

August 16, 2016

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

Re: **Notice of Exempt Modification – Facility Modification
Gifford Lane in Bozrah, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 162- foot level of the existing 193-foot tower at Gifford Lane in Bozrah (the “Property”). The tower is owned by SBA. Cellco’s shared use of this tower was approved by the Council in 2000. Cellco now intends to modify its facility by replacing three (3) of its existing antennas with three (3) model QUAD6560000x, 700 MHz antennas at the same level on the tower. Cellco also intends to install three (3) remote radio heads (“RRHs”) behind its new 700 MHz antennas. Included in Attachment 1 are specifications for the replacement antennas and RRHs.

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 Glenn S. Pianka, First Selectman for the Town of Bozrah. A copy of this letter is also being sent to Nathan Adelman, the owner of the Property and SBA, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s replacement antennas and RRHs will be installed at the 162-foot level on the 193-foot tower.

15059656-v1

Robinson+Cole

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2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis Report included in Attachment 3).

A copy of the Town Assessor's Parcel Map and property owner information is included in Attachment 4.

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:

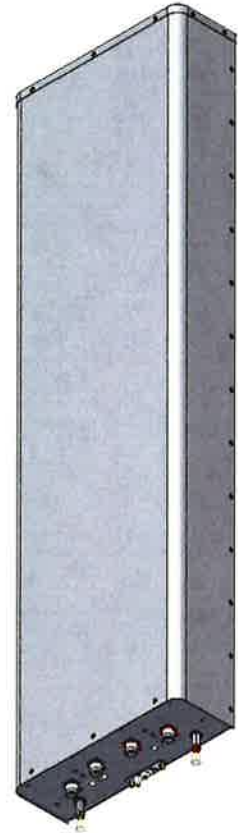
Glenn S. Pianka, Bozrah First Selectman
Nathan Adelman
SBA
Tim Parks

ATTACHMENT 1

QUAD656C0000x

Twin Band | Quad Port | Panel Antenna | (2x) X-Pol | 65° / 65° | 15.0 / 15.0 dBi | Variable Tilt

- Twin band, quad-port panel antenna with variable electrical tilt
- 4x4 MIMO
- Patented internal RET actuator adds no additional length to the antenna





Ordering Options		Model Number	
When ordering, replace "x" in the model number with one of the options listed below.			
Manual Electrical Tilt		QUAD656C0000M	
Remote Electrical Tilt AISG v2.0 / 3GPP with an MDCU RET Actuator		QUAD656C0000G	
Remote Electrical Tilt AISG v2.0 / 3GPP with an MDDU RET Actuator		QUAD656C0000L	
Mounting bracket kits and other accessories are ordered separately.			
Electrical Characteristics		(2x) 696-900 MHz	
Frequency Bands		696-806 MHz	806-900 MHz
Polarization		(2x) ±45° (Quad-Pol)	
Horizontal Beamwidth		67°	66°
Vertical Beamwidth		13.6°	12.4°
Gain		14.5 dBi	15.0 dBi
Electrical Downtilt		0-12°	
Impedance		50Ω	
VSWR		≤ 1.5:1	
Upper Sidelobe Suppression		18 dB	18 dB
Front-to-Back Ratio		> 25 dB	> 25 dB
Inband Isolation		25 dB	
Isolation Between Bands		28 dB	
IM3 (2x20W carrier)		< -153 dBc	
Input Power		(4x) 500 W	
Total Number of Connectors		Antennas has 4 connectors located at the bottom	
Connectors Per Band	696-900 MHz	(2x) 7/16-DIN Female	
	696-900 MHz	(2x) 7/16-DIN Female	
Diplexed		No	
Lightning Protection		Direct Ground	
Operating Temperature		-40° to +60° C (-40° to +140° F)	
Mechanical Characteristics			
Dimensions (Length x Width x Depth)		1889 x 520 x 182 mm	74.4 x 20.5 x 7.2 in
Depth with Z-Brackets		227 mm	8.9 in
Weight without Mounting Brackets: MET		24.5 kg	54.0 lbs
Weight without Mounting Brackets: RET		24.8 kg	54.7 lbs
Survival Wind Speed		> 241 km/hr	> 150 mph
Wind Area	Front	0.98 m ²	10.6 ft ²
	Side	0.34 m ²	3.7 ft ²
Wind Loads (160 km/hr or 100 mph)	Front	1200 N	270 lbf
	Side	415 N	93 lbf

Quoted performance parameters are provided to offer typical, peak or range values only and may vary as a result of normal testing, 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 products may be made without notice.

QUAD656C0000x

Twin Band | Quad Port | Panel Antenna | (2x) X-Pol | 65° / 65° | 15.0 / 15.0 dBi | Variable Tilt

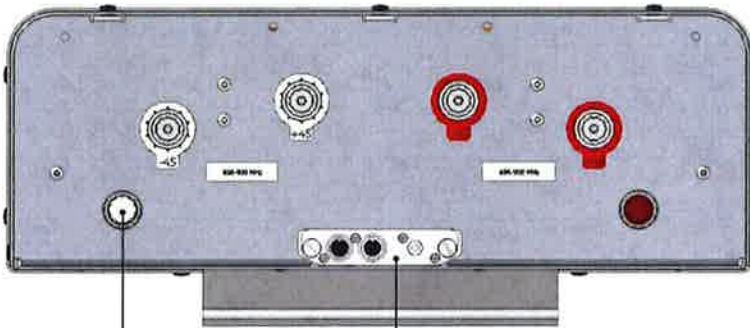
Electrical Downtilt Control				
Electrical downtilt for each band can be controlled separately. Tilt indicator(s) are covered by removable transparent cap(s).				
Manual Electrical Tilt (MET) Control	A colored knob at the end of the tilt indicator allows change of the tilt without need of a tool. The knob color is identical to the corresponding connector ring color. To access the knob, remove the cap by turning it counter-clockwise. It is re-installed by opposite rotation. Do not remove the transparent cap(s) from the antenna.			
Remote Electrical Tilt (RET) Control	The remote control of the electrical tilt is managed by either a Multi-Device Control Unit (MDCU) or a Multi-Device Dual Unit (MDDU) inserted in the bottom of the antenna. A single actuator individually controls the tilt of each band (no need for daisy chain cables between the bands). This module does not add any additional length to the antenna. For RET control, the transparent caps must be in place and locked. The tilt angle indicators always remain visible and the antenna still has manual tilt control (manual override).			
RET Actuator	Select one of the following RET actuators when ordering this antenna.			
	Multi-Device Control Unit (MDCU)	The MDCU is an electronic module that allows the remote control of the electrical downtilt (RET) in Amphenol antennas with factory embedded motors. The MDCU is factory installed. Refer to ordering options.		
	Multi-Device Dual Unit (MDDU)	The MDDU allows two separate RET Controllers to independently drive the RETs in Amphenol antennas with factory installed motors (for antenna sharing). The MDDU is factory installed. Refer to ordering options.		
Important Installation Instructions 	In order to operate RET control, the transparent caps covering the tilt adjustment indicators must be engaged and locked. Do not cut them from the antenna.			
	Do not install the antenna with the connectors facing upward.			
Mounting Options	Part Number	Image	Fits Pipe Diameter	Weight
All mounting bracket kits are ordered separately unless otherwise indicated. Select from the options listed below.				
3-Point Mounting and Downtilt Bracket Kit	36210008		40-115 mm 1.6-4.5 in	6.9 kg 15.2 lbs
Configuration Options				
This antenna model cannot be used with Amphenol's UNICELL 3-sector antenna enclosures.				

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QUAD656C0000x


Twin Band | Quad Port | Panel Antenna | (2x) X-Pol | 65° / 65° | 15.0 / 15.0 dBi | Variable Tilt

Bottom View of Antenna

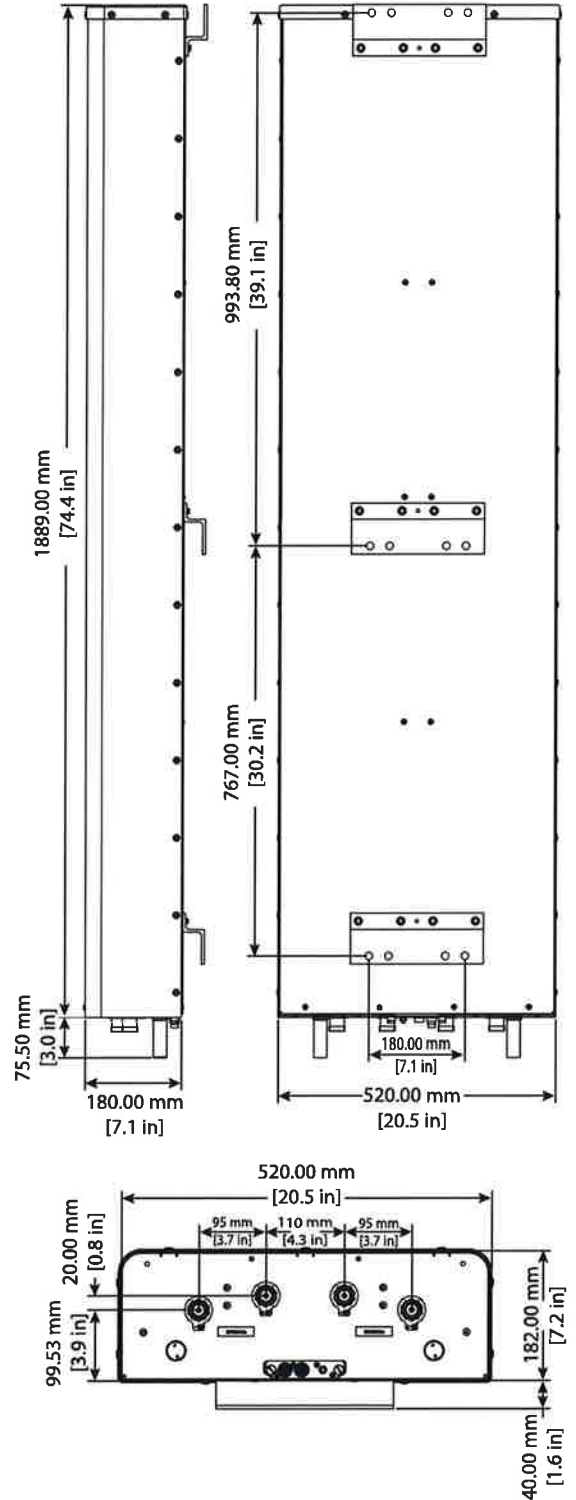


Location of the MDCU or MDDU for RET Control (MDCU shown)

Tilt indicators covered by transparent caps. Manual adjustment is accessed by removing the caps. Knob colors are the same as the connectors.

 In order to operate RET control, the transparent caps covering the tilt adjustment indicators must be engaged and locked. Do not cut them from the antenna.

Dimensions

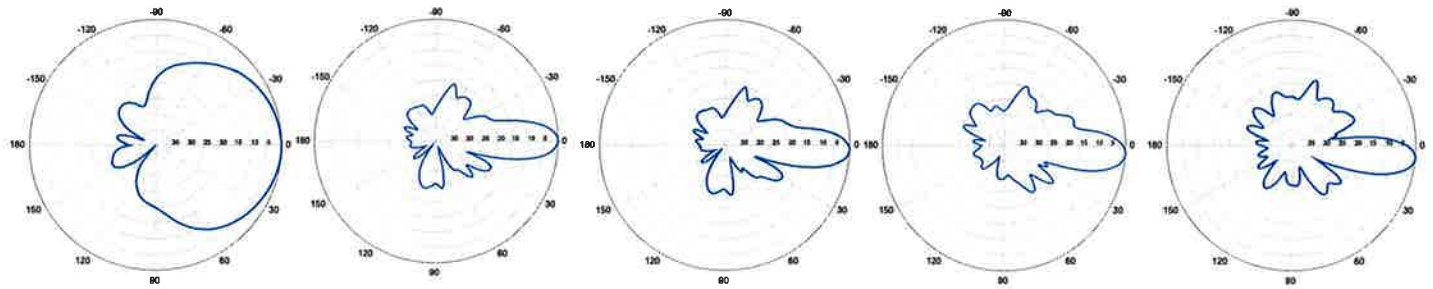


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QUAD656C0000x

Twin Band | Quad Port | Panel Antenna | (2x) X-Pol | 65° / 65° | 15.0 / 15.0 dBi | Variable Tilt

696-900 MHz



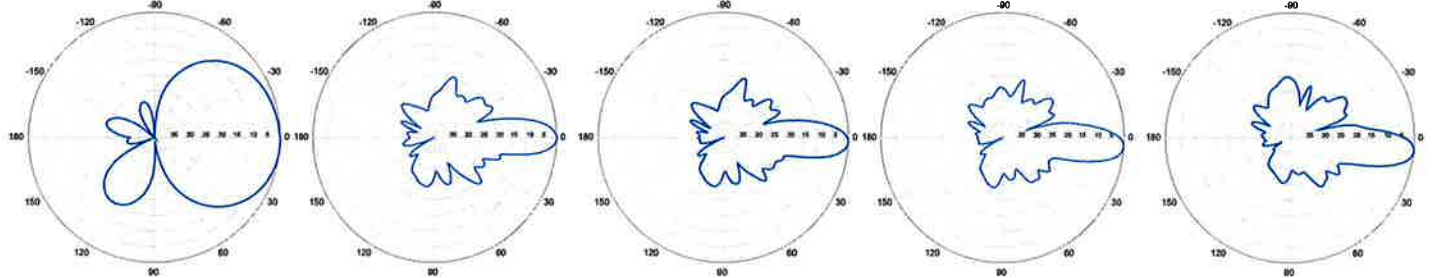
Horizontal | 750 MHz

0° | Vertical | 750 MHz

2° | Vertical | 750 MHz

4° | Vertical | 750 MHz

6° | Vertical | 750 MHz



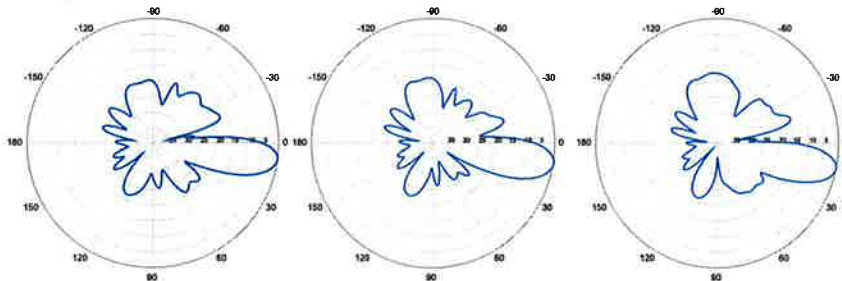
Horizontal | 850 MHz

0° | Vertical | 850 MHz

2° | Vertical | 850 MHz

4° | Vertical | 850 MHz

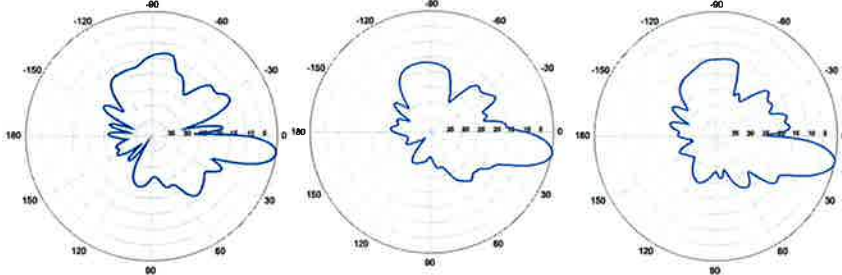
6° | Vertical | 850 MHz



8° | Vertical | 750 MHz

10° | Vertical | 750 MHz

12° | Vertical | 750 MHz



8° | Vertical | 850 MHz

10° | Vertical | 850 MHz

12° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical, peak or range values only and may vary as a result of normal testing, 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 products may be made without notice.

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

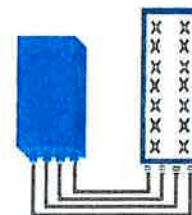


FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield)
Volume in L	38 (with solar shield)
Weight in kg (lb) (w/o mounting HW)	26 (57.2) (with solar shield)
DC voltage range	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	550W typical @100% RF load (in 2Tx or 4Tx mode)
Environmental conditions	-40°C (-40°F) / +55°C (+131°F)
Wind load (@150km/h or 93mph)	IP65 Frontal: <200N / Lateral : <150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

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ATTACHMENT 2

Site Name: Bozrah East Tower Height: 193Ft.	General	Power	Density							
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total		
*Omnipoint	2	386	195	1930	0.0078	1.0000	0.08%			
*Sprint	3	625	175.5	1900	0.0235	1.0000	0.23%			
*AT&T	4	349	182	850	0.0162	0.5667	0.29%			
*AT&T	5	703	182	700	0.0408	0.4667	0.87%			
*AT&T	3	869	182	700	0.0303	0.4667	0.65%			
Verizon PCS	1	3241	162	0.0444	1970	1.0000	4.44%			
Verizon Cellular	9	376	162	0.0464	869	0.5793	8.00%			
Verizon AWS	1	1750	162	0.0240	2145	1.0000	2.40%			
Verizon 700	1	1050	162	0.0144	746	0.4973	2.89%			19.86%
* Source: Siting Council										

ATTACHMENT 3

SBA Communications Corporation
8051 Congress Avenue
Boca Raton, FL 33487-1307

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F + 561 995 7626

sbsite.com



Structural Analysis Report

Client: Verizon

Client Site ID: Bozrah East
ApplID : 29689, v2

SBA Site Name: Bozrah
SBA Site ID: CT01105-S-03
193' Self Support Tower
131 Gifford Lane
Bozrah, CT 06334
Lat: 41°33'9.06", Long: -72°9'2.55"

Project number: CT01105-VZW-011816

Analysis Results

Tower	88.7%	Pass
Foundation	78.4%	Pass

Joji George
CT # 24444

January 26, 2016



Prepared in compliance with:

- ANSI/TIA-222-F Structural Standard for Antennas and Antenna Supporting Structures
- 2003 International Building Code (IBC) / 2005 Connecticut Building Code (CBC)

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Executive Summary

The enclosed structural analysis was performed for Verizon on January 26, 2016 to verify the structural capacity of the 193' Self Supporting Tower located at 131 Gifford Lane, Bozrah, CT 06334 to support the proposed antenna, transmission lines and mounting equipment in addition to those currently installed. The following documents were used to determine the geotechnical characteristics, foundation data, tower geometry and member sizes/type:

Table 1 List of Documents Used

Item	Document
Tower design/drawings	PiROD Inc., Job #: A-115466, Dated: 4/1/1999
Foundation drawings	PiROD Inc., Job #: A-115466, Dated: 4/1/1999
Geotechnical report	Jaworski Geotech, Inc., Project # C98492G, Dated: 12/14/1998
Latest SA	FDH Engineering, Project # 15BAJP1400, Dated: 1/9/2015

The analysis was performed in accordance with the following requirements:

Table 2 Code Related Data

Jurisdiction (State/County/City)	Connecticut
Governing Codes	ANSI/TIA-222-F, IBC 2003, CBC 2005
Base Wind Speed	85 mph
Wind Speed with Ice	63.75 mph
Ice Thickness	0.5 in

The SBA Communications Corporation verifies that the 193' Self Supporting Tower located at 131 Gifford Lane, Bozrah, CT 06334 is **sufficient** to support the proposed loadings for Verizon in addition to those currently existing based on standards set forth in governing building codes and dependent on Verizon satisfying all Installation Requirements provided herein. The analysis performed assumes the site information provided is accurate and the tower/foundation has been properly designed, manufactured, installed and maintained. Additional details regarding the assumptions and limitations are provided within the Assumptions and Limitations section of this report.

Assumptions

This analysis was completed based on the following assumptions:

- Tower has been properly maintained
- Tower erection was in accordance to manufacturer drawings
- Leg flanges have been properly designed by manufacturer to not be a limiting reaction
- Welds have been properly designed and installed by manufacturer to not be a limiting reaction
- Foundation was constructed in accordance to manufacturer drawings
- Foundation does not have structural damage
- Bolts have been properly tightened according to manufacturer specifications
- Appurtenance, mount and transmission line sizes and weights are best estimates using the tnxTower database and manufacturer information

Limitations

The computer generated analysis performed by the tnxTower software is limited to theoretical capacities of the towers structural members and does not account for any missing or damaged members or connections. The tower and foundation are assumed to have been properly designed, fabricated, installed and maintained, barring any conflicting findings from the most recent inspection. All leg flanges, welds and bolts are assumed to be designed by the manufacturer in such a way that these are not limiting reactions.

SBA Communications Corporation has used its due diligence to verify the information provided to perform this analysis. It is unreasonable to perform a more detailed inspection of a tower and its components. This report is not a condition assessment of the tower or foundation.

Installation Requirements

This analysis was performed under the assumption that Verizon will place the proposed equipment and feed lines at a height of 162' and in accordance with the orientation shown in the Appendix. RRUs are to be installed on existing mounts behind tenant's antennas unless otherwise noted. No equipment is to be installed directly in the climbing path. All equipment is to be installed per mount manufacturer specifications. In case site conditions do not allow for the required installation parameters to be met Verizon must notify SBA Communications Corporation engineers for approval of an alternative placement.

Appurtenance Loading

Existing Loading:

The existing antenna and feed line information was obtained from the Site Summary and/or previous Structural Analysis. SBA Communications Corporation uses due diligence to ensure reasonably accurate information has been recorded. The existing loadings are shown in Table 3.

Table 3 Existing Appurtenances

Mount Elev. (ft)	CL Elev. (ft)	Carrier	Type	Qty	Manufacturer	Model	Qty	Feed Line Size	Mount Type Qty
193	195	T-Mobile	Panel	9	EMS	RR90-17-02DP	12	1-5/8"	(1) Low Profile Platform
182	182	New Cingular	Panel	3	CCI	HPA-65R-BUU-H8	3 2 8	1-5/8" 5/8" 3/4" DC	(3) 12.5' T-Frames (Commscope P/N: MTC 3615)
			Panel	3	Powerwave	7770			
			Panel	3	CCI	OPA-65R-LCUU-H6			
			TMA	6	Powerwave	LGP21401			
			RRU	6	Ericsson	RRUS 11			
			RRU	3	Ericsson	RRUS 12			
			RRU	3	Ericsson	RRUS A2			
			RRU	3	Ericsson	RRUS 32			
			RRU	3	Ericsson	RRUS E2			
			-	3	Polyphases	1000860			
			-	6	Powerwave	LGP21901			
			-	2	Raycap	DC6-48-60-18-8F			
175	175	Sprint	Panel	6	-	6'x1' panels (Assumed)	6	1-5/8"	(3) T-Frames
162	162	Verizon	Panel	6	Commscope	HBXX-6517DS-A2M	12 2	1-5/8" 1-5/8" Fiber	(3) T-Frames
			Panel	6	Commscope	LNx-6514DS-VTM			
			RRH	3	Alcatel Lucent	1900 RRH 2x60W			
			RRH	3	Alcatel Lucent	RRH2x60 RRUs			
			-	2	RFS	DB-T1-6Z-8AB-0Z			
			-	6	RFS	FD9R6004/2C-3L			
100	100		GPS	1	Lucent	KS24019-L112A	1	GPS Line	Direct Mount
30	30	T-Mobile	Omni	2	Andrew	PC1N0F-0190B-002M E911	2	1/2"	Direct Mount

Proposed Loading:

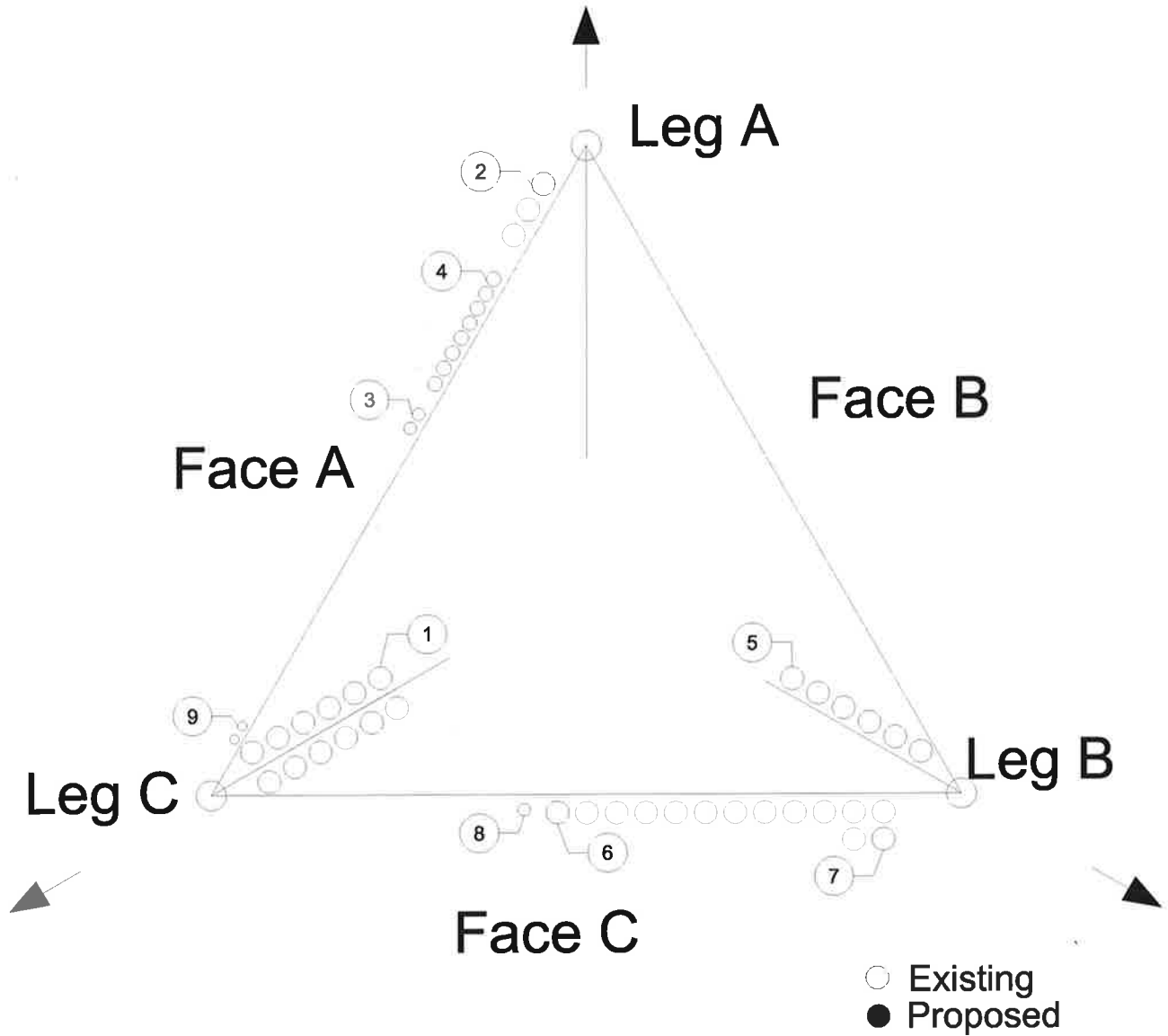
Information pertaining to proposed antennas and transmission lines were based upon the APP ID 29689 v2 from Verizon and is listed in Table 4.

Table 4 Proposed Appurtenances

Mount Elev. (ft)	CL Elev. (ft)	Carrier	Type	Qty	Manufacturer	Model	Qty	Feed Line Size	Mount Type Qty
162	162	Verizon	Panel	6	Commscope	HBXX-6517DS-A2M	12 2	1-5/8" 1-5/8" Fiber	(3) T-Frames
			Panel	3	Commscope	LNX-6514DS-A1M			
			Panel	3	Amphenol	QUAD656C0000x			
			RRH	3	Alcatel Lucent	RRH2x60-AWS			
			RRH	3	Alcatel Lucent	RRH2X60-1900			
			RRH	3	Alcatel Lucent	RRH2x60-700			
			-	6	RFS	FD9R6004/2CL-3CL			
			-	2	RFS	DB-T1-6Z-8AB-0Z			
100	100		GPS	1	Lucent	KS24019-L112A	1	GPS Line	Direct Mount



Coax Layout



CT01105-S					
#	CARRIER	SIZE	QTY.	ELEVATION	NOTES
1	T-MOBILE	1-5/8"	12	193'	
2	NEW CINGULAR	1-5/8"	3	182'	
3	NEW CINGULAR	5/8"	2	182'	FIBER
4	NEW CINGULAR	3/4"	8	182'	DC POWER
5	SPRINT	1-5/8"	6	175'	
6	VERIZON	1-5/8"	12	162'	
7	VERIZON	1-5/8"	2	162'	FIBER
8	VERIZON	3/8"	1	100'	GPS LINE
9	T-MOBILE	1/2"	2	30'	

Results

Tower

The results of the structural analysis performed with the tnxTower software are shown below. Table 5 shows the most critical member elements and the percentage of the force in the member with respect to the member capacity. Capacities of up to 105% are considered acceptable. The foundation reactions obtained from tnxTower are shown in Table 6 and Table 7. These reactions are used for the analysis of the foundation systems. Additional information for the tower analysis is provided within the Appendix.

Table 5 Tower Analysis Summary

Structural Component	% capacity	Analysis Result
Leg	88.7	Pass
Diagonal	85.1	Pass
Horizontal	10.0	Pass
Top girt	4.3	Pass
Bottom girt	6.6	Pass
Mid girt	2.1	Pass
Bolt	88.7	Pass
Tower	88.7	Pass

Table 6 Tower Base Reactions

Axial (kips)	56
Shear (kips)	59
Moment (kip-ft)	6812

Table 7 Tower leg Reactions

Uplift (kips)	333
Compression (kips)	376
Shear (kips)	43

Foundation System

The results of the foundation based on the geotechnical report and foundation mapping or design drawings are shown below in Table 8. Additional information for the foundation analysis is provided within the Appendix.

Table 8 Foundation Analysis Summary

Structural Component	% capacity	Analysis Result
Foundation	78.4	Pass

Appendix

tnxTower SBA Communications Corp. 8051 Congress Avenue Boca Raton, FL, 33487 Phone: (561) 226-9452 FAX: 561) 322-2939	Job CT01105-VZW-011816	Page 1 of 26
	Project APP ID 29689, v2	Date 14:08:15 01/20/16
	Client Verizon	Designed by dtrotsek

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 193.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 5.00 ft at the top and 22.00 ft at the base.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in New London County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 64 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

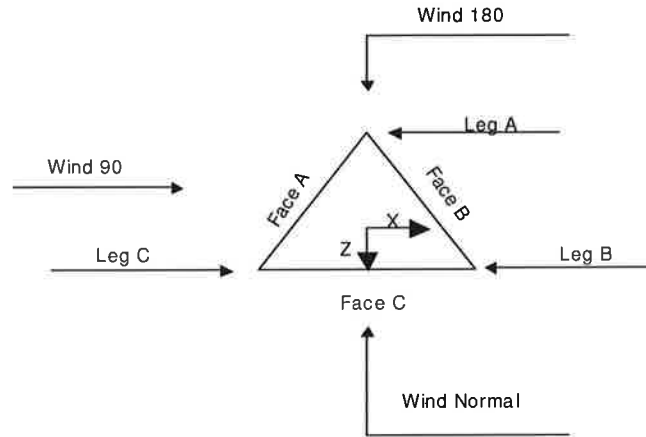
Stress ratio used in tower member design is 1.333.

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

Options

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys √ Escalate Ice Always Use Max Kz Use Special Wind Profile √ Include Bolts In Member Capacity Leg Bolts Are At Top Of Section √ Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area √ Use Clear Spans For KL/r Retension Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder | <ul style="list-style-type: none"> Use ASCE 10 X-Brace Ly Rules √ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA √ SR Leg Bolts Resist Compression √ All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feed Line Torque √ Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <li style="text-align: center;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets |
|--|--|---|

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Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	193.00-185.00			5.00	1	8.00
T2	185.00-170.00			5.00	1	15.00
T3	170.00-160.00			5.00	1	10.00
T4	160.00-140.00			6.00	1	20.00
T5	140.00-120.00			8.00	1	20.00
T6	120.00-100.00			10.00	1	20.00
T7	100.00-80.00			12.00	1	20.00
T8	80.00-60.00			14.00	1	20.00
T9	60.00-40.00			16.00	1	20.00
T10	40.00-20.00			18.00	1	20.00
T11	20.00-0.00			20.00	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	193.00-185.00	2.38	X Brace	No	Steps	5.2500	5.2500
T2	185.00-170.00	2.38	X Brace	No	Steps	4.5000	4.5000
T3	170.00-160.00	10.00	X Brace	No	No	0.0000	0.0000
T4	160.00-140.00	10.00	X Brace	No	No	0.0000	0.0000

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Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T5	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T6	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T7	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T8	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T9	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T10	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T11	20.00-0.00	20.00	X Brace	No	No	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 193.00-185.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T2 185.00-170.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T3 170.00-160.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 160.00-140.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T5 140.00-120.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T6 120.00-100.00	Truss Leg	Pirod 105218	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T7 100.00-80.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3x3x5/16	A36 (36 ksi)
T8 80.00-60.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T9 60.00-40.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T10 40.00-20.00	Truss Leg	Pirod 105220	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T11 20.00-0.00	Truss Leg	Pirod 112738	A572-50 (50 ksi)	Double Equal Angle	2L3 1/2x3 1/2x5/16x1	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 193.00-185.00	Solid Round	1 1/4	A572-50 (50 ksi)	Solid Round	1 1/4	A572-50 (50 ksi)
T2 185.00-170.00	Solid Round	1 1/4	A572-50 (50 ksi)	Solid Round	1 1/4	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

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Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹							
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
ft										
T5 140.00-120.00	Yes	No	1	1	1	1	1	1	1	1
T6 120.00-100.00	Yes	No	1	1	1	1	1	1	1	1
T7 100.00-80.00	Yes	No	1	1	1	1	1	1	1	1
T8 80.00-60.00	Yes	No	1	1	1	1	1	1	1	1
T9 60.00-40.00	Yes	No	1	1	1	1	1	1	1	1
T10 40.00-20.00	Yes	No	1	1	1	1	1	1	1	1
T11 20.00-0.00	Yes	No	1	1	1	1	1	1	1	1

¹Note: 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	Leg Panels	Truss-Leg K Factors			
		Truss-Legs Used As Leg Members		Truss-Legs Used As Inner Members	
		X Brace Diagonals	Z Brace Diagonals	Leg Panels	X Brace Diagonals
T3 170.00-160.00	1	0.5	0.85	1	0.5
T4 160.00-140.00	1	0.5	0.85	1	0.5
T5 140.00-120.00	1	0.5	0.85	1	0.5
T6 120.00-100.00	1	0.5	0.85	1	0.5
T7 100.00-80.00	1	0.5	0.85	1	0.5
T8 80.00-60.00	1	0.5	0.85	1	0.5
T9 60.00-40.00	1	0.5	0.85	1	0.5
T10 40.00-20.00	1	0.5	0.85	1	0.5
T11 20.00-0.00	1	0.5	0.85	1	0.5

Tower Section Geometry (cont'd)

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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 ***	C	No	Ar (Leg)	193.00 - 5.00	0.0000	0.15	12	6	0.5000	1.9800		1.04
1 5/8	A	Yes	Ar (CfAe)	182.00 - 5.00	0.0000	0.3	3	3	0.5000	1.9800		1.04
5/8"	A	Yes	Ar (CfAe)	182.00 - 5.00	0.0000	0.25	2	2	0.5000	0.8800		0.40
3/4" DC	A	Yes	Ar (CfAe)	182.00 - 5.00	0.0000	0.2	8	8	0.5000	0.9950		0.47
Power ***												
1 5/8 ***	B	No	Ar (Leg)	175.00 - 5.00	0.0000	0.15	6	6	0.5000	1.9800		1.04
1 5/8 ***	C	Yes	Ar (CfAe)	162.00 - 5.00	0.0000	-0.2	12	12	0.5000	1.9800		1.04
1/2 ***	A	Yes	Ar (CfAe)	30.00 - 5.00	0.0000	-0.4	2	2	0.5000	0.5800		0.25
Feedline Ladder (Af)	A	Yes	Af (CfAe)	182.00 - 5.00	0.0000	0.25	1	1	3.0000	1.5000	6.0000	8.40
Feedline Ladder (Af) ***	C	Yes	Af (CfAe)	193.00 - 5.00	0.0000	-0.2	1	1	3.0000	1.5000	6.0000	8.40
1-5/8" Fiber ***	C	Yes	Ar (CfAe)	162.00 - 5.00	2.0000	-0.25	2	2	0.5000	1.9800		1.04
3/8"	C	Yes	Ar (CfAe)	100.00 - 5.00	0.0000	-0.28	1	1	0.3750	0.3750		0.18

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	193.00-185.00	A	7.920	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	7.920	1.000	0.000	0.000	0.17
T2	185.00-170.00	A	30.510	1.500	0.000	0.000	0.19
		B	4.950	0.000	0.000	0.000	0.03
		C	19.800	1.875	0.000	0.000	0.31
T3	170.00-160.00	A	22.950	1.250	0.000	0.000	0.16
		B	9.900	0.000	0.000	0.000	0.06
		C	24.420	1.250	0.000	0.000	0.24
T4	160.00-140.00	A	45.900	2.500	0.000	0.000	0.32
		B	19.800	0.000	0.000	0.000	0.12
		C	85.800	2.500	0.000	0.000	0.71
T5	140.00-120.00	A	45.900	2.500	0.000	0.000	0.32
		B	19.800	0.000	0.000	0.000	0.12
		C	85.800	2.500	0.000	0.000	0.71
T6	120.00-100.00	A	45.900	2.500	0.000	0.000	0.32
		B	19.800	0.000	0.000	0.000	0.12
		C	85.800	2.500	0.000	0.000	0.71
T7	100.00-80.00	A	45.900	2.500	0.000	0.000	0.32
		B	19.800	0.000	0.000	0.000	0.12
		C	86.425	2.500	0.000	0.000	0.71
T8	80.00-60.00	A	45.900	2.500	0.000	0.000	0.32
		B	19.800	0.000	0.000	0.000	0.12
		C	86.425	2.500	0.000	0.000	0.71
T9	60.00-40.00	A	45.900	2.500	0.000	0.000	0.32

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Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T10	40.00-20.00	B	19.800	0.000	0.000	0.000	0.12
		C	86.425	2.500	0.000	0.000	0.71
		A	46.867	2.500	0.000	0.000	0.33
T11	20.00-0.00	B	19.800	0.000	0.000	0.000	0.12
		C	86.425	2.500	0.000	0.000	0.71
		A	35.875	1.875	0.000	0.000	0.25
		B	14.850	0.000	0.000	0.000	0.09
		C	64.819	1.875	0.000	0.000	0.53

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	193.00-185.00	A	0.616	2.142	8.267	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		2.142	9.815	0.000	0.000	0.34
T2	185.00-170.00	A	0.612	11.531	34.621	0.000	0.000	0.41
		B		1.335	5.167	0.000	0.000	0.09
		C		5.340	23.561	0.000	0.000	0.63
T3	170.00-160.00	A	0.607	8.906	26.261	0.000	0.000	0.34
		B		2.661	10.333	0.000	0.000	0.18
		C		6.386	27.551	0.000	0.000	0.50
T4	160.00-140.00	A	0.600	17.720	52.507	0.000	0.000	0.67
		B		5.299	20.667	0.000	0.000	0.35
		C		21.195	94.766	0.000	0.000	1.65
T5	140.00-120.00	A	0.589	17.584	52.485	0.000	0.000	0.67
		B		5.265	20.667	0.000	0.000	0.35
		C		21.059	94.743	0.000	0.000	1.64
T6	120.00-100.00	A	0.578	17.428	52.459	0.000	0.000	0.66
		B		5.226	20.667	0.000	0.000	0.34
		C		20.903	94.717	0.000	0.000	1.63
T7	100.00-80.00	A	0.564	17.245	52.428	0.000	0.000	0.65
		B		5.180	20.667	0.000	0.000	0.34
		C		23.225	94.687	0.000	0.000	1.63
T8	80.00-60.00	A	0.547	17.021	52.391	0.000	0.000	0.64
		B		5.124	20.667	0.000	0.000	0.34
		C		22.945	94.649	0.000	0.000	1.62
T9	60.00-40.00	A	0.526	16.733	52.343	0.000	0.000	0.63
		B		5.052	20.667	0.000	0.000	0.33
		C		22.584	94.601	0.000	0.000	1.59
T10	40.00-20.00	A	0.500	17.708	53.186	0.000	0.000	0.64
		B		4.967	20.667	0.000	0.000	0.32
		C		22.158	94.544	0.000	0.000	1.57
T11	20.00-0.00	A	0.500	14.269	40.565	0.000	0.000	0.49
		B		3.725	15.500	0.000	0.000	0.24
		C		16.619	70.908	0.000	0.000	1.18

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	193.00-185.00	A	0.000	0.000	0.000	0.000

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Section	Elevation	Face	A_R	A_R	A_F	A_F
	ft		ft ²	Ice ft ²	ft ²	Ice ft ²
		B	0.000	0.000	0.000	0.000
		C	0.113	0.456	0.000	0.000
T2	185.00-170.00	A	1.624	5.556	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.214	0.858	0.000	0.000
T3	170.00-160.00	A	0.000	0.943	1.235	1.944
		B	0.000	0.000	0.000	0.000
		C	0.000	0.347	0.507	0.716
T4	160.00-140.00	A	0.000	1.571	2.502	3.931
		B	0.000	0.000	0.000	0.000
		C	0.000	2.263	4.261	5.660
T5	140.00-120.00	A	0.000	1.318	2.141	3.354
		B	0.000	0.000	0.000	0.000
		C	0.000	1.901	3.647	4.837
T6	120.00-100.00	A	0.000	1.163	1.935	3.019
		B	0.000	0.000	0.000	0.000
		C	0.000	1.680	3.294	4.361
T7	100.00-80.00	A	0.000	1.055	1.805	2.806
		B	0.000	0.000	0.000	0.000
		C	0.000	1.586	3.113	4.219
T8	80.00-60.00	A	0.000	0.970	2.006	3.102
		B	0.000	0.000	0.000	0.000
		C	0.000	1.461	3.459	4.673
T9	60.00-40.00	A	0.000	0.893	1.936	2.975
		B	0.000	0.000	0.000	0.000
		C	0.000	1.349	3.339	4.490
T10	40.00-20.00	A	0.000	0.863	1.949	3.021
		B	0.000	0.000	0.000	0.000
		C	0.000	1.243	3.252	4.351
T11	20.00-0.00	A	0.000	0.414	0.922	1.451
		B	0.000	0.000	0.000	0.000
		C	0.000	0.569	1.490	1.993

Feed Line Center of Pressure

Section	Elevation	CP_x	CP_z	CP_x	CP_z
	ft	in	in	Ice in	Ice in
T1	193.00-185.00	-4.5295	3.2227	-2.8193	2.0793
T2	185.00-170.00	-3.5011	-0.5658	-2.1798	0.1057
T3	170.00-160.00	-0.3858	0.7725	-0.2426	0.6769
T4	160.00-140.00	1.8646	4.1335	1.2411	2.9645
T5	140.00-120.00	2.3967	5.1748	1.6175	3.7344
T6	120.00-100.00	2.8578	6.0710	1.9523	4.4155
T7	100.00-80.00	3.3502	6.9434	2.4831	5.2503
T8	80.00-60.00	3.6771	7.6176	2.7693	5.8648
T9	60.00-40.00	4.0348	8.3089	3.0717	6.4681
T10	40.00-20.00	4.1157	9.1948	3.2278	7.2061
T11	20.00-0.00	3.5819	8.5497	2.9014	6.7233

Discrete Tower Loads

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						ft
			ft	ft	°	ft	ft ²	ft ²	K	
(3) RR90-17-02DP w/ Mount Pipe	A	From Leg	3.00		0.0000	193.00	No Ice	4.59	3.32	0.03
			0.00				1/2" Ice	5.09	4.09	0.07
			2.00				1" Ice	5.58	4.78	0.12
							2" Ice	6.59	6.23	0.22
							4" Ice	8.73	9.31	0.56
(3) RR90-17-02DP w/ Mount Pipe	B	From Leg	3.00		0.0000	193.00	No Ice	4.59	3.32	0.03
			0.00				1/2" Ice	5.09	4.09	0.07
			2.00				1" Ice	5.58	4.78	0.12
							2" Ice	6.59	6.23	0.22
							4" Ice	8.73	9.31	0.56
(3) RR90-17-02DP w/ Mount Pipe	C	From Leg	3.00		0.0000	193.00	No Ice	4.59	3.32	0.03
			0.00				1/2" Ice	5.09	4.09	0.07
			2.00				1" Ice	5.58	4.78	0.12
							2" Ice	6.59	6.23	0.22
							4" Ice	8.73	9.31	0.56
(1) Low Profile Platform	A	None			0.0000	193.00	No Ice	24.33	24.33	1.65
							1/2" Ice	30.22	30.22	2.03
							1" Ice	36.11	36.11	2.41
							2" Ice	47.89	47.89	3.18
							4" Ice	71.45	71.45	4.72

Powerwave 7770 w/ Mount Pipe	A	From Leg	3.00		0.0000	182.00	No Ice	6.46	4.59	0.06
			0.00				1/2" Ice	7.14	5.66	0.11
			0.00				1" Ice	7.73	6.45	0.17
							2" Ice	8.94	8.06	0.31
							4" Ice	11.51	11.64	0.72
Powerwave 7770 w/ Mount Pipe	B	From Leg	3.00		0.0000	182.00	No Ice	6.46	4.59	0.06
			0.00				1/2" Ice	7.14	5.66	0.11
			0.00				1" Ice	7.73	6.45	0.17
							2" Ice	8.94	8.06	0.31
							4" Ice	11.51	11.64	0.72
Powerwave 7770 w/ Mount Pipe	C	From Leg	3.00		0.0000	182.00	No Ice	6.46	4.59	0.06
			0.00				1/2" Ice	7.14	5.66	0.11
			0.00				1" Ice	7.73	6.45	0.17
							2" Ice	8.94	8.06	0.31
							4" Ice	11.51	11.64	0.72
HPA-65R-BUU-H8 w/ Mount Pipe	A	From Leg	3.00		0.0000	182.00	No Ice	13.30	9.18	0.09
			0.00				1/2" Ice	13.99	10.48	0.19
			0.00				1" Ice	14.70	11.49	0.29
							2" Ice	16.14	13.55	0.52
							4" Ice	19.13	17.87	1.16
HPA-65R-BUU-H8 w/ Mount Pipe	B	From Leg	3.00		0.0000	182.00	No Ice	13.30	9.18	0.09
			0.00				1/2" Ice	13.99	10.48	0.19
			0.00				1" Ice	14.70	11.49	0.29
							2" Ice	16.14	13.55	0.52
							4" Ice	19.13	17.87	1.16
HPA-65R-BUU-H8 w/ Mount Pipe	C	From Leg	3.00		0.0000	182.00	No Ice	13.30	9.18	0.09
			0.00				1/2" Ice	13.99	10.48	0.19
			0.00				1" Ice	14.70	11.49	0.29
							2" Ice	16.14	13.55	0.52
							4" Ice	19.13	17.87	1.16
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	3.00		0.0000	182.00	No Ice	10.60	7.18	0.11
			0.00				1/2" Ice	11.27	8.36	0.18
			0.00				1" Ice	11.91	9.26	0.27
							2" Ice	13.21	11.09	0.47
							4" Ice	15.93	15.15	1.01
OPA-65R-LCUU-H6 w/	B	From Leg	3.00		0.0000	182.00	No Ice	10.60	7.18	0.11

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	Client		Verizon		Designed by	dtrotsek

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz Lateral	Vert					
Mount Pipe			0.00						
			0.00			1/2" Ice	11.27	8.36	0.18
						1" Ice	11.91	9.26	0.27
						2" Ice	13.21	11.09	0.47
						4" Ice	15.93	15.15	1.01
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	3.00	0.0000	182.00	No Ice	10.60	7.18	0.11
			0.00			1/2" Ice	11.27	8.36	0.18
			0.00			1" Ice	11.91	9.26	0.27
						2" Ice	13.21	11.09	0.47
						4" Ice	15.93	15.15	1.01
(2) LGP21401	A	From Leg	3.00	0.0000	182.00	No Ice	0.00	0.23	0.01
			0.00			1/2" Ice	0.00	0.31	0.02
			0.00			1" Ice	0.00	0.40	0.03
						2" Ice	0.00	0.61	0.05
						4" Ice	0.00	1.12	0.14
(2) LGP21401	B	From Leg	3.00	0.0000	182.00	No Ice	0.00	0.23	0.01
			0.00			1/2" Ice	0.00	0.31	0.02
			0.00			1" Ice	0.00	0.40	0.03
						2" Ice	0.00	0.61	0.05
						4" Ice	0.00	1.12	0.14
(2) LGP21401	C	From Leg	3.00	0.0000	182.00	No Ice	0.00	0.23	0.01
			0.00			1/2" Ice	0.00	0.31	0.02
			0.00			1" Ice	0.00	0.40	0.03
						2" Ice	0.00	0.61	0.05
						4" Ice	0.00	1.12	0.14
(2) RRUS 11	A	From Leg	3.00	0.0000	182.00	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00			1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
(2) RRUS 11	B	From Leg	3.00	0.0000	182.00	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00			1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
(2) RRUS 11	C	From Leg	3.00	0.0000	182.00	No Ice	3.25	1.37	0.05
			0.00			1/2" Ice	3.49	1.55	0.07
			0.00			1" Ice	3.74	1.74	0.10
						2" Ice	4.27	2.14	0.15
						4" Ice	5.43	3.04	0.31
RRUS 12	A	From Leg	3.00	0.0000	182.00	No Ice	3.67	1.49	0.06
			0.00			1/2" Ice	3.93	1.67	0.08
			0.00			1" Ice	4.19	1.87	0.11
						2" Ice	4.75	2.28	0.17
						4" Ice	5.96	3.21	0.34
RRUS 12	B	From Leg	3.00	0.0000	182.00	No Ice	3.67	1.49	0.06
			0.00			1/2" Ice	3.93	1.67	0.08
			0.00			1" Ice	4.19	1.87	0.11
						2" Ice	4.75	2.28	0.17
						4" Ice	5.96	3.21	0.34
RRUS 12	C	From Leg	3.00	0.0000	182.00	No Ice	3.67	1.49	0.06
			0.00			1/2" Ice	3.93	1.67	0.08
			0.00			1" Ice	4.19	1.87	0.11
						2" Ice	4.75	2.28	0.17
						4" Ice	5.96	3.21	0.34
RRUS A2	A	From Leg	3.00	0.0000	182.00	No Ice	2.41	0.53	0.02
			0.00			1/2" Ice	2.62	0.67	0.03
			0.00			1" Ice	2.84	0.81	0.05

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	Client	Verizon	Designed by	dtrotsek

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Lateral					
RRUS A2	B	From Leg	3.00	0.0000	182.00	2" Ice	3.30	1.11	0.09
						4" Ice	4.32	1.83	0.20
						No Ice	2.41	0.53	0.02
						1/2" Ice	2.62	0.67	0.03
						1" Ice	2.84	0.81	0.05
						2" Ice	3.30	1.11	0.09
RRUS A2	C	From Leg	3.00	0.0000	182.00	4" Ice	4.32	1.83	0.20
						No Ice	2.41	0.53	0.02
						1/2" Ice	2.62	0.67	0.03
						1" Ice	2.84	0.81	0.05
						2" Ice	3.30	1.11	0.09
						4" Ice	4.32	1.83	0.20
RRUS-32	A	From Leg	3.00	0.0000	182.00	No Ice	3.87	2.76	0.08
						1/2" Ice	4.15	3.02	0.10
						1" Ice	4.44	3.29	0.14
						2" Ice	5.06	3.85	0.21
						4" Ice	6.38	5.08	0.41
						No Ice	3.87	2.76	0.08
RRUS-32	B	From Leg	3.00	0.0000	182.00	1/2" Ice	4.15	3.02	0.10
						1" Ice	4.44	3.29	0.14
						2" Ice	5.06	3.85	0.21
						4" Ice	6.38	5.08	0.41
						No Ice	3.87	2.76	0.08
						1/2" Ice	4.15	3.02	0.10
RRUS-32	C	From Leg	3.00	0.0000	182.00	1" Ice	4.44	3.29	0.14
						2" Ice	5.06	3.85	0.21
						4" Ice	6.38	5.08	0.41
						No Ice	3.87	2.76	0.08
						1/2" Ice	4.15	3.02	0.10
						1" Ice	4.44	3.29	0.14
RRUS-E2	A	From Leg	3.00	0.0000	182.00	2" Ice	5.06	3.85	0.21
						4" Ice	5.96	3.21	0.34
						No Ice	3.67	1.49	0.06
						1/2" Ice	3.93	1.67	0.08
						1" Ice	4.19	1.87	0.11
						2" Ice	4.75	2.28	0.17
RRUS-E2	B	From Leg	3.00	0.0000	182.00	4" Ice	5.96	3.21	0.34
						No Ice	3.67	1.49	0.06
						1/2" Ice	3.93	1.67	0.08
						1" Ice	4.19	1.87	0.11
						2" Ice	4.75	2.28	0.17
						4" Ice	5.96	3.21	0.34
RRUS-E2	C	From Leg	3.00	0.0000	182.00	No Ice	3.67	1.49	0.06
						1/2" Ice	3.93	1.67	0.08
						1" Ice	4.19	1.87	0.11
						2" Ice	4.75	2.28	0.17
						4" Ice	5.96	3.21	0.34
						No Ice	3.67	1.49	0.06
(2) LGP21901	A	From Leg	3.00	0.0000	182.00	1/2" Ice	2.13	0.62	0.04
						1" Ice	2.33	0.75	0.06
						2" Ice	2.75	1.03	0.09
						4" Ice	3.69	1.69	0.19
						No Ice	1.95	0.50	0.03
						1/2" Ice	2.13	0.62	0.04
(2) LGP21901	B	From Leg	3.00	0.0000	182.00	1" Ice	2.33	0.75	0.06
						2" Ice	2.75	1.03	0.09
						4" Ice	3.69	1.69	0.19
						No Ice	1.95	0.50	0.03
						1/2" Ice	2.13	0.62	0.04
						1" Ice	2.33	0.75	0.06
(2) LGP21901	C	From Leg	3.00	0.0000	182.00	2" Ice	2.75	1.03	0.09
						4" Ice	3.69	1.69	0.19
						No Ice	1.95	0.50	0.03
						1/2" Ice	2.13	0.62	0.04
						1" Ice	2.33	0.75	0.06
						2" Ice	2.75	1.03	0.09
						4" Ice	3.69	1.69	0.19

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
1000860	A	From Leg	3.00	0.0000	182.00	No Ice	1.95	0.50	0.03
			0.00			1/2" Ice	2.13	0.62	0.04
			0.00			1" Ice	2.33	0.75	0.06
						2" Ice	2.75	1.03	0.09
						4" Ice	3.69	1.69	0.19
1000860	B	From Leg	3.00	0.0000	182.00	No Ice	1.95	0.50	0.03
			0.00			1/2" Ice	2.13	0.62	0.04
			0.00			1" Ice	2.33	0.75	0.06
						2" Ice	2.75	1.03	0.09
						4" Ice	3.69	1.69	0.19
1000860	C	From Leg	3.00	0.0000	182.00	No Ice	1.95	0.50	0.03
			0.00			1/2" Ice	2.13	0.62	0.04
			0.00			1" Ice	2.33	0.75	0.06
						2" Ice	2.75	1.03	0.09
						4" Ice	3.69	1.69	0.19
DC6-48-60-18-8F	B	From Leg	3.00	0.0000	182.00	No Ice	2.57	2.57	0.02
			0.00			1/2" Ice	2.80	2.80	0.04
			0.00			1" Ice	3.04	3.04	0.07
						2" Ice	3.54	3.54	0.13
						4" Ice	4.66	4.66	0.30
DC6-48-60-18-8F	C	From Leg	3.00	0.0000	182.00	No Ice	2.57	2.57	0.02
			0.00			1/2" Ice	2.80	2.80	0.04
			0.00			1" Ice	3.04	3.04	0.07
						2" Ice	3.54	3.54	0.13
						4" Ice	4.66	4.66	0.30
(3) 12.5' T-Frames (Commscope P/N: MTC3615)	C	None		0.0000	182.00	No Ice	49.30	49.30	2.29
						1/2" Ice	52.20	52.20	2.68
						1" Ice	55.10	55.10	3.07
						2" Ice	60.90	60.90	3.85
						4" Ice	72.50	72.50	5.41

(2) 6' Panel w/ Mount Pipe	A	From Leg	3.00	0.0000	175.00	No Ice	8.64	5.20	0.05
			0.00			1/2" Ice	9.29	6.36	0.11
			0.00			1" Ice	9.91	7.24	0.18
						2" Ice	11.18	9.03	0.34
						4" Ice	13.83	12.81	0.81
(2) 6' Panel w/ Mount Pipe	B	From Leg	3.00	0.0000	175.00	No Ice	8.64	5.20	0.05
			0.00			1/2" Ice	9.29	6.36	0.11
			0.00			1" Ice	9.91	7.24	0.18
						2" Ice	11.18	9.03	0.34
						4" Ice	13.83	12.81	0.81
(2) 6' Panel w/ Mount Pipe	C	From Leg	3.00	0.0000	175.00	No Ice	8.64	5.20	0.05
			0.00			1/2" Ice	9.29	6.36	0.11
			0.00			1" Ice	9.91	7.24	0.18
						2" Ice	11.18	9.03	0.34
						4" Ice	13.83	12.81	0.81
(3) T-Frames	C	None		0.0000	175.00	No Ice	18.91	18.91	0.85
						1/2" Ice	26.78	26.78	1.23
						1" Ice	34.65	34.65	1.62
						2" Ice	50.39	50.39	2.38
						4" Ice	81.87	81.87	3.91

PC1NOF-0190B-002M	A	From Leg	0.00	0.0000	30.00	No Ice	0.03	0.03	0.00
			0.00			1/2" Ice	0.07	0.07	0.00
			0.00			1" Ice	0.12	0.12	0.00
						2" Ice	0.25	0.25	0.01

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	6.44	3.16	0.19
						4" Ice	8.08	4.32	0.33
						No Ice	0.37	0.08	0.00
						1/2" Ice	0.45	0.14	0.01
						1" Ice	0.54	0.20	0.01
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
						No Ice	0.37	0.08	0.00
						1/2" Ice	0.45	0.14	0.01
						1" Ice	0.54	0.20	0.01
(2) FD9R6004/2C-3L	C	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
						No Ice	0.37	0.08	0.00
						1/2" Ice	0.45	0.14	0.01
						1" Ice	0.54	0.20	0.01
KS24019-L112A	A	From Leg	4.00 0.00 0.00	0.0000	100.00	2" Ice	0.75	0.34	0.02
						4" Ice	1.28	0.74	0.06
						No Ice	0.16	0.16	0.01
						1/2" Ice	0.22	0.22	0.01
						1" Ice	0.30	0.30	0.01
*** Empty Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	0.48	0.48	0.02
						4" Ice	0.95	0.95	0.06
						No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
Empty Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
						No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
Empty Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
						No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						1" Ice	2.29	2.29	0.05
QUAD656C0000x	A	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	3.06	3.06	0.09
						4" Ice	4.70	4.70	0.23
						No Ice	13.24	5.62	0.05
						1/2" Ice	14.01	6.32	0.13
						1" Ice	14.78	7.02	0.21
QUAD656C0000x	B	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	16.32	8.42	0.36
						4" Ice	19.40	11.22	0.66
						No Ice	13.24	5.62	0.05
						1/2" Ice	14.01	6.32	0.13
						1" Ice	14.78	7.02	0.21
QUAD656C0000x	C	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	16.32	8.42	0.36
						4" Ice	19.40	11.22	0.66
						No Ice	13.24	5.62	0.05
						1/2" Ice	14.01	6.32	0.13
						1" Ice	14.78	7.02	0.21
RRH2x60-AWS	A	From Leg	4.00 0.00 0.00	0.0000	162.00	2" Ice	16.32	8.42	0.36
						4" Ice	19.40	11.22	0.66
						No Ice	3.50	1.82	0.06
						1/2" Ice	3.89	2.17	0.08
						1" Ice	4.28	2.52	0.10
						2" Ice	5.06	3.22	0.14

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _{Front}	C _A A _{Side}	Weight
			Horz	Vert					
RRH2x60-AWS	B	From Leg	4.00	0.0000	162.00	4" Ice	6.62	4.62	0.22
						No Ice	3.50	1.82	0.06
						1/2" Ice	3.89	2.17	0.08
						1" Ice	4.28	2.52	0.10
						2" Ice	5.06	3.22	0.14
RRH2x60-AWS	C	From Leg	4.00	0.0000	162.00	4" Ice	6.62	4.62	0.22
						No Ice	3.50	1.82	0.06
						1/2" Ice	3.89	2.17	0.08
						1" Ice	4.28	2.52	0.10
						2" Ice	5.06	3.22	0.14
RRH2x60-1900	A	From Leg	4.00	0.0000	162.00	4" Ice	6.62	4.62	0.22
						No Ice	1.87	1.22	0.04
						1/2" Ice	2.14	1.44	0.06
						1" Ice	2.41	1.66	0.08
						2" Ice	2.95	2.10	0.11
RRH2x60-1900	B	From Leg	4.00	0.0000	162.00	4" Ice	4.03	2.98	0.18
						No Ice	1.87	1.22	0.04
						1/2" Ice	2.14	1.44	0.06
						1" Ice	2.41	1.66	0.08
						2" Ice	2.95	2.10	0.11
RRH2x60-1900	C	From Leg	4.00	0.0000	162.00	4" Ice	4.03	2.98	0.18
						No Ice	1.87	1.22	0.04
						1/2" Ice	2.14	1.44	0.06
						1" Ice	2.41	1.66	0.08
						2" Ice	2.95	2.10	0.11
RRH2x60-700	A	From Leg	4.00	0.0000	162.00	4" Ice	4.03	2.98	0.18
						No Ice	3.50	1.82	0.06
						1/2" Ice	3.89	2.17	0.08
						1" Ice	4.28	2.52	0.10
						2" Ice	5.06	3.22	0.14
RRH2x60-700	B	From Leg	4.00	0.0000	162.00	4" Ice	6.62	4.62	0.22
						No Ice	3.50	1.82	0.06
						1/2" Ice	3.89	2.17	0.08
						1" Ice	4.28	2.52	0.10
						2" Ice	5.06	3.22	0.14
RRH2x60-700	C	From Leg	4.00	0.0000	162.00	4" Ice	6.62	4.62	0.22
						No Ice	3.50	1.82	0.06
						1/2" Ice	3.89	2.17	0.08
						1" Ice	4.28	2.52	0.10
						2" Ice	5.06	3.22	0.14
						4" Ice	6.62	4.62	0.22

Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in ²	in ²	K	K	in	in	in ²
Pirod 105244	1026.8606	1925.2161	0.54	0.28	7.1310	13.3696	3.6816
Pirod 105217	2130.7479	3873.0887	0.59	0.58	7.3984	13.4482	5.3014
Pirod 105217	2130.7479	3835.1536	0.59	0.57	7.3984	13.3165	5.3014

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Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in ²	in ²	K	K	in	in	in ²
Pirod 105218	2263.4687	3974.3504	0.72	0.57	7.8593	13.7998	7.2158
Pirod 105219	2441.8688	4190.6548	0.90	0.58	8.4787	14.5509	9.4248
Pirod 105219	2441.8688	4123.8866	0.90	0.55	8.4787	14.3191	9.4248
Pirod 105220	2578.8005	4233.9108	1.07	0.54	8.9542	14.7011	11.9282
Pirod 105220	2578.8005	4132.5504	1.07	0.50	8.9542	14.3491	11.9282
Pirod 112738	3389.3479	5023.2440	1.68	0.67	11.7686	17.4418	14.7262

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 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	193 - 185	7.657	31	0.3833	0.0200
T2	185 - 170	7.006	31	0.3816	0.0196
T3	170 - 160	5.801	31	0.3603	0.0177
T4	160 - 140	5.045	31	0.3355	0.0164
T5	140 - 120	3.691	31	0.2845	0.0143
T6	120 - 100	2.589	31	0.2209	0.0111
T7	100 - 80	1.745	31	0.1700	0.0089
T8	80 - 60	1.090	31	0.1300	0.0067
T9	60 - 40	0.605	31	0.0894	0.0048
T10	40 - 20	0.270	31	0.0574	0.0029
T11	20 - 0	0.060	31	0.0252	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.00	(3) RR90-17-02DP w/ Mount Pipe	31	7.657	0.3833	0.0200	Inf
182.00	Powerwave 7770 w/ Mount Pipe	31	6.762	0.3794	0.0193	130397
175.00	(2) 6' Panel w/ Mount Pipe	31	6.196	0.3702	0.0185	37773
162.00	(3) T-Frames	31	5.192	0.3406	0.0165	24056
100.00	KS24019-L112A	31	1.745	0.1700	0.0089	27569
30.00	PC1N0F-0190B-002M	31	0.146	0.0410	0.0019	32118

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	193 - 185	22.088	6	1.1047	0.0578
T2	185 - 170	20.208	6	1.0999	0.0567
T3	170 - 160	16.732	6	1.0394	0.0512
T4	160 - 140	14.551	6	0.9675	0.0475
T5	140 - 120	10.646	6	0.8205	0.0413
T6	120 - 100	7.468	6	0.6371	0.0319
T7	100 - 80	5.034	6	0.4904	0.0257
T8	80 - 60	3.144	6	0.3750	0.0194
T9	60 - 40	1.746	6	0.2579	0.0139
T10	40 - 20	0.779	6	0.1655	0.0083
T11	20 - 0	0.174	6	0.0726	0.0028

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
193.00	(3) RR90-17-02DP w/ Mount Pipe	6	22.088	1.1047	0.0578	692248
182.00	Powerwave 7770 w/ Mount Pipe	6	19.504	1.0937	0.0559	46530
175.00	(2) 6' Panel w/ Mount Pipe	6	17.872	1.0676	0.0534	13242

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
162.00	(3) T-Frames	6	14.976	0.9824	0.0478	8379
100.00	KS24019-L112A	6	5.034	0.4904	0.0257	9560
30.00	PC1N0F-0190B-002M	6	0.422	0.1182	0.0054	11141

Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt	Allowable Load	Ratio Load Allowable	Allowable Ratio	Criteria
	ft			in		K	K			
T1	193	Leg	A325N	0.6250	5	1.22	12.89	0.095 ✓	1.333	Bolt DS
T2	185	Leg	A325N	1.0000	6	5.69	34.50	0.165 ✓	1.333	Bolt Tension
T3	170	Leg	A325N	1.0000	6	7.09	34.55	0.205 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	7.42	7.75	0.958 ✓	1.333	Member Block Shear
T4	160	Leg	A325N	1.0000	6	15.45	34.56	0.447 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.56	8.43	1.135 ✓	1.333	Member Block Shear
T5	140	Leg	A325N	1.0000	6	22.66	34.56	0.656 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	8.63	8.43	1.024 ✓	1.333	Member Block Shear
T6	120	Leg	A325N	1.0000	6	29.03	34.56	0.840 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	8.64	14.05	0.615 ✓	1.333	Member Block Shear
T7	100	Leg	A325N>1'	1.2500	6	34.81	42.52	0.819 ✓	1.333	Bolt Tension
		Diagonal	A325N>1'	1.2500	1	8.79	14.95	0.588 ✓	1.333	Member Block Shear
T8	80	Leg	A325N>1'	1.2500	6	40.16	42.52	0.944 ✓	1.333	Bolt Tension
		Diagonal	A325N>1'	1.2500	1	9.33	17.22	0.542 ✓	1.333	Member Block Shear
T9	60	Leg	A325N>1'	1.2500	6	45.21	42.52	1.063 ✓	1.333	Bolt Tension
		Diagonal	A325N>1'	1.2500	1	9.73	17.22	0.565 ✓	1.333	Member Block Shear
T10	40	Leg	A325N>1'	1.2500	6	50.29	42.52	1.183 ✓	1.333	Bolt Tension
		Diagonal	A325N>1'	1.2500	1	10.57	17.22	0.614 ✓	1.333	Member Block Shear
T11	20	Leg	A687	2.0000	6	52.41	129.59	0.404 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	2	8.41	23.79	0.354 ✓	1.333	Member Block Shear

Compression Checks

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Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
T1	193 - 185	2	8.00	2.38	57.0 K=1.00	23.223	3.1416	-6.12	72.96	0.084 ✓
T2	185 - 170	2	15.00	2.38	57.0 K=1.00	23.223	3.1416	-40.86	72.96	0.560 ✓
T3	170 - 160	Pirod 105244	10.02	10.02	45.4 K=1.00	25.051	3.6816	-49.60	92.23	0.538 ✓
T4	160 - 140	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-103.40	138.54	0.746 ✓
T5	140 - 120	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-149.38	138.54	1.078 ✓
T6	120 - 100	Pirod 105218	20.03	10.02	32.4 K=1.00	26.848	7.2158	-190.97	193.73	0.986 ✓
T7	100 - 80	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-229.63	257.78	0.891 ✓
T8	80 - 60	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-266.05	257.78	1.032 ✓
T9	60 - 40	Pirod 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-301.33	330.69	0.911 ✓
T10	40 - 20	Pirod 105220	20.03	10.02	25.2 K=1.00	27.723	11.9282	-337.33	330.69	1.020 ✓
T11	20 - 0	Pirod 112738	20.03	20.03	32.6 K=1.00	26.826	14.7262	-351.41	395.05	0.890 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L _d ft	Kl/r	F _a ksi	A in ²	Actual V K	Allow. V _a K	Stress Ratio
T3	170 - 160	0.5	1.48	121.0	10.193	0.1963	1.80	2.24	0.806 ✓
T4	160 - 140	0.5	1.47	120.0	10.279	0.1963	0.26	2.26	0.114 ✓
T5	140 - 120	0.5	1.47	120.0	10.279	0.1963	0.28	2.26	0.125 ✓
T6	120 - 100	0.5	1.46	119.0	10.423	0.1963	0.22	2.29	0.094 ✓
T7	100 - 80	0.625	1.45	94.4	13.671	0.3068	0.20	4.69	0.043 ✓
T8	80 - 60	0.625	1.45	94.4	13.671	0.3068	0.21	4.69	0.045 ✓
T9	60 - 40	0.625	1.43	93.6	13.766	0.3068	0.45	4.73	0.094 ✓
T10	40 - 20	0.625	1.43	93.6	13.766	0.3068	2.85	4.73	0.603 ✓
T11	20 - 0	0.75	1.73	93.9	16.080	0.4418	1.37	9.78	0.140 ✓

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Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _n ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	193 - 185	1	5.54	2.68	115.6 K=0.90	11.179	0.7854	-1.31	8.78	0.149 ✓
T2	185 - 170	1	5.54	2.68	115.6 K=0.90	11.179	0.7854	-5.13	8.78	0.584 ✓
T3	170 - 160	L2 1/2x2 1/2x3/16	11.42	5.19	125.8 K=1.00	9.431	0.9020	-8.05	8.51	0.946 ✓
T4	160 - 140	L3x3x3/16	11.93	5.59	114.4 K=1.02	10.952	1.0900	-9.61	11.94	0.805 ✓
T5	140 - 120	L3x3x3/16	13.80	6.54	131.6 K=1.00	8.625	1.0900	-8.78	9.40	0.934 ✓
T6	120 - 100	L3x3x5/16	15.24	7.29	148.5 K=1.00	6.769	1.7800	-8.91	12.05	0.739 ✓
T7	100 - 80	L3x3x5/16	16.80	8.09	164.8 K=1.00	5.496	1.7800	-9.12	9.78	0.932 ✓
T8	80 - 60	L3 1/2x3 1/2x5/16	18.45	8.93	155.2 K=1.00	6.196	2.0900	-9.66	12.95	0.746 ✓
T9	60 - 40	L3 1/2x3 1/2x5/16	20.16	9.79	170.3 K=1.00	5.150	2.0900	-9.88	10.76	0.917 ✓
T10	40 - 20	L3 1/2x3 1/2x5/16	21.03	10.24	178.1 K=1.00	4.710	2.0900	-10.93	9.84	1.111 ✓
T11	20 - 0	2L3 1/2x3 1/2x5/16x1	29.01	13.87	145.7 K=0.95	7.031	4.1797	-19.21	29.39	0.654 ✓

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _n ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	193 - 185	7/8	5.00	4.83	185.6 K=0.70	4.335	0.6013	-0.15	2.61	0.058 ✓
T2	185 - 170	7/8	5.00	4.83	185.6 K=0.70	4.335	0.6013	-0.35	2.61	0.133 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _n ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	193 - 185	1 1/4	5.00	4.83	129.9 K=0.70	8.847	1.2272	-0.62	10.86	0.057 ✓
T2	185 - 170	1 1/4	5.00	4.83	129.9 K=0.70	8.847	1.2272	-0.22	10.86	0.021 ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
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Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
T1	193 - 185	1 1/4	5.00	4.83	129.9 K=0.70	8.847	1.2272	-0.73	10.86	0.067 ✓
T2	185 - 170	1 1/4	5.00	4.83	129.9 K=0.70	8.847	1.2272	-0.96	10.86	0.088 ✓

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
T2	185 - 170	1 1/4	5.00	4.83	129.9 K=0.70	8.847	1.2272	-0.30	10.86	0.028 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P/P _a
T1	193 - 185	2	8.00	2.38	57.0	32.500	1.7942	4.29	58.31	0.074 # ✓
T2	185 - 170	2	15.00	2.38	57.0	30.000	3.1416	34.16	94.25	0.362 ✓
T3	170 - 160	Pirod 105244	10.02	10.02	45.4	30.000	3.6816	42.55	110.45	0.385 ✓
T4	160 - 140	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	92.70	159.04	0.583 ✓
T5	140 - 120	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	135.99	159.04	0.855 ✓
T6	120 - 100	Pirod 105218	20.03	10.02	32.4	30.000	7.2158	174.15	216.47	0.804 ✓
T7	100 - 80	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	208.84	282.74	0.739 ✓
T8	80 - 60	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	240.96	282.74	0.852 ✓
T9	60 - 40	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	271.27	357.85	0.758 ✓

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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 $\frac{P}{P_a}$
T10	40 - 20	Pirod 105220	20.03	10.02	25.2	30.000	11.9282	301.73	357.85	0.843
T11	20 - 0	Pirod 112738	20.03	20.03	32.6	30.000	14.7262	314.45	441.79	0.712

Based on net area of leg in section below

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L _d ft	Kl/r	F _a ksi	A in ²	Actual V K	Allow. V _a K	Stress Ratio
T3	170 - 160	0.5	1.48	121.0	10.193	0.1963	1.80	2.24	0.806
T4	160 - 140	0.5	1.47	120.0	10.279	0.1963	0.26	2.26	0.114
T5	140 - 120	0.5	1.47	120.0	10.279	0.1963	0.28	2.26	0.125
T6	120 - 100	0.5	1.46	119.0	10.423	0.1963	0.22	2.29	0.094
T7	100 - 80	0.625	1.45	94.4	13.671	0.3068	0.20	4.69	0.043
T8	80 - 60	0.625	1.45	94.4	13.671	0.3068	0.21	4.69	0.045
T9	60 - 40	0.625	1.43	93.6	13.766	0.3068	0.45	4.73	0.094
T10	40 - 20	0.625	1.43	93.6	13.766	0.3068	2.85	4.73	0.603
T11	20 - 0	0.75	1.73	93.9	16.080	0.4418	1.37	9.78	0.140

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	193 - 185	1	5.54	2.68	128.4	30.000	0.7854	1.28	23.56	0.054
T2	185 - 170	1	5.54	2.68	128.4	30.000	0.7854	4.99	23.56	0.212
T3	170 - 160	L2 1/2x2 1/2x3/16	11.42	5.19	80.1	29.000	0.5183	7.42	15.03	0.494
T4	160 - 140	L3x3x3/16	11.93	5.59	71.5	29.000	0.6593	9.56	19.12	0.500
T5	140 - 120	L3x3x3/16	13.13	6.22	79.5	29.000	0.6593	8.63	19.12	0.451
T6	120 - 100	L3x3x5/16	14.50	6.93	90.3	29.000	1.0713	8.64	31.07	0.278

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T7	100 - 80	L3x3x5/16	16.80	8.09	105.3	29.000	1.0127	8.79	29.37	0.299
T8	80 - 60	L3 1/2x3 1/2x5/16	18.45	8.93	99.2	29.000	1.2452	9.33	36.11	0.258
T9	60 - 40	L3 1/2x3 1/2x5/16	20.16	9.79	108.8	29.000	1.2452	9.73	36.11	0.269
T10	40 - 20	L3 1/2x3 1/2x5/16	21.92	10.68	118.6	29.000	1.2452	10.57	36.11	0.293
T11	20 - 0	2L3 1/2x3 1/2x5/16x1	29.01	13.87	156.9	29.000	2.6074	16.83	75.62	0.223

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	193 - 185	7/8	5.00	4.83	265.1	21.600	0.6013	0.20	12.99	0.016
T2	185 - 170	7/8	5.00	4.83	265.1	21.600	0.6013	0.52	12.99	0.040

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 P P _a
T1	193 - 185	1 1/4	5.00	4.83	185.6	30.000	1.2272	0.61	36.82	0.017
T2	185 - 170	1 1/4	5.00	4.83	185.6	30.000	1.2272	0.25	36.82	0.007

Bottom 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 P P _a
T1	193 - 185	1 1/4	5.00	4.83	185.6	30.000	1.2272	0.77	36.82	0.021
T2	185 - 170	1 1/4	5.00	4.83	185.6	30.000	1.2272	1.15	36.82	0.031

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Mid 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 $\frac{P}{P_a}$
T2	185 - 170	1 1/4	5.00	4.83	185.6	30.000	1.2272	0.49	36.82	0.013

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail	
T1	193 - 185	Leg	2	1	-6.12	97.25	6.3	Pass	
		Diagonal	1	11	-1.31	11.70	7.1 (b)	Pass	
		Horizontal	7/8	23	-0.15	3.47	4.4	Pass	
		Top Girt	1 1/4	6	-0.62	14.47	4.3	Pass	
		Bottom Girt	1 1/4	8	-0.73	14.47	5.1	Pass	
T2	185 - 170	Leg	2	30	-40.86	97.25	42.0	Pass	
		Diagonal	1	43	-5.13	11.70	43.8	Pass	
		Horizontal	7/8	75	-0.35	3.47	10.0	Pass	
		Top Girt	1 1/4	33	-0.22	14.47	1.5	Pass	
		Bottom Girt	1 1/4	36	-0.96	14.47	6.6	Pass	
		Mid Girt	1 1/4	39	-0.30	14.47	2.1	Pass	
T3	170 - 160	Leg	Pirod 105244	83	-49.49	122.94	60.4	Pass	
		Diagonal	L2 1/2x2 1/2x3/16	86	-8.05	11.34	71.0	Pass	
							71.8 (b)		
T4	160 - 140	Leg	Pirod 105217	92	-103.40	184.67	56.0	Pass	
		Diagonal	L3x3x3/16	101	-9.61	15.91	60.4	Pass	
							85.1 (b)		
T5	140 - 120	Leg	Pirod 105217	107	-149.38	184.67	80.9	Pass	
		Diagonal	L3x3x3/16	110	-8.78	12.53	70.0	Pass	
							76.8 (b)		
T6	120 - 100	Leg	Pirod 105218	122	-190.97	258.24	74.0	Pass	
		Diagonal	L3x3x5/16	125	-8.91	16.06	55.4	Pass	
T7	100 - 80	Leg	Pirod 105219	137	-229.63	343.62	66.8	Pass	
		Diagonal	L3x3x5/16	140	-9.12	13.04	69.9	Pass	
T8	80 - 60	Leg	Pirod 105219	152	-266.05	343.62	77.4	Pass	
		Diagonal	L3 1/2x3 1/2x5/16	155	-9.66	17.26	55.9	Pass	
T9	60 - 40	Leg	Pirod 105220	167	-301.33	440.81	68.4	Pass	
		Diagonal	L3 1/2x3 1/2x5/16	169	-9.88	14.35	79.8 (b)	Pass	
T10	40 - 20	Leg	Pirod 105220	182	-337.33	440.81	76.5	Pass	
		Diagonal	L3 1/2x3 1/2x5/16	191	-10.93	13.12	88.7 (b)	Pass	
T11	20 - 0	Leg	Pirod 112738	197	-351.41	526.59	66.7	Pass	
		Diagonal	2L3 1/2x3 1/2x5/16x1	199	-19.21	39.18	49.0	Pass	
							Summary		
							Leg (T10)	88.7	Pass
							Diagonal (T4)	85.1	Pass
							Horizontal (T2)	10.0	Pass
							Top Girt (T1)	4.3	Pass
							Bottom Girt (T2)	6.6	Pass
							Mid Girt	2.1	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
						(T2)		
						Bolt Checks	88.7	Pass
						RATING =	88.7	Pass

SST Mat Foundation Analysis

Input

Project Data

SBA Project #	CT01105-VZW-011816
SBA Site Name	Bozrah
SBA Site Number	CT1105-S-03
Client	Verizon
Date	1/26/2016
Code (F or G)	F

Tower Data

Type	SST
Height(ft)	193
Width(ft)	22
offset of tower center (ft)	3.177

Load Data

Tower leg

Compression (Kips)	376
Uplift (Kips)	333
Shear (Kips)	43

Tower Base

Shear(Kips)	59
Moment (ft-Kips)	6812
Axial (Kips)	56

Material Data

Concrete strength (psi)	4000
Concrete unit weight (pcf)	150
Siesmic zone (0-4)	1
rebar yield strength (Ksi)	60

Soil Data

Allowable Bearing capacity (Ksf)	20
Internal angle of friction (deg.)	30
undrained shear strength (psf)	0
Allowable passive pressure (psf)	0
effectiveSoil unit weight (pcf)	170
friction coefficient	0.7

Foundation Data

Type	Unit base
Number of piers	0
Pier diameter (ft)	0
Pier height above grade (ft)	0
Pad width (ft)	32.5
Pad thickness (ft)	5
Pad bearing depth (ft)	4.5
Frost depth (ft)	5
Water table depth (ft)	99
clear cover (in)	3

Reinforcement Data

pier reinforcement	size	0
	quantity	0
Pad reinforcement	size	11
	quantity	49

Factor of safety

Bearing	3
Friction	2
Passive p	2

Strength reduction factors

ϕ shear	0.75
ϕ comp	0.65
ϕ tension	0.9



SST Mat Foundation Analysis

Analysis Result

Geotechnical failure checks

1. OTM failure	Design factored moment (kip-ft)	7107.0			
	Allowable foundation overturning resistance(kip-ft)	9070.1			
Overturning moment failure					
2. Base Sliding failure	Shear Applied (kips)	59.0			
	Shear capacity (kips)	277.2			
Base Sliding failure					
3. Bearing capacity failure	Applied pressure (ksf)	1.2			
	Allowable bearing capacity (ksf)	20.0			
Bearing capacity failure					
Geotech total					
					78.4
					Pass ✓

Reinforced concrete failure checks

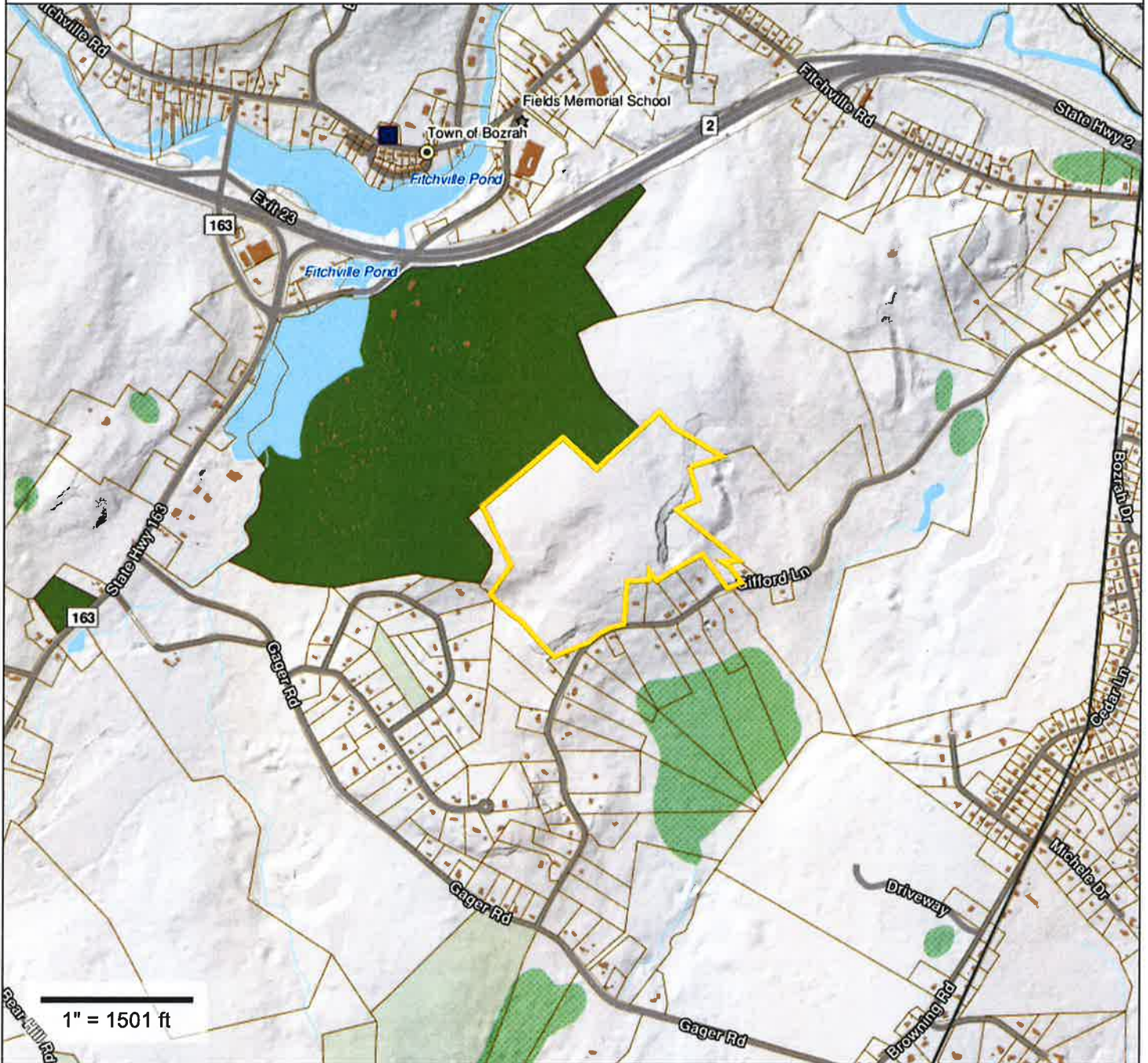
Pad

7. Two way shear failure	Applied shear(kips)	488.8			
	Allowable shear capacity (kips)	1869.3			
Two way shear failure					
8. Flexure failure	Applied moment (kip-ft)	4403.4			
	Allowable moment capacity (kip-ft)	18684.8			
Pad flexure failure					
R.C. Total					
					26.1
					Pass ✓
					23.6
					Pass ✓
					78.4
					Pass ✓

Total foundation	78.4		
	Pass	✓	



ATTACHMENT 4



Property Information

Property ID 13-07/119
Location GIFFORD LA
Owner NGA CAPITAL LLC



**MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT**

The Town makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated October 1, 2013





SCCOG

Date Updated: October 1, 2013

PROPERTY INFORMATION

Property ID	07/119	Account	24000633_1
Location	GIFFORD LA Bozrah 06334		
Size	0.00 ac	Frontage	

LOCATION INFORMATION

Zoning	R-1	Neighborhood	200
Class		Utilities	
Flood Zone		Tax District	
Local District		Fire District	
School District		Voting District	
Census	7131	Source	

OWNERSHIP

NGA CAPITAL LLC	38 BOZRAH ST
	BOZRAH, CT 06334

VALUATION

Fiscal Year		Revaluation
Last Sale	\$525,000 7/28/2005	
Deed	90 / 519	
Total Value	\$127,000	
Land Value		
Building Value		
Excess Value		

OTHER DATA

Out Building Value