt	Max Tension	2	0.04	0.00	0.00
			Max. Compression	10	-0.06	0.00	0.00
			Max. Mx	18	-0.01	-0.03	0.00
			Max. Vy	18	0.01	0.00	0.00
T2	102.5 - 92.5	Leg	Max Tension	10	3.70	-0.00	-0.34
			Max. Compression	19	-5.52	0.00	-0.06
			Max. Mx	14	-0.60	-0.68	-0.00
			Max. My	2	0.37	0.01	-0.74
			Max. Vy	6	0.41	-0.31	-0.00
			Max. Vx	2	-0.44	0.01	0.33
		Diagonal	Max Tension	9	1.86	0.00	0.00
			Max. Compression	17	-1.88	0.00	0.00
			Max. Mx	27	1.60	0.01	0.00
			Max. My	16	-1.74	0.00	-0.00
			Max. Vy	27	-0.01	0.01	0.00
			Max. Vx	8	-0.00	0.00	0.00
		Top Girt	Max Tension	19	0.11	0.00	0.00
			Max. Compression	10	-0.10	0.00	0.00
			Max. Mx	18	0.02	-0.03	0.00
			Max. Vy	18	0.01	0.00	0.00
T3	92.5 - 72.5	Leg	Max Tension	10	17.75	-0.00	-0.04
			Max. Compression	19	-21.62	0.00	0.00
			Max. Mx	22	-10.68	-0.14	-0.01
			Max. My	19	-16.25	0.00	0.15
			Max. Vy	22	0.06	-0.14	-0.01
			Max. Vx	19	-0.06	0.00	0.15
		Diagonal	Max Tension	26	3.02	0.00	0.00
			Max. Compression	26	-2.78	0.00	0.00
			Max. Mx	21	0.79	0.03	-0.00
			Max. My	6	-2.23	0.00	0.00
			Max. Vy	21	0.02	0.03	-0.00
			Max. Vx	6	-0.00	0.00	0.00
		Top Girt	Max Tension	27	0.42	0.00	0.00
			Max. Compression	2	-0.12	0.00	0.00
			Max. Mx	18	0.31	-0.03	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. Vy	18	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	13	22.23	2.93	-1.82
	Max. H_x	13	22.23	2.93	-1.82
	Max. H_z	20	-15.35	-2.93	2.25
	Min. Vert	5	-19.45	-2.73	1.70
	Min. H_x	22	-17.48	-3.42	2.08
	Min. H_z	11	18.99	2.26	-1.89
Leg B	Max. Vert	7	22.32	-2.91	-1.85
	Max. H_x	32	-17.23	3.40	2.10
	Max. H_z	34	-15.10	2.90	2.30
	Min. Vert	15	-19.37	2.72	1.73
	Min. H_x	7	22.32	-2.91	-1.85
	Min. H_z	9	19.08	-2.23	-1.95
Leg A	Max. Vert	19	23.38	0.04	2.60
	Max. H_x	14	1.21	1.03	0.03
	Max. H_z	2	23.17	0.04	3.54
	Min. Vert	10	-19.87	-0.04	-3.31
	Min. H_x	6	1.21	-1.03	0.03
	Min. H_z	27	-17.18	-0.03	-4.07

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	3.17	0.00	0.00	-1.10	-0.35	0.00
Dead+Wind 0 deg - No Ice	3.17	0.00	-6.74	-164.01	-0.35	0.57
Dead+Wind 30 deg - No Ice	3.17	3.12	-5.62	-137.87	-75.96	-0.46
Dead+Wind 45 deg - No Ice	3.17	4.39	-4.56	-112.18	-106.70	-0.91
Dead+Wind 60 deg - No Ice	3.17	5.34	-3.20	-79.23	-129.88	-1.30
Dead+Wind 90 deg - No Ice	3.17	6.25	-0.00	-1.10	-151.58	-1.84
Dead+Wind 120 deg - No Ice	3.17	5.63	3.37	80.35	-135.64	-1.98
Dead+Wind 135 deg - No Ice	3.17	4.39	4.56	109.98	-106.70	-1.66
Dead+Wind 150 deg - No Ice	3.17	3.12	5.62	135.66	-75.96	-1.38
Dead+Wind 180 deg - No Ice	3.17	0.00	6.41	155.16	-0.35	-0.52
Dead+Wind 210 deg - No Ice	3.17	-3.12	5.62	135.66	75.27	0.46
Dead+Wind 225 deg - No Ice	3.17	-4.39	4.56	109.98	106.00	0.91
Dead+Wind 240 deg - No Ice	3.17	-5.63	3.37	80.35	134.94	1.41
Dead+Wind 270 deg - No Ice	3.17	-6.25	-0.00	-1.10	150.88	1.84
Dead+Wind 300 deg - No Ice	3.17	-5.34	-3.20	-79.23	129.18	1.82
Dead+Wind 315 deg - No Ice	3.17	-4.39	-4.56	-112.18	106.00	1.66
Dead+Wind 330 deg - No Ice	3.17	-3.12	-5.62	-137.87	75.27	1.38
Dead+Ice+Temp	5.97	-0.00	0.00	-3.44	-1.08	0.00
Dead+Wind 0 deg+Ice+Temp	5.97	0.00	-6.66	-158.64	-1.08	0.56
Dead+Wind 30 deg+Ice+Temp	5.97	3.04	-5.43	-131.60	-72.50	-0.43
Dead+Wind 45 deg+Ice+Temp	5.97	4.25	-4.38	-107.24	-101.24	-0.85
Dead+Wind 60 deg+Ice+Temp	5.97	5.15	-3.07	-76.23	-122.71	-1.20

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+Ice+Temp	5.97	6.08	0.00	-3.44	-143.93	-1.73
Dead+Wind 120 deg+Ice+Temp	5.97	5.61	3.33	74.16	-131.04	-1.96
Dead+Wind 135 deg+Ice+Temp	5.97	4.25	4.38	100.36	-101.24	-1.55
Dead+Wind 150 deg+Ice+Temp	5.97	3.04	5.43	124.73	-72.50	-1.30
Dead+Wind 180 deg+Ice+Temp	5.97	0.00	6.13	142.15	-1.08	-0.48
Dead+Wind 210 deg+Ice+Temp	5.97	-3.04	5.43	124.73	70.35	0.43
Dead+Wind 225 deg+Ice+Temp	5.97	-4.25	4.38	100.36	99.08	0.85
Dead+Wind 240 deg+Ice+Temp	5.97	-5.61	3.33	74.16	128.89	1.40
Dead+Wind 270 deg+Ice+Temp	5.97	-6.08	0.00	-3.44	141.77	1.73
Dead+Wind 300 deg+Ice+Temp	5.97	-5.15	-3.07	-76.23	120.55	1.68
Dead+Wind 315 deg+Ice+Temp	5.97	-4.25	-4.38	-107.24	99.08	1.55
Dead+Wind 330 deg+Ice+Temp	5.97	-3.04	-5.43	-131.60	70.35	1.30
Dead+Wind 0 deg - Service	3.17	0.00	-2.63	-64.74	-0.35	0.22
Dead+Wind 30 deg - Service	3.17	1.22	-2.20	-54.53	-29.89	-0.18
Dead+Wind 45 deg - Service	3.17	1.71	-1.78	-44.49	-41.89	-0.36
Dead+Wind 60 deg - Service	3.17	2.09	-1.25	-31.62	-50.95	-0.51
Dead+Wind 90 deg - Service	3.17	2.44	0.00	-1.10	-59.42	-0.72
Dead+Wind 120 deg - Service	3.17	2.20	1.32	30.72	-53.19	-0.77
Dead+Wind 135 deg - Service	3.17	1.71	1.78	42.29	-41.89	-0.65
Dead+Wind 150 deg - Service	3.17	1.22	2.20	52.32	-29.89	-0.54
Dead+Wind 180 deg - Service	3.17	0.00	2.50	59.94	-0.35	-0.20
Dead+Wind 210 deg - Service	3.17	-1.22	2.20	52.32	29.19	0.18
Dead+Wind 225 deg - Service	3.17	-1.71	1.78	42.29	41.19	0.36
Dead+Wind 240 deg - Service	3.17	-2.20	1.32	30.72	52.50	0.55
Dead+Wind 270 deg - Service	3.17	-2.44	0.00	-1.10	58.73	0.72
Dead+Wind 300 deg - Service	3.17	-2.09	-1.25	-31.62	50.25	0.71
Dead+Wind 315 deg - Service	3.17	-1.71	-1.78	-44.49	41.19	0.65
Dead+Wind 330 deg - Service	3.17	-1.22	-2.20	-54.53	29.19	0.54

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-3.17	0.00	0.00	3.17	0.00	0.000%
2	0.00	-3.17	-6.74	-0.00	3.17	6.74	0.000%
3	3.12	-3.17	-5.62	-3.12	3.17	5.62	0.000%
4	4.39	-3.17	-4.56	-4.39	3.17	4.56	0.000%
5	5.34	-3.17	-3.20	-5.34	3.17	3.20	0.000%
6	6.25	-3.17	0.00	-6.25	3.17	0.00	0.000%
7	5.63	-3.17	3.37	-5.63	3.17	-3.37	0.000%
8	4.39	-3.17	4.56	-4.39	3.17	-4.56	0.000%
9	3.12	-3.17	5.62	-3.12	3.17	-5.62	0.000%
10	0.00	-3.17	6.41	-0.00	3.17	-6.41	0.000%
11	-3.12	-3.17	5.62	3.12	3.17	-5.62	0.000%
12	-4.39	-3.17	4.56	4.39	3.17	-4.56	0.000%
13	-5.63	-3.17	3.37	5.63	3.17	-3.37	0.000%
14	-6.25	-3.17	0.00	6.25	3.17	0.00	0.000%
15	-5.34	-3.17	-3.20	5.34	3.17	3.20	0.000%
16	-4.39	-3.17	-4.56	4.39	3.17	4.56	0.000%
17	-3.12	-3.17	-5.62	3.12	3.17	5.62	0.000%
18	0.00	-5.97	0.00	0.00	5.97	-0.00	0.000%
19	0.00	-5.97	-6.66	-0.00	5.97	6.66	0.000%
20	3.04	-5.97	-5.43	-3.04	5.97	5.43	0.000%
21	4.25	-5.97	-4.38	-4.25	5.97	4.38	0.000%
22	5.15	-5.97	-3.07	-5.15	5.97	3.07	0.000%
23	6.08	-5.97	0.00	-6.08	5.97	-0.00	0.000%
24	5.61	-5.97	3.33	-5.61	5.97	-3.33	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
25	4.25	-5.97	4.38	-4.25	5.97	-4.38	0.000%
26	3.04	-5.97	5.43	-3.04	5.97	-5.43	0.000%
27	0.00	-5.97	6.13	-0.00	5.97	-6.13	0.000%
28	-3.04	-5.97	5.43	3.04	5.97	-5.43	0.000%
29	-4.25	-5.97	4.38	4.25	5.97	-4.38	0.000%
30	-5.61	-5.97	3.33	5.61	5.97	-3.33	0.000%
31	-6.08	-5.97	0.00	6.08	5.97	-0.00	0.000%
32	-5.15	-5.97	-3.07	5.15	5.97	3.07	0.000%
33	-4.25	-5.97	-4.38	4.25	5.97	4.38	0.000%
34	-3.04	-5.97	-5.43	3.04	5.97	5.43	0.000%
35	0.00	-3.17	-2.63	-0.00	3.17	2.63	0.000%
36	1.22	-3.17	-2.20	-1.22	3.17	2.20	0.000%
37	1.71	-3.17	-1.78	-1.71	3.17	1.78	0.000%
38	2.09	-3.17	-1.25	-2.09	3.17	1.25	0.000%
39	2.44	-3.17	0.00	-2.44	3.17	-0.00	0.000%
40	2.20	-3.17	1.32	-2.20	3.17	-1.32	0.000%
41	1.71	-3.17	1.78	-1.71	3.17	-1.78	0.000%
42	1.22	-3.17	2.20	-1.22	3.17	-2.20	0.000%
43	0.00	-3.17	2.50	-0.00	3.17	-2.50	0.000%
44	-1.22	-3.17	2.20	1.22	3.17	-2.20	0.000%
45	-1.71	-3.17	1.78	1.71	3.17	-1.78	0.000%
46	-2.20	-3.17	1.32	2.20	3.17	-1.32	0.000%
47	-2.44	-3.17	0.00	2.44	3.17	-0.00	0.000%
48	-2.09	-3.17	-1.25	2.09	3.17	1.25	0.000%
49	-1.71	-3.17	-1.78	1.71	3.17	1.78	0.000%
50	-1.22	-3.17	-2.20	1.22	3.17	2.20	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	6	0.00000001	0.00000001
3	Yes	6	0.00000001	0.00000001
4	Yes	6	0.00000001	0.00000001
5	Yes	6	0.00000001	0.00000001
6	Yes	6	0.00000001	0.00000001
7	Yes	6	0.00000001	0.00000001
8	Yes	6	0.00000001	0.00000001
9	Yes	6	0.00000001	0.00000001
10	Yes	6	0.00000001	0.00000001
11	Yes	6	0.00000001	0.00000001
12	Yes	6	0.00000001	0.00000001
13	Yes	6	0.00000001	0.00000001
14	Yes	6	0.00000001	0.00000001
15	Yes	6	0.00000001	0.00000001
16	Yes	6	0.00000001	0.00000001
17	Yes	6	0.00000001	0.00000001
18	Yes	6	0.00000001	0.00000001
19	Yes	6	0.00000001	0.00000001
20	Yes	6	0.00000001	0.00000001
21	Yes	6	0.00000001	0.00000001
22	Yes	6	0.00000001	0.00000001
23	Yes	6	0.00000001	0.00000001
24	Yes	6	0.00000001	0.00000001
25	Yes	6	0.00000001	0.00000001

26	Yes	6	0.00000001	0.00000001
27	Yes	6	0.00000001	0.00000001
28	Yes	6	0.00000001	0.00000001
29	Yes	6	0.00000001	0.00000001
30	Yes	6	0.00000001	0.00000001
31	Yes	6	0.00000001	0.00000001
32	Yes	6	0.00000001	0.00000001
33	Yes	6	0.00000001	0.00000001
34	Yes	6	0.00000001	0.00000001
35	Yes	6	0.00000001	0.00000001
36	Yes	6	0.00000001	0.00000001
37	Yes	6	0.00000001	0.00000001
38	Yes	6	0.00000001	0.00000001
39	Yes	6	0.00000001	0.00000001
40	Yes	6	0.00000001	0.00000001
41	Yes	6	0.00000001	0.00000001
42	Yes	6	0.00000001	0.00000001
43	Yes	6	0.00000001	0.00000001
44	Yes	6	0.00000001	0.00000001
45	Yes	6	0.00000001	0.00000001
46	Yes	6	0.00000001	0.00000001
47	Yes	6	0.00000001	0.00000001
48	Yes	6	0.00000001	0.00000001
49	Yes	6	0.00000001	0.00000001
50	Yes	6	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	112.5 - 102.5	0.222	35	0.0289	0.0030
T2	102.5 - 92.5	0.159	35	0.0285	0.0030
T3	92.5 - 72.5	0.086	35	0.0255	0.0023

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
110.00	LPA-171063-8CF	35	0.208	0.0289	0.0030	104021
100.00	LPA-80080/4CF	35	0.141	0.0282	0.0029	148185

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	112.5 - 102.5	0.564	2	0.0731	0.0076
T2	102.5 - 92.5	0.404	2	0.0722	0.0076
T3	92.5 - 72.5	0.219	2	0.0646	0.0058

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
110.00	LPA-171063-8CF	2	0.526	0.0730	0.0077	40706
100.00	LPA-80080/4CF	2	0.358	0.0715	0.0073	57965

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	112.5	Leg	A325N	0.6250	4	0.13	13.50	0.009 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	0.40	3.17	0.127 ✓	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	0.06	4.12	0.014 ✓	1.333	Bolt Shear
T2	102.5	Leg	A325N	0.6250	4	0.92	13.50	0.068 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	1.86	3.17	0.587 ✓	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	0.11	3.17	0.035 ✓	1.333	Member Bearing
T3	92.5	Leg	A325N	0.6250	4	4.44	13.50	0.329 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3.02	4.12	0.733 ✓	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	0.42	3.17	0.131 ✓	1.333	Member Bearing

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 $\frac{P}{P_a}$
T1	112.5 - 102.5	P2.5x.203	10.00	5.00	63.3 K=1.00	22.141	1.7040	-0.85	37.73	0.023 ✓
T2	102.5 - 92.5	P2.5x.203	10.00	5.00	63.3 K=1.00	22.141	1.7040	-5.52	37.73	0.146 ✓
T3	92.5 - 72.5	P2.5x.203	20.00	5.00	63.3 K=1.00	22.141	1.7040	-21.62	37.73	0.573 ✓

Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
T1	112.5 - 102.5	L1 1/2x1 1/2x1/8	9.92	4.70	190.6 K=1.00	4.111	0.3594	-0.41	1.48	0.277 ✓
T2	102.5 - 92.5	L1 1/2x1 1/2x1/8	9.92	4.70	190.6 K=1.00	4.111	0.3594	-1.88	1.48	1.270 ✓
T3	92.5 - 72.5	L2x2x3/16	9.92	4.70	143.3 K=1.00	7.274	0.7150	-2.78	5.20	0.535 ✓

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
T1	112.5 - 102.5	L1 1/2x1 1/2x1/8	8.56	8.09	327.9 K=1.00	1.389	0.3594	-0.06	0.50	0.116 ✓
T2	102.5 - 92.5	KL/R > 200 (C) - 4 L1 1/2x1 1/2x1/8	8.56	8.09	327.9 K=1.00	1.389	0.3594	-0.10	0.50	0.196 ✓
T3	92.5 - 72.5	KL/R > 200 (C) - 22 L1 1/2x1 1/2x1/8 KL/R > 200 (C) - 40	8.56	8.09	327.9 K=1.00	1.389	0.3594	-0.12	0.50	0.249 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
T1	112.5 - 102.5	P2.5x.203	10.00	5.00	63.3	30.000	1.7040	0.50	51.12	0.010 ✓
T2	102.5 - 92.5	P2.5x.203	10.00	5.00	63.3	30.000	1.7040	3.70	51.12	0.072 ✓
T3	92.5 - 72.5	P2.5x.203	20.00	5.00	63.3	30.000	1.7040	17.75	51.12	0.347 ✓

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	112.5 - 102.5	L1 1/2x1 1/2x1/8	9.92	4.70	124.3	29.000	0.2109	0.40	6.12	0.066 ✔
T2	102.5 - 92.5	L1 1/2x1 1/2x1/8	9.92	4.70	124.3	29.000	0.2109	1.86	6.12	0.305 ✔
T3	92.5 - 72.5	L2x2x3/16	9.92	4.70	93.7	29.000	0.4484	3.02	13.00	0.233 ✔

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	112.5 - 102.5	L1 1/2x1 1/2x1/8	8.56	8.09	214.7	29.000	0.2109	0.04	6.12	0.007 ✔
T2	102.5 - 92.5	L1 1/2x1 1/2x1/8	8.56	8.09	214.7	29.000	0.2109	0.11	6.12	0.018 ✔
T3	92.5 - 72.5	L1 1/2x1 1/2x1/8	8.56	8.09	214.7	29.000	0.2109	0.31	6.12	0.051* ✔

* DL controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	112.5 - 102.5	Leg	P2.5x.203	1	-0.85	50.29	1.7	Pass
T2	102.5 - 92.5	Leg	P2.5x.203	21	-5.52	50.29	11.0	Pass
T3	92.5 - 72.5	Leg	P2.5x.203	39	-21.62	50.29	43.0	Pass
T1	112.5 - 102.5	Diagonal	L1 1/2x1 1/2x1/8	8	-0.41	1.97	20.8	Pass
T2	102.5 - 92.5	Diagonal	L1 1/2x1 1/2x1/8	28	-1.88	1.97	95.3	Pass
T3	92.5 - 72.5	Diagonal	L2x2x3/16	51	-2.78	6.93	40.1	Pass
							55.0 (b)	
T1	112.5 - 102.5	Top Girt	L1 1/2x1 1/2x1/8	4	-0.06	0.67	8.7	Pass
T2	102.5 - 92.5	Top Girt	L1 1/2x1 1/2x1/8	22	-0.10	0.67	14.7	Pass
T3	92.5 - 72.5	Top Girt	L1 1/2x1 1/2x1/8	40	-0.12	0.67	18.7	Pass
							Summary	
						Leg (T3)	43.0	Pass
						Diagonal (T2)	95.3	Pass
						Top Girt (T3)	18.7	Pass
						Bolt Checks	55.0	Pass
						RATING =	**95.3**	**Pass**

DESIGN BASIS:

1. GOVERNING CODE: 2005 CONNECTICUT STATE BUILDING CODE (CSBC) AS MODIFIED BY THE 2009 CT STATE SUPPLEMENT. SPECIFIC REFERENCE IS MADE TO SECTION 3108: RADIO AND TELEVISION TOWERS OF THE 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE CSBC.

2. DESIGN CRITERIA

   WIND LOAD:

   2005 CONNECTICUT STATE BUILDING CODE: **CONTROLS**

   - BASIC WIND SPEED (V) = 80 MPH (FASTEST MILE) EQUIVALENT TO 100 MPH (3-SECOND GUST) AS PER APPENDIX K OF THE CONNECTICUT SUPPLEMENT.
   - BASIC WIND SPEED (V) = 69 MPH (FASTEST MILE) CONCURRENT W/ 0.5" RADIAL ICE.

   TIA/EIA-222-F96 STANDARD:

   - BASIC WIND SPEED (V) = 77.5 MPH (FASTEST MILE).

GENERAL NOTES:

1. PROVIDE TEMPORARY ANCHORS, GUYING AND/OR BRACING AS REQUIRED TO SAFELY CONDUCT THE WORK.
2. ALL WORK SHALL BE IN ACCORDANCE WITH TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES".
3. THE TOWER STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER REINFORCEMENTS ARE COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE TOWER STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIE-DOWNS, WHICH MIGHT BE NECESSARY.
5. 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 TOWER OWNER.
6. 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 SCOPE AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
7. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
8. 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.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
10. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.
11. TOWER STEEL REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.
12. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.
13. 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.

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

REV	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
A	06/07/12	TJL	CFC	ISSUED FOR CONSTRUCTION

CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

VERIZON WIRELESS
PROPOSED WIRELESS COMMUNICATIONS ANTENNA INSTALLATION
BRISTOL
40-0 ROHN SSV TOWER
REINFORCEMENT DESIGN FOR
ANTENNA INSTALLATION
92 VALLEY STREET
BRISTOL, CT 06010

DATE:	06/7/12
SCALE:	AS SHOWN
JOB NO.	12001.C041

GENERAL NOTES

SHEET NO.
N-1
Sheet No. 1 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 C, (FY = 46 KSI)
   E. PIPE---ASTM A53 GRADE B, (FY = 35 KSI MIN)
   F. CONNECTION BOLTS---ASTM A490-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 WHERE APPLICABLE 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. CONNECTIONS SHALL CONFORM TO ALL REQUIREMENTS OF THE "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR SHELTERS", LATEST EDITION, AND THE "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS", LATEST EDITION.

14. CONNECTIONS SHALL CONFORM TO ALL REQUIREMENTS OF THE "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR SHELTERS", LATEST EDITION, AND THE "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS", LATEST EDITION.

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

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

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

18. FABRICATE BEAMS WITH MILL CAMBER UP.

19. 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.

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

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

22. 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:	TJL
DRAWN BY:	TJL
CHK'D BY:	CFC

NO.	DATE	DRAWN BY/CHK'D BY	DESCRIPTION
1	06/07/12	TJL/CFC	ISSUED FOR CONSTRUCTION

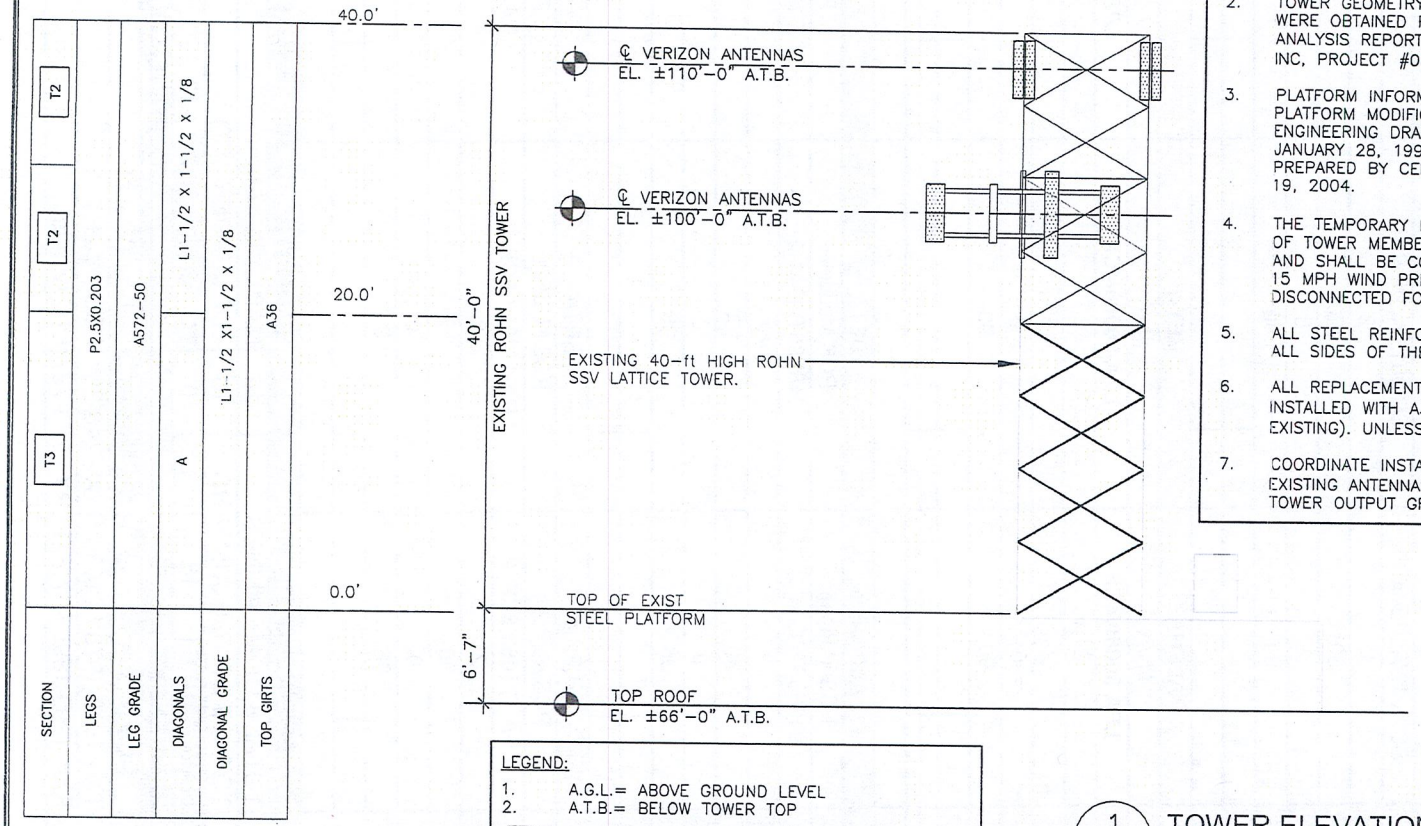
CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

VERIZON WIRELESS
PROPOSED WIRELESS TELECOMMUNICATIONS INSTALLATION
BRISTOL
40-ft ROHN SSV TOWER
REINFORCEMENT DESIGN FOR
ANTENNA INSTALLATION
84 VALLEY STREET
BRISTOL, CT 06010

DATE:	06/7/12
SCALE:	AS SHOWN
JOB NO.	12001.C041

STRUCTURAL NOTES

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



1 S-1 TOWER ELEVATION

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

TOWER REINFORCEMENT NOTES:

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., FOR VERIZON WIRELESS, REVISION #0, DATED 6/7/12.
2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM A PREVIOUS STRUCTURAL ANALYSIS REPORT PREPARED BY WALKER ENGINEERING INC, PROJECT #0308-321, DATED AUGUST 14, 2003.
3. PLATFORM INFORMATION WAS OBTAINED FROM THE PLATFORM MODIFICATION DRAWINGS PREPARED BY L&W ENGINEERING DRAWING NO. S-1 THRU S-3 DATED JANUARY 28, 1992 AND CONSTRUCTION DRAWINGS PREPARED BY CENTEK ENGINEERING DATED JANUARY 19, 2004.
4. THE TEMPORARY DETACHMENT AND/OR REPLACEMENT OF TOWER MEMBERS SHALL BE DONE ONE AT A TIME AND SHALL BE CONDUCTED ON DAYS WITH LESS THAN 15 MPH WIND PRESENT. NO MEMBER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY.
5. ALL STEEL REINFORCEMENT SHOWN HEREIN APPLIES TO ALL SIDES OF THE TOWER.
6. ALL REPLACEMENT STEEL MEMBERS SHALL BE INSTALLED WITH A325-N BOLTS (SIZE TO MATCH EXISTING). UNLESS OTHERWISE NOTED BELOW.
7. COORDINATE INSTALLATION OF REINFORCEMENT WITH EXISTING ANTENNAS/APPURTENANCES. REFER TO RISA TOWER OUTPUT GRAPHIC SUMMARY FOR INFORMATION.

LEGEND:

1. A.G.L.= ABOVE GROUND LEVEL
2. A.T.B.= BELOW TOWER TOP

[TXX] DENOTES RISA TOWER OUTPUT SECTION NUMBER

MAX. TOWER STEEL USAGE w/ ABOVE REINFORCEMENTS:
LOAD CASE #1 = 95.3%
(DIAGONAL SECTION T2 0'-0"-20'-0" ATB)

REINFORCEMENT SCHEDULE KEY:

A. REPLACE EXISTING DIAGONALS w/ L2X2X3/16.

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CHK'D BY:	CFC

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TOWER ELEVATION AND NOTES

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

SITE NAME	BRISTOL CT	ECP - CELL #	8	17
LATITUDE	41-40-34.35 N	LONGITUDE	72-56-51.37 W	
Additional Comments: ANTMO, leave one 850 antenna in place on the lower centerline as a placeholder, for a total of 18 antennas		SAVE BUTTON		
		STRUCTURE TYPE	ROOFTOP	

700 Mhz - LTE ANTENNA ADD	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	eNodeB	eNodeB	eNodeB
ANTENNA TYPE	BXA-70063-6CF_2	BXA-70063-6CF_2	BXA-70063-6CF_2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	4
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	#N/A	#N/A	#N/A
ANTENNA TYPE	SC-9012/ALPE-9011	SC-9012/ALPE-9011	SC-9012/ALPE-9011
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	#N/A	#N/A	#N/A
ANTENNA TYPE	LPA-80080/4CF	LPA-80080/4CF	LPA-80063/4CF_4
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	2
RAD CTR (FT AGL)	90	90	90
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
DIPLEX WITH LTE CABLE			

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell	PCS Modcell	PCS Modcell
ANTENNA TYPE	948F85T2E-M_2	948F85T2E-M_2	948F85T2E-M_2
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	98	98	98
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

1900 PCS - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell	PCS Modcell	PCS Modcell
ANTENNA TYPE	LPA-171063-8CF_2	LPA-171063-8CF_2	LPA-171063-8CF_2
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	98	98	98
TMA - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE			

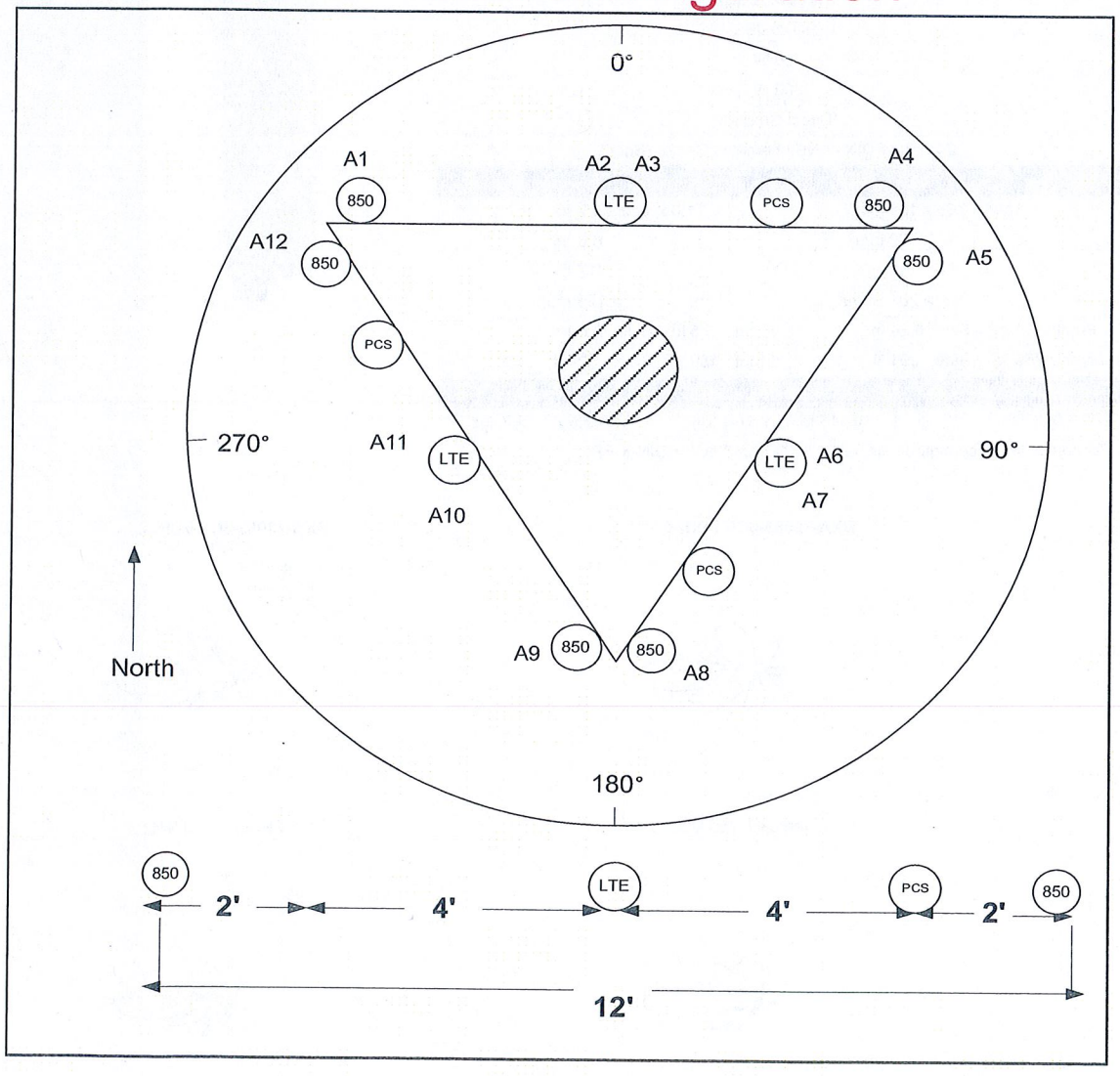
NUMBER OF CABLE'S NEEDED					ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES		18	MAINLINE (FT)			
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS		18	TOP JUMPER (FT)			12
Equipment Cable Ordering		MAIN CABLE	18	+ 0	TOP JUMPER #	18	+	0

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	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By: Mark Brauer	Steve Weatherbee	MB	6/5/2012

Site Configuration



Amphenol ANTENNA SOLUTIONS

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

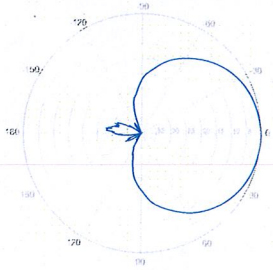
Replace "X" with desired electrical downtilt.

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

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

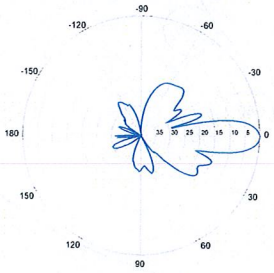
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



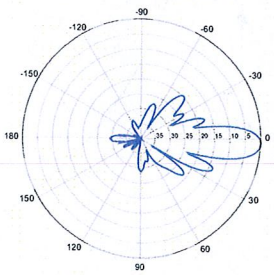
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

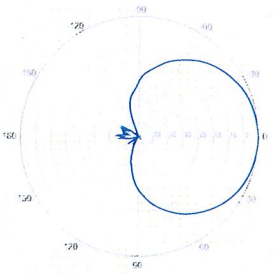


0° | Vertical | 750 MHz

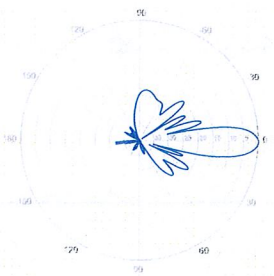
BXA-70063-6CF-EDIN-2



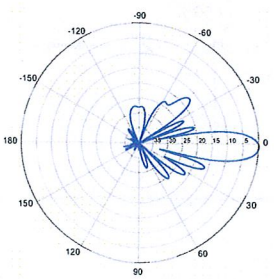
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

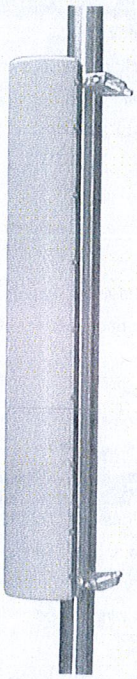
Amphenol ANTENNA SOLUTIONS

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.

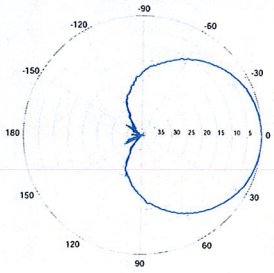


Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1755 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	Vertical		
Horizontal beamwidth	61°	63°	60°
Vertical beamwidth	6°	7°	6°
Gain	14.9 dBd (17.0 dBi)	15.4 dBd (17.5 dBi)	14.9 dBd (17.0 dBi)
Electrical downtilt (X)	0, 2		
Impedance	50Ω		
VSWR	≤ 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)		

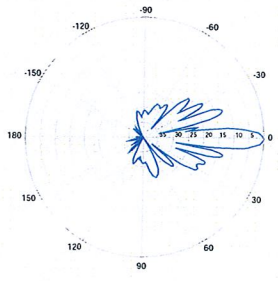
Mechanical Characteristics		
Dimensions Length x Width x Depth	1207 x 203 x 203 mm	47.5 x 8.0 x 8.0 in
Weight without mounting brackets	5.2 kg	11.5 lbs
Survival wind speed	>201 km/hr	>125 mph
Wind area	Front: 0.20 m² Side: 0.27 m²	Front: 2.2 ft² Side: 2.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 246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

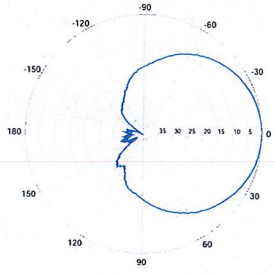


Horizontal

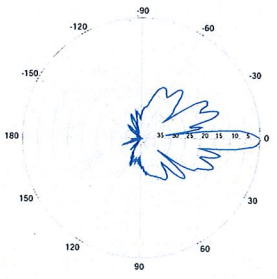


0° | Vertical

1850-1990 MHz

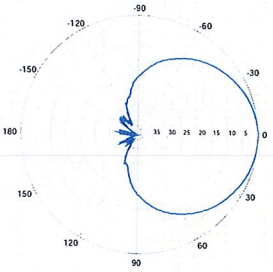


Horizontal

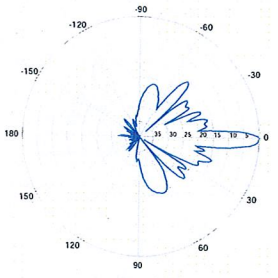


0° | Vertical

1920-2170 MHz



Horizontal



0° | Vertical

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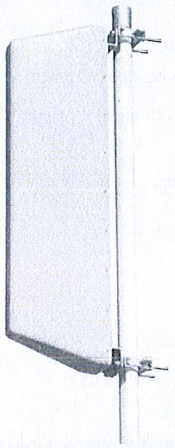
Amphenol ANTENNA SOLUTIONS

LPA-80080-4CF-EDIN-X

V-Pol | Log Periodic | 80° | 12.5 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.

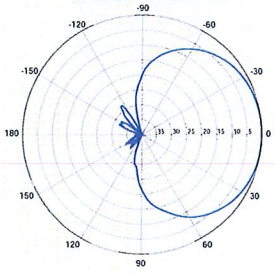


Electrical Characteristics	
Frequency bands	806-960 MHz
Polarization	Vertical
Horizontal beamwidth	80°
Vertical beamwidth	15°
Gain	12.5 dBd (14.6 dBi)
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10, 12, 14
Impedance	50Ω
VSWR	≤1.4:1
Upper sidelobe suppression (0°)	-14.2 dB
Front-to-back ratio (+/-30°)	-34.7 dB
Null fill	15% (-16.48 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	1200 x 140 x 335 mm	47.2 x 5.5 x 13.2 in
Depth of antenna with z-bracket	375 mm	14.8 in
Weight without mounting brackets	5.4 kg	12 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.17 m² Side: 0.40 m²	Front: 1.8 ft² Side: 4.3 ft²
Wind load @ 161 km/hr (100 mph)	Front: 254 N Side: 574 N	Front: 57 lbf Side: 129 lbf

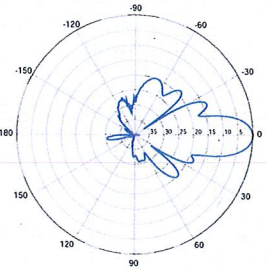
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit (0-20°)	21699999	50-102 mm 2.0-4.0 in	5.4 kg 12 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80080-4CF-EDIN-X



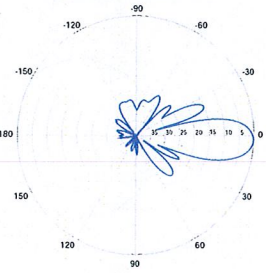
Horizontal

LPA-80080-4CF-EDIN-0



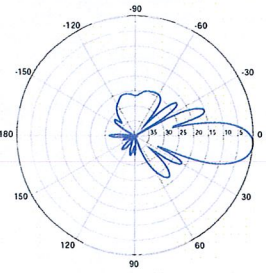
0° | Vertical

LPA-80080-4CF-EDIN-2



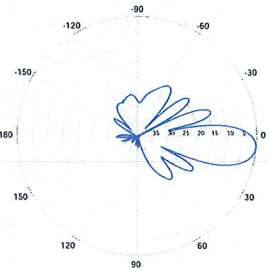
2° | Vertical

LPA-80080-4CF-EDIN-4



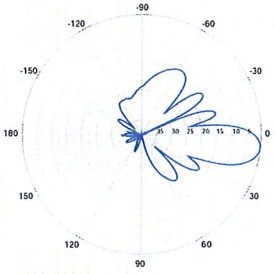
2° | Vertical

LPA-80080-4CF-EDIN-5



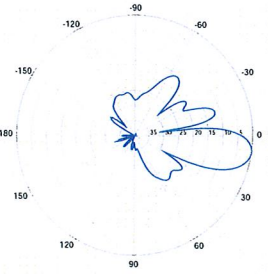
5° | Vertical

LPA-80080-4CF-EDIN-6



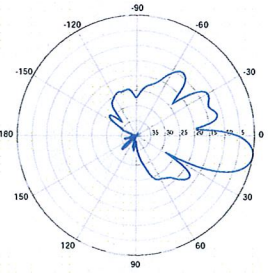
6° | Vertical

LPA-80080-4CF-EDIN-8



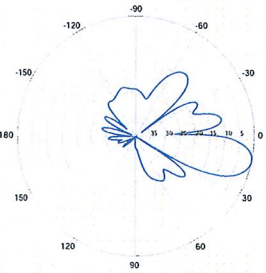
8° | Vertical

LPA-80080-4CF-EDIN-10



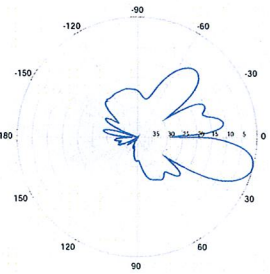
10° | Vertical

LPA-80080-4CF-EDIN-12



12° | Vertical

LPA-80080-4CF-EDIN-14



14° | Vertical

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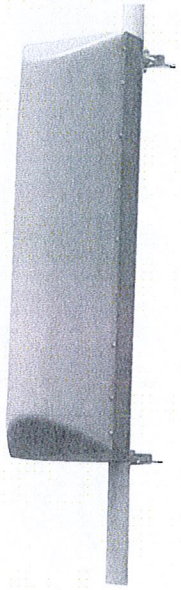
Amphenol ANTENNA SOLUTIONS

LPA-80063-4CF-EDIN-X

V-Pol | Log Periodic | 63° | 13.0 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.

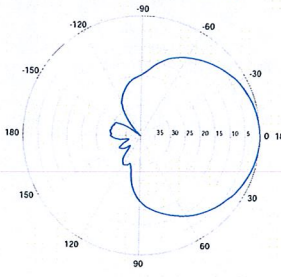


Electrical Characteristics	
Frequency bands	806-960 MHz
Polarization	Vertical
Horizontal beamwidth	63°
Vertical beamwidth	15°
Gain	13.0 dBd (15.1 dBi)
Electrical downtilt (X)	0, 2, 4, 5, 6, 8, 10, 12, 14
Impedance	50Ω
VSWR	≤1.4:1
Upper sidelobe suppression (0°)	-15.7 dB
Front-to-back ratio (+/-30°)	-31.7 dB
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	1205 x 385 x 332 mm	47.4 x 15.2 x 13.1 in
Depth of antenna with z-bracket	372 mm	14.6 in
Weight without mounting brackets	9.1 kg	20 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.46 m² Side: 0.39 m²	Front: 5.0 ft² Side: 4.2 ft²
Wind load @ 161 km/hr (100 mph)	Front: 660 N Side: 550 N	Front: 149 lbf Side: 124 lbf

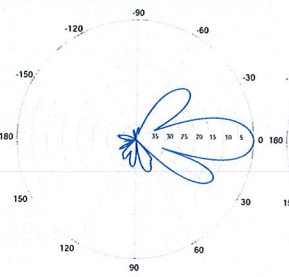
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit (0-20°)	21699999	50-102 mm 2.0-4.0 in	5.4 kg 12 lbs
Lock-Down Brace	If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in.		

LPA-80063-4CF-EDIN-X



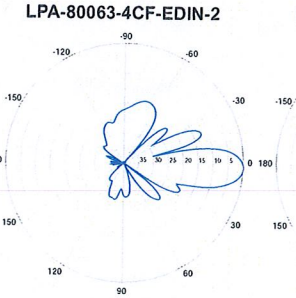
Horizontal

LPA-80063-4CF-EDIN-0



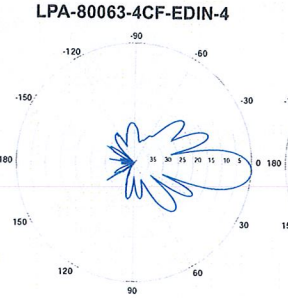
0° | Vertical

LPA-80063-4CF-EDIN-2



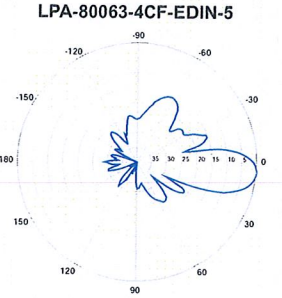
2° | Vertical

LPA-80063-4CF-EDIN-4



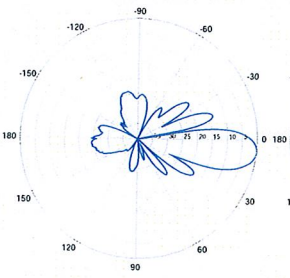
4° | Vertical

LPA-80063-4CF-EDIN-5



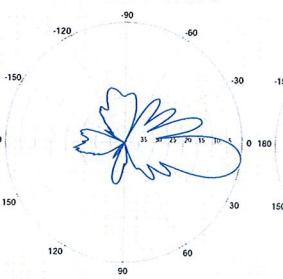
5° | Vertical

LPA-80063-4CF-EDIN-6



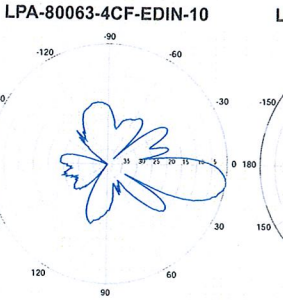
6° | Vertical

LPA-80063-4CF-EDIN-8



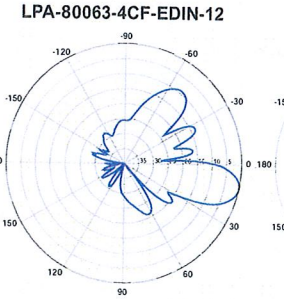
8° | Vertical

LPA-80063-4CF-EDIN-10



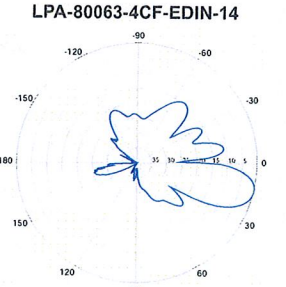
10° | Vertical

LPA-80063-4CF-EDIN-12



12° | Vertical

LPA-80063-4CF-EDIN-14



14° | Vertical