

November 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
250 Silas Deane Highway, Wethersfield, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 90-foot level of the existing 120-foot tower at 250 Silas Deane Highway in Wethersfield, Connecticut (the “Property”). The tower and underlying property are owned by the Town of Wethersfield (“Town”). The Council approved Cellco’s use of this tower in 2004. Cellco now intends to modify its facility by replacing nine (9) of its antennas with three (3) model SBNHH-1D65B, 700 MHz antennas; three (3) model SBNHH-1D65B, 1900 MHz antennas; and three (3) model SBNHH-1D65B, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 90-foot level on the tower. Cellco also intends to replace three (3) remote radio heads (“RRHs”) and install six (6) new RRHs and one (1) HYBRIFLEX™ fiber optic antenna cable. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and HYBRIFLEX™ cable. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and antenna cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Jeff Bridges, Town Manager of the Town of Wethersfield. As noted above, the Town is the owner of the Property and tower.

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

Melanie A. Bachman

November 16, 2016

Page 2

1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's new antennas and RRHs will be installed at a centerline height of 90 feet on the 120-foot tower.

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for each of Cellco's operating frequencies are included behind Attachment 2. The Far Field calculations demonstrate that Cellco's modified facility will operate well within the RF emissions limits established by the FCC.

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

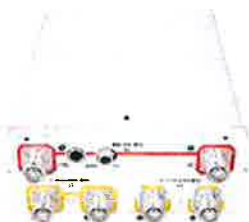
Enclosures

Copy to:

Jeff Bridges, Wethersfield Town Manager

Tim Parks

ATTACHMENT 1



SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2 x 1710–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR Return Loss, dB	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0° 14.6	0° 14.5	0° 17.4	0° 17.8	0° 18.1	0° 18.2
	7° 14.6	7° 14.4	3° 17.5	3° 17.9	3° 18.3	3° 18.4
	14° 14.2	14° 13.6	7° 17.4	7° 17.9	7° 18.2	7° 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® Teletilt®
Operating Frequency Band	1710 – 2360 MHz 698 – 896 MHz

Mechanical Specifications

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.

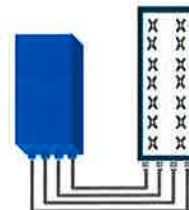


FEATURES

- 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

ALCATEL-LUCENT B25 RRH4X30

Alcatel-Lucent Band 25 Remote Radio Head 4x30W is the new 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 B25 RRH4x30 allows operators to have a compact radio solution to deploy LTE in the PCS band (1.9 GHz, 3GPP band 25), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B25 RRH4x30 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, LTE carriers from 3 MHz up to 20 MHz and up to 65 MHz instantaneous bandwidth.

The Alcatel-Lucent B25 RRH4x30 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 B25 RRH4x30 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.

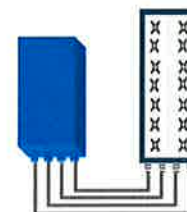


FEATURES

- Supporting LTE in 1.9 GHz band (PCS, 3GPP band 2 & 25)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- Ready for 3, 5, 10, 15 or 20MHz LTE carrier operation with 4Rx Diversity
- Ready to support up to 4 carriers anywhere in 65MHz instantaneous bandwidth
- Convection-cooled (fan-less)
- Supports AISG 2.0 devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in PCS band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Full flexibility for multiple carriers operation over entire PCS spectrum
- Improves downlink spectral efficiency and cell edge throughput through MIMO4
- Increases LTE coverage thanks to 4-way Rx 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	3GPP bands 2 & 25 (PCS-G) DL: 1930 - 1995 MHz UL: 1850 - 1915 MHz
Instantaneous bandwidth - #carriers	65MHz – Up to 4 LTE carriers (in 40MHz occupied bandwidth)
LTE carrier bandwidth	3, 5, 10, 15 or 20 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure (3GPP band 2)	2.0 dB typ. (<2.5 dB max)
RX Diversity scheme	2 or 4 way Rx diversity
Sizes (HxWxD)(w/ solar shield) in mm (in.)	538 x 304 x 182 (21.2" x 12.0" x 7.2")
Volume (w/ solar shield) in L	30
Weight (w/ solar shield) in kg (lb)	24 (53)
DC voltage range	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	580W typical @100% RF load
Environmental conditions	-40°C (-40°F) / +55°C (+131°F) IP65
Wind load (@150km/h or 93mph)	Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5 (> 14dB)
CPRI ports	2 CPRI ports (HW ready for Rate7 / 9.8 Gbps)
AISG Interfaces	1 AISG2.0 output (RS485), +24V/2A DC power Integrated Smart Bias Tees (x2)
Misc. Interfaces	1 external alarms connector (4 alarms) 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

www.alcatel-lucent.com Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein. Copyright © 2014 Alcatel-Lucent. All Rights Reserved

ALCATEL-LUCENT B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 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. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

Supporting 2Tx/4Tx MIMO and 2-way/4-way Rx diversity, the Alcatel-Lucent B66a RRH4x45 allows operators to have a compact radio solution to deploy LTE in the 2100 band (3GPP band 4, 10, and 66), providing them with the means to achieve high capacity, high quality, high reliability, large instantaneous bandwidth, and high coverage with minimum site requirements.

The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.



The Alcatel-Lucent B66a RRH4x45 is a compact (near zero-footprint) solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

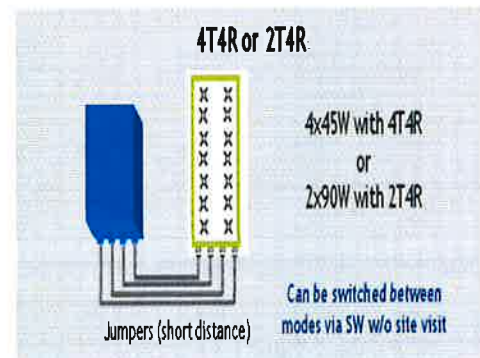
Its compactness and slim design makes the Alcatel-Lucent B66a RRH4x45 easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz 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 AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



TECHNICAL SPECIFICATIONS

Features & Performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R selectable by SW)
Frequency band	AWS 1-3, B4/B66a DL: 2110-2180 MHz / UL: 1710-1780 MHz
Instantaneous bandwidth - #carriers	70 MHz – 4 LTE MIMO carriers (in 70 MHz occupied bandwidth)
LTE carrier bandwidth	5, 10, 15, 20 MHz
RF output power	2x90W or 4x45W (selectable by SW)
Noise figure – RX Diversity scheme Receiver Sensitivity (FRC A1-3)	2 dB typical (<2.5 dB max) – 2 or 4 way Rx diversity -104.5 dBm maximum
Sizes (HxWxD) in mm (in.)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield)
Volume in Liters	35.5 (with solar shield) 29.7 (without solar shield)
Weight in kg (lb) (w/o mounting HW)	25.8kg (56.8lb) (with solar shield)
DC voltage range	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions	-40°C (-40°F) / +55°C (+131°F) UL50E Type 4 Enclosure
Wind load (@150km/h or 93mph)	250N (56lb) Frontal/150N (34lb) Lateral
Antenna ports	4 ports 4.3-10 female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate 7, 9.8 Gbps) SFP: SMDF (HW supports also SMSF and MMDF)
AISG interfaces	1 AISG 2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-487 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27 / FCC Part 15 / GR-3178-CORE

www.alcatel-lucent.com Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein.
Copyright © 2016 Alcatel-Lucent. All Rights Reserved



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

Product Description

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

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

Features/Benefits

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



Figure 1: HYBRIFLEX Series

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	(mm (in))	46.5 (1.83)
Jacket	Polyethylene, PE	(mm (in))	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight		(kg/m (lb/ft))	1.9 (1.30)
Minimum Bending Radius, Single Bending		(mm (in))	200 (8)
Minimum Bending Radius, Repeated Bending		(mm (in))	500 (20)
Recommended/Maximum Clamp Spacing		(m (ft))	1.0 / 1.2 (3.25 / 4.0)
DC Resistance		(Ω/km (Ω/1000ft))	0.68 (0.205)
DC-Resistance Outer Conductor Armor		(Ω/km (Ω/1000ft))	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad	(μm)		50/125
Primary Coating (Acrylate)	(μm)		245
Buffer Diameter, Nominal	(μm)		900
Secondary Protection, Jacket, Nominal	(mm (in))		2.0 (0.08)
Minimum Bending Radius	(mm (in))		104 (4.1)
Insertion Loss @ wavelength 850nm	dB/km		3.0
Insertion Loss @ wavelength 1310nm	dB/km		1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable			
Size (Power)	(mm (AWG))		8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)	(mm (AWG))		0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal	(mm (in))		6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Operating Temperature			
Installation Temperature	(°C (°F))		-40 to +65 (-40 to 149)
Operation Temperature	(°C (°F))		-40 to +65 (-40 to 149)

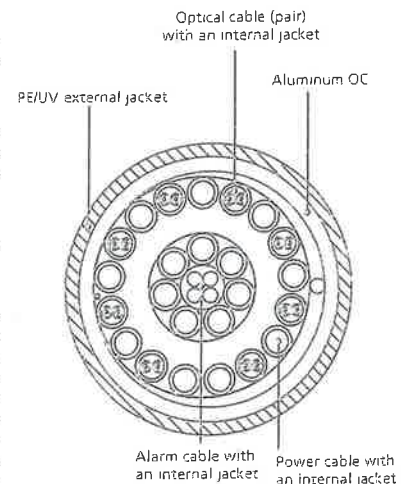


Figure 2: Construction Detail

All information contained in the present datasheet is subject to confirmation at time of ordering.

* This data is provisional and subject to change

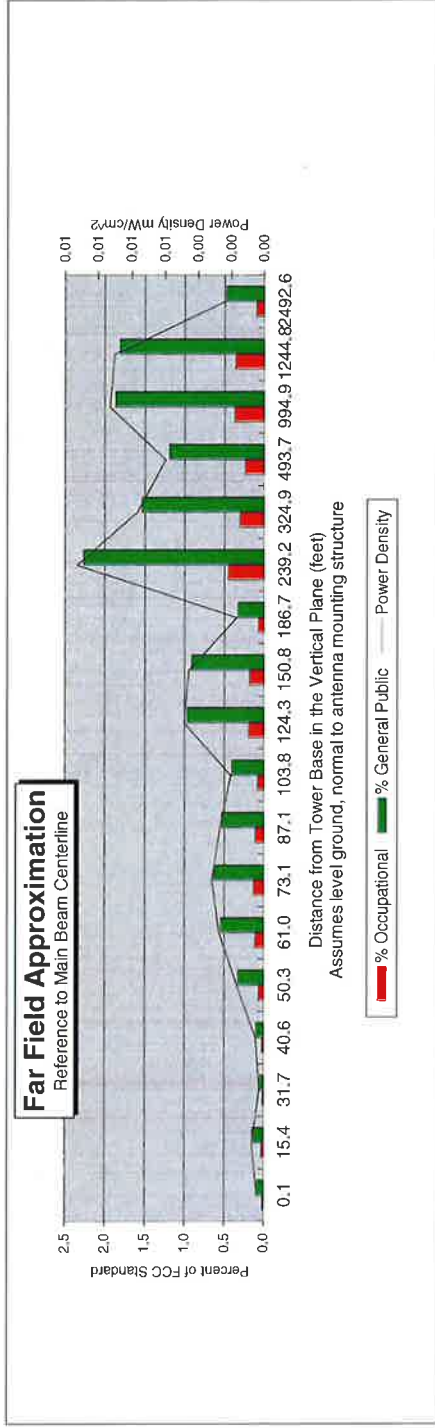
ATTACHMENT 2

Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole / Wire/ Yagi Antenna Types



Location:	Hartford 9, CT
Site #:	
Date:	11/09/16
Name:	Mark Brauer
File Name:	Hartford 9, CT - FF Power
Operating Freq. (MHz)	746.0
Antenna Height (ft):	90.0
Antenna Gain (dBi):	14.8
Antenna Size (in.):	72.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	2200.0
Number of Channels	1



Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	87.0	88.4	92.6	96.0	100.5	106.2	113.6	123.1	135.4	151.7	174.1	206.0	254.5	336.3	501.3	998.7	1247.8	2494.1
Distance from Antenna Structure Base in Horizontal plane	0.1	15.4	31.7	40.6	50.3	61.0	73.1	87.1	103.8	124.3	150.8	186.7	239.2	324.9	493.7	994.9	1244.8	2492.6
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm²)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	0.3	0.2	0.4	0.4	0.1
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.3	0.5	0.6	0.5	0.4	1.0	0.9	0.3	2.3	1.5	1.2	1.9	1.8	0.5

Antenna Type: SBNHH-1D65B
Max%: 2.27%

Instructions:

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

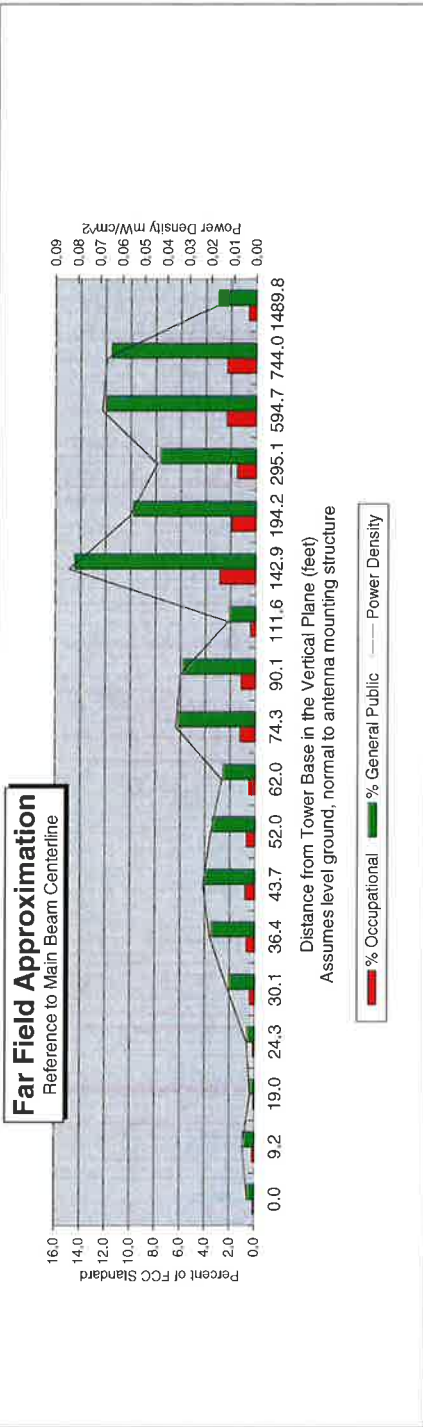
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole / Wire/Yagi Antenna Types



Location:	Hartford 9, CT
Site #:	
Date:	11/09/16
Name:	Mark Brauer
File Name:	Hartford 9, CT - FF Power

Operating Freq. (MHz)	869.0
Antenna Height (ft)	90.0
Antenna Gain (dBi)	16.7
Antenna Size (in.)	72.0
Downtilt (degrees)	0.0
Feedline Loss (dB)	0.0
Power @ J4 (w)	3795.0
Number of Channels	9



	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Calc. Angle	52.0	52.8	55.3	57.4	60.1	63.5	67.9	73.6	80.9	90.7	104.0	123.1	152.1	201.0	299.6	596.9	745.8	1490.7
Solve for r, dx to antenna	0.0	9.2	19.0	24.3	30.1	36.4	43.7	52.0	62.0	74.3	90.1	111.6	142.9	194.2	295.1	594.7	744.0	1489.8
Distance from Antenna Structure Base in Horizontal plane	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
Angle from Main Beam (reference to horizontal plane)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
dB down from centerline (referenced to centerline)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Reflection Coefficient (1 to 4, 2.56 typical)	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.02	0.01	0.04	0.03	0.01	0.08	0.06	0.04	0.07	0.07	0.02
Power Density (mW/cm²)	0.1	0.2	0.1	0.1	0.4	0.7	0.8	0.7	0.5	1.2	1.2	0.4	2.9	2.0	1.5	2.4	2.3	0.6
Percent of Occupational Standard	0.5	0.9	0.3	0.6	2.1	3.5	4.0	3.4	2.6	6.2	5.8	2.1	14.5	9.8	7.6	11.9	11.5	3.0
Percent of General Population Standard																		

Antenna Type: BXA-80063-6CF
Max%: 14.46%

Instructions:

- 1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to be saved as.
- 2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
- 3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBi to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Power Density (mW/cm²).
- 4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
- 5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
- 6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
- 7) An odd distance may be entered in the rightmost column of the lower table.

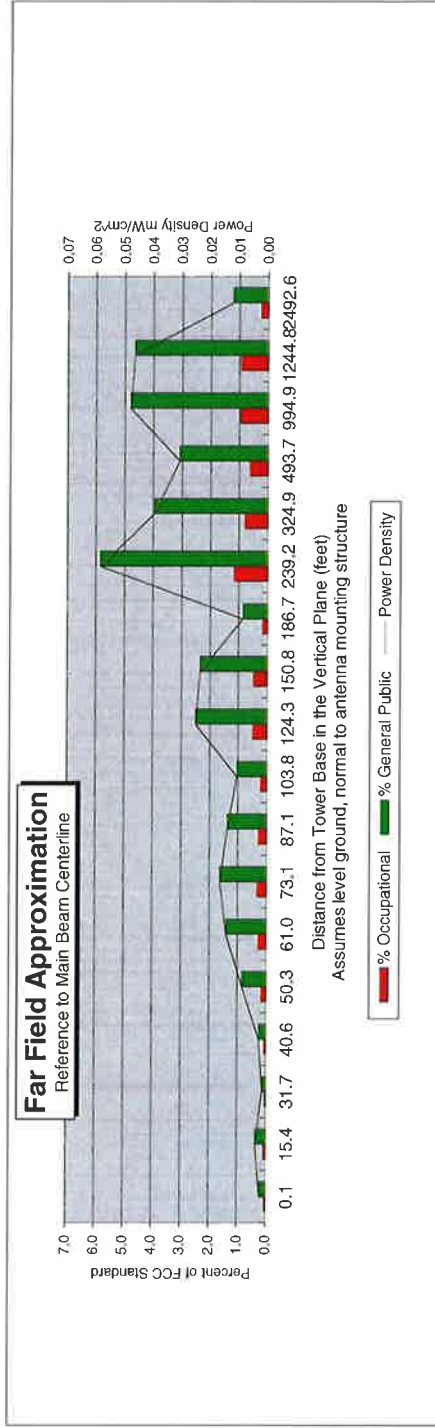
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole / Wire/ Yagi Antenna Types



Location:	Hartford 9, CT
Site #:	
Date:	11/09/16
Name:	Mark Brauer
File Name:	Hartford 9, CT - FF Power

Operating Freq. (MHz)	1970.0
Antenna Height (ft):	90.0
Antenna Gain (dBi):	18.4
Antenna Size (in.):	72.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	5000.0
Number of Channels	1



Calc. Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	87.0	88.4	92.6	96.0	100.5	106.2	113.6	123.1	135.4	151.7	174.1	206.0	254.5	336.3	501.3	998.7	1247.8	2494.1
Distance from Antenna Structure Base in Horizontal plane	0.1	15.4	31.7	40.6	50.3	61.0	73.1	87.1	103.8	124.3	150.8	186.7	239.2	324.9	493.7	994.9	1244.8	2492.6
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm²)	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.06	0.04	0.03	0.05	0.05	0.01
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.2	0.3	0.3	0.2	0.5	0.5	0.5	0.2	1.2	0.8	0.6	1.0	0.9	0.2
Percent of General Population Standard	0.2	0.4	0.1	0.2	0.8	1.4	1.6	1.4	1.0	2.5	2.3	0.8	5.8	4.0	3.1	4.8	4.7	1.2

Distance in feet below:

Antenna Type: SBNHH-1D65B
Max%: 5.83%

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

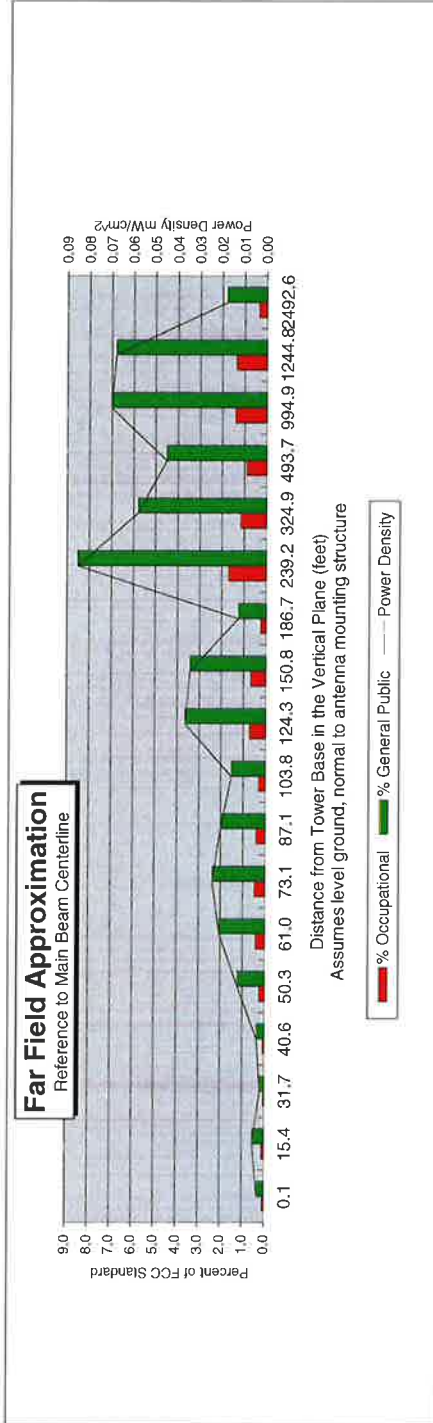
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole / Wire/ Yagi Antenna Types



Location:	Hartford 9, CT
Site #:	
Date:	11/09/16
Name:	Mark Brauer
File Name:	Hartford 9, CT - FF Power

Operating Freq. (MHz)	2110.0
Antenna Height (ft):	90.0
Antenna Gain (dBi):	18.3
Antenna Size (in.):	72.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
Power @ J4 (w):	7400.0
Number of Channels	1



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	87.0	88.4	92.6	96.0	100.5	106.2	113.6	123.1	135.4	151.7	174.1	206.0	254.5	336.3	501.3	998.7	1247.8	2494.1
Distance from Antenna Structure Base in Horizontal plane	0.1	15.4	31.7	40.6	50.3	61.0	73.1	87.1	103.8	124.3	150.8	186.7	239.2	324.9	493.7	994.9	1244.8	2492.6
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm²)	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.04	0.03	0.01	0.09	0.06	0.04	0.07	0.07	0.02
Percent of Occupational Standard	0.1	0.1	0.0	0.1	0.2	0.4	0.5	0.4	0.3	0.7	0.7	0.2	1.7	1.2	0.9	1.4	1.4	0.4
Percent of General Population Standard	0.3	0.5	0.2	0.4	1.2	2.1	2.4	2.0	1.5	3.6	3.4	1.2	8.5	5.8	4.5	7.0	6.8	1.8

Distance in feet below:

Antenna Type: SBNHH-1D65B
Max%: 8.51%

Instructions:

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

ATTACHMENT 3

Structural Analysis Report

120-ft Existing Rohn Monopole

*Proposed Verizon Wireless
Antenna Upgrade*

Verizon Site Ref: Hartford 9

*250 Silas Deane Highway
Wethersfield, CT*

Centek Project No. 15001.060

~~Date: July 21, 2015~~

~~Rev 1: November 8, 2016~~

Rev 2: November 14, 2016



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

Table of Contents

SECTION 1 - REPORT

- INTRODUCTION
- ANTENNA AND APPURTENANCE SUMMARY
- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS
- ANALYSIS
- TOWER LOADING
- TOWER CAPACITY
- FOUNDATION AND ANCHORS
- CONCLUSION

SECTION 2 – CONDITIONS & SOFTWARE

- STANDARD ENGINEERING CONDITIONS
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

SECTION 3 – CALCULATIONS

- tnxTower INPUT/OUTPUT SUMMARY
- tnxTower DETAILED OUTPUT
- ANCHOR BOLT AND BASEPLATE ANALYSIS
- FOUNDATION ANALYSIS

SECTION 4 – REFERENCE MATERIAL

- RF DATA SHEET
- ANTENNA CUT SHEETS

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 on the existing monopole (tower) located in Wethersfield, CT.

The host tower is a 120-ft tall, three-section, eighteen sided, tapered monopole originally designed and manufactured by ROHN Eng. File No: 50576RA, dated July 11, 2002. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned tower design documents. This analysis takes into account monopole reinforcements designed and installed by Structural Components for Verizon Wireless, SC no. 110361, dated March 25, 2011.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek engineering job no; 12124.038 dated February 15, 2013, visual verification from grade by Centek personnel on July 21, 2015 and a Verizon RF data sheet.

The tower consists of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 16.00-in at the top and 36.00-in at the base.

Verizon proposes the removal of nine (9) panel antennas, six (6) diplexers and three (3) RRHs and the installation of nine (9) panel antennas, nine (9) RRHs and one (1) main distribution box mounted to the existing T-Arms. 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:

- TOWN (Reserved):
Antennas: Two (2) Andrew DB809-XC Omni-directional whip antennas pipe mounted with an elevation of 117-ft above grade.
Coax Cables: Two (2) 7/8" \varnothing coax cables running on the inside of the existing monopole.
- TOWN (Existing):
Antennas: One (1) 2-ft \varnothing Microwave dish antenna pipe mounted to the monopole with an elevation of 110-ft above grade.
Coax Cables: Two (2) 1/2" \varnothing coax cables running on the inside of the existing monopole.
- TOWN (Reserved):
Antennas: Two (2) 1-ft \varnothing and two (2) 2-ft \varnothing Microwave dish antennas pipe mounted to the monopole with an elevation of 110-ft above grade.
Coax Cables: Six (6) 7/8" \varnothing coax cables running on the inside of the existing monopole.

- **METRO PCS (Existing):**
Antennas: Six (6) Ericsson AIR21 panel antennas mounted on three (3) 6-ft T-arms with a RAD center elevation of 105-ft above existing grade.
Coax Cables: One (1) 1-5/8" Ø fiber cable running on the inside of the existing monopole.
- **TOWN (EXISTING):**
Antennas: One (1) Decibel DB404 4-Bay Dipole, two (2) Andrew Decibel DB583, one (1) RFS Celwave PD1142 and one (1) 5-ft x 1" Ø Omni-directional whip antennas mounted on three (3) side arms with an elevation of 54-ft above existing grade.
Coax Cables: Five (5) 1/2" Ø coax cables running on the inside of the existing monopole.
- **VERIZON WIRELESS (Existing to Remain):**
Antennas: Three (3) Antel BXA-80063-6CF panel antennas and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on T-Arms with a RAD center elevation of 90-ft above grade.
Coax Cables: Twelve (12) 1-5/8" Ø coax cables and one (1) 1-5/8" Ø fiber cable running on the inside of the existing tower.
- **VERIZON WIRELESS (Existing to Remove):**
Antennas: Three (3) Antel BXA-70063-6CF panel antennas, three (3) Antel BXA-185063-8CF panel antennas, three (3) BXA-171063-8CF panel antennas, six (6) RFS FD9R6004/2C-3L Diplexers and three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads mounted on T-Arms with a RAD center elevation of 90-ft above grade.
- **VERIZON (Proposed):**
Antennas: Nine (9) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on T-Arms with a RAD center elevation of 90-ft above grade.
Coax Cables: One (1) 1-5/8" Ø fiber cable running on the exterior of the existing tower.

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 tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled “Structural Standard for Antenna Support Structures and Antennas”, the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC¹ and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 1.00” radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford; v = 90-105 mph (3-second gust)	[Annex B of TIA-222-G-2005]
	Wethersfield; v = 97 mph (3 second gust)	[Appendix N of the 2016 CT Building Code]
Load Cases:	<u>Load Case 1</u> ; 97 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	[Appendix N of the 2016 CT Building Code]
	<u>Load Case 2</u> ; 50 mph wind speed w/ 1.00” radial ice plus gravity load – used in calculation of tower stresses.	[Annex B of TIA-222-G-2005]

¹ The 2012 International Building Code as amended by the 2016 Connecticut State Building Code (CSBC).

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 4-8 of the TIA code.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **72.8%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L4)	35.00'-44.42'	72.8%	PASS

Foundation and Anchors

The existing foundation consists of a 5-ft 6in \varnothing x 19ft-6in long modified reinforced concrete caisson with a 2.0-ft thick x 14-ft-6in square reinforced concrete pad. The base of the monopole tower is connected to the caisson foundation by means of (6) original 2.25" \varnothing , ASTM A615-75 anchor bolts and six (6) additional 2.75" \varnothing , ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation. The base plate thickness was field measured and noted in a Pre-construction and TIA Inspection report prepared by Structural Components, dated August 25, 2010 as 2.25in thick in lieu of the original ROHN design thickness of 2.00in.

- 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	20 kips
	Compression	20 kips
	Moment	1470 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 FS ⁽¹⁾	Proposed Loading (FS) ⁽¹⁾	Result
Reinforced Concrete Pad w/ Caisson	OTM ⁽²⁾	1.0	1.52	PASS

Note 1: FS denotes Factor of Safety.

Note 2: OTM denotes Overturning Moment

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Compression and Shear	47.5%	PASS
Base Plate	Bending	18.2%	PASS

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed 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:



Timothy J. Lynn, PE
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

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

tnxTower Features:

- tnxTower 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.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	30.250	18	0.188	2.670	16.000	21.287	A572-65	1.1
2	22.420	18	0.188	20.445	24.252	24.252	A572-65	1.0
3	25.583	18	0.275	3.583	24.252	28.725	A572-65	2.0
4	13.000	18	0.275	27.549	29.880	29.880	A572-65	1.1
5	35.000	18	0.364	29.880	36.000	36.000	A572-65	4.5
								9.7

120.0 ft

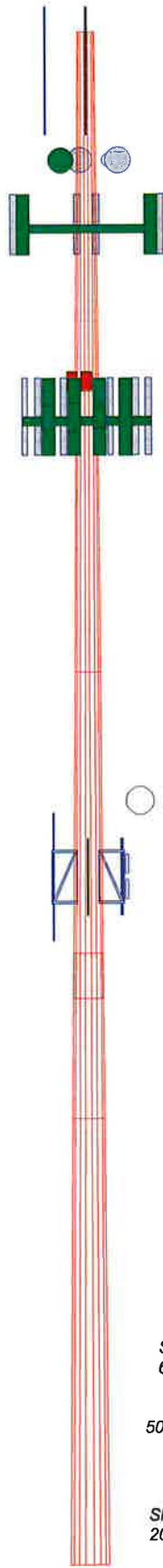
89.8 ft

70.0 ft

44.4 ft

35.0 ft

0.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB809K-XC (Town)	117	RRH2x60-PCS (Verizon - Proposed)	90
DB809K-XC (Town)	117	RRH2x60-07-U (Verizon - Proposed)	90
6"x2" Pipe Mount (Town)	110	RRH4x45/2x90-AWS (Verizon - Proposed)	90
6"x2" Pipe Mount (Town)	110	EI 6-ft T-Arm (Verizon - Existing)	90
6"x2" Pipe Mount (Town)	110	EI 6-ft T-Arm (Verizon - Existing)	90
2-ft dish (Town)	110	EI 6-ft T-Arm (Verizon - Existing)	90
2-ft dish (Town)	110	BXA-80063/6CF (Verizon - Existing)	90
2-ft dish (Town)	110	SBNHH-1D65B (Verizon - Proposed)	90
1-ft Dish (Town)	110	SBNHH-1D65B (Verizon - Proposed)	90
1-ft Dish (Town)	110	SBNHH-1D65B (Verizon - Proposed)	90
(2) AIR21 B2A/B4P (MetroPCS - Existing)	105	BXA-80063/6CF (Verizon - Existing)	90
(2) AIR21 B2A/B4P (MetroPCS - Existing)	105	SBNHH-1D65B (Verizon - Proposed)	90
(2) AIR21 B2A/B4P (MetroPCS - Existing)	105	SBNHH-1D65B (Verizon - Proposed)	90
(2) AIR21 B2A/B4P (MetroPCS - Existing)	105	RRH2x60-07-U (Verizon - Proposed)	90
EEI 6-ft T-Arm (MetroPCS - Existing)	105	RRH2x60-07-U (Verizon - Proposed)	90
EEI 6-ft T-Arm (MetroPCS - Existing)	105	SBNHH-1D65B (Verizon - Proposed)	90
EEI 6-ft T-Arm (MetroPCS - Existing)	105	SBNHH-1D65B (Verizon - Proposed)	90
Valmont Uni-Tri Bracket (MetroPCS - Existing)	105	BXA-80063/6CF (Verizon - Existing)	90
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	92	SBNHH-1D65B (Verizon - Proposed)	90
DB-T1-6Z-8AB-0Z (Verizon - Existing)	92	SBNHH-1D65B (Verizon - Proposed)	90
RRH4x45/2x90-AWS (Verizon - Proposed)	90	Pirot 4' Side Mount Standoff (1) (Town)	54
RRH4x45/2x90-AWS (Verizon - Proposed)	90	Pirot 4' Side Mount Standoff (1) (Town)	54
RRH2x60-PCS (Verizon - Proposed)	90	5' x 1" dia. Omni (Town)	54
RRH2x60-PCS (Verizon - Proposed)	90	PD1142-1 (Town)	54
		DB404 (Town)	54
		DB583 (Town)	54
		DB583 (Town)	54
		Pirot 4' Side Mount Standoff (1) (Town)	54

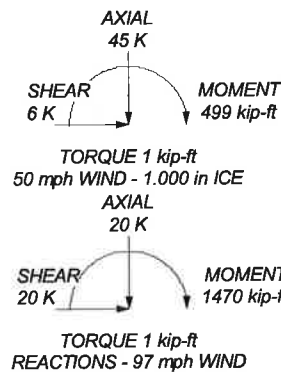
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.000 ft
7. Weld together tower sections have flange connections.
8. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
10. Welds are fabricated with ER-70S-6 electrodes.
11. Pole Sections 3 and 4 - Equivalent Thickness of 0.275" Used to Account for Stiffened Section
12. Pole Section 5 - Equivalent Thickness of 0.364" Used to Account for Stiffened Section.
13. Includes monopole reinforcement design prepared by Structural Components, LLC., dated 03/25/11.
14. TOWER RATING: 72.8%

ALL REACTIONS ARE FACTORED



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

Job: **15001.060 - Hartford 9**
 Project: **120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield,**
 Client: Verizon Wireless Drawn by: T.JL App'd:
 Code: TIA-222-G Date: 11/14/16 Scale: NTS
 Path: Dwg No. E-1

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 1 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Tower Input Data

There is a pole section.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Basic wind speed of 97 mph.

Structure Class II.

Exposure Category C.

Topographic Category 1.

Crest Height 0.000 ft.

Nominal ice thickness of 1.000 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 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..

Pole Sections 3 and 4 - Equivalent Thickness of 0.275" Used to Account for Stiffened Section.

Pole Section 5 - Equivalent Thickness of 0.3640" Used to Account for Stiffened Section..

Includes monopole reinforcement design prepared by Structural Components, LLC., dated 03/25/11..

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

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

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

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	√ Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	√ Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		

Tapered Pole Section Geometry

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 2 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.000-89.750	30.250	2.670	18	16.000	21.287	0.188	0.750	A572-65 (65 ksi)
L2	89.750-70.000	22.420	0.000	18	20.445	24.252	0.188	0.750	A572-65 (65 ksi)
L3	70.000-44.417	25.583	3.583	18	24.252	28.725	0.275	1.100	A572-65 (65 ksi)
L4	44.417-35.000	13.000	0.000	18	27.549	29.880	0.275	1.100	A572-65 (65 ksi)
L5	35.000-0.000	35.000		18	29.880	36.000	0.364	1.456	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	16.247	9.410	297.267	5.613	8.128	36.573	594.926	4.706	2.486	13.259
	21.615	12.557	706.256	7.490	10.814	65.311	1413.441	6.280	3.417	18.221
L2	21.221	12.056	625.065	7.192	10.386	60.182	1250.953	6.029	3.268	17.431
	24.626	14.321	1047.795	8.543	12.320	85.048	2096.968	7.162	3.938	21.005
L3	24.626	20.928	1520.063	8.512	12.320	123.382	3042.126	10.466	3.784	13.761
	29.168	24.833	2539.358	10.100	14.592	174.020	5082.057	12.419	4.572	16.624
L4	28.626	23.806	2237.183	9.682	13.995	159.860	4477.310	11.905	4.365	15.871
	30.341	25.841	2861.358	10.510	15.179	188.507	5726.482	12.923	4.775	17.363
L5	30.341	34.101	3753.343	10.478	15.179	247.271	7511.625	17.054	4.618	12.687
	36.555	41.172	6605.605	12.651	18.288	361.199	13219.902	20.590	5.695	15.647

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 Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
L1 120.000-89.750				1	1	1			
L2 89.750-70.000				1	1	1			
L3 70.000-44.417				1	1	1			
L4 44.417-35.000				1	1	1			
L5 35.000-0.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight klf
LDF5-50A (7/8 FOAM) (Town - Reserved)	C	No	Inside Pole	117.000 - 4.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 3 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJJ

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _{AA}		Weight klf
						ft ² /ft	klf	
LDF4P-50A (1/2 FOAM) (Town)	C	No	Inside Pole	110.000 - 4.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF5-50A (7/8 FOAM) (Town - Reserved)	C	No	Inside Pole	110.000 - 4.000	6	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF7-50A (1-5/8 FOAM) (Verizon - Existing)	C	No	Inside Pole	90.000 - 4.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
LDF4-50A (1/2 FOAM) (Town - Existing)	C	No	Inside Pole	55.000 - 4.000	5	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
HYBRIFLEX 1-5/8" (MetroPCS - Existing)	C	No	Inside Pole	105.000 - 7.000	1	No Ice	0.000	0.002
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.002
HYBRIFLEX 1-5/8" (Verizon - Existing)	C	No	Inside Pole	90.000 - 4.000	1	No Ice	0.000	0.002
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.002
SC - SwitchBlade (SC - Reinf)	A	No	CaAa (Out Of Face)	35.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
SC - SwitchBlade (SC - Reinf)	B	No	CaAa (Out Of Face)	70.000 - 0.000	1	No Ice	0.350	0.000
						1/2" Ice	0.450	0.000
						1" Ice	0.550	0.000
HYBRIFLEX 1-5/8" (Verizon - Proposed)	C	No	CaAa (Out Of Face)	90.000 - 4.000	1	No Ice	0.198	0.002
						1/2" Ice	0.298	0.003
						1" Ice	0.398	0.006

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA}		Weight K
					In Face ft ²	Out Face ft ²	
L1	120.000-89.750	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.050	0.097
L2	89.750-70.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	3.910	0.365
L3	70.000-44.417	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	8.954	0.000
		C	0.000	0.000	0.000	5.065	0.481
L4	44.417-35.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	3.296	0.000
		C	0.000	0.000	0.000	1.865	0.181
L5	35.000-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	12.250	0.000
		C	0.000	0.000	0.000	6.138	0.590

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}		Weight K
						In Face ft ²	Out Face ft ²	
L1	120.000-89.750	A	2.244	0.000	0.000	0.000	0.000	0.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 4 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.162	0.100
L2	89.750-70.000	A	2.184	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	12.774	0.604
L3	70.000-44.417	A	2.112	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	19.759	0.000
		C		0.000	0.000	0.000	15.871	0.757
L4	44.417-35.000	A	2.037	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	7.273	0.000
		C		0.000	0.000	0.000	5.842	0.283
L5	35.000-0.000	A	1.877	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	25.387	0.000
		C		0.000	0.000	0.000	17.773	0.869

Feed Line Center of Pressure

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
L1	120.000-89.750	-0.002	0.001	-0.006	0.004
L2	89.750-70.000	-0.230	0.133	-0.539	0.311
L3	70.000-44.417	0.156	0.325	0.109	0.578
L4	44.417-35.000	0.159	0.331	0.114	0.602
L5	35.000-0.000	0.190	0.325	0.183	0.583

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice

Discrete Tower Loads

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
EEl 6-ft T-Arm (Verizon - Existing)	A	From Face	1.750 0.000 0.000	0.000	90.000	No Ice 5.000 1/2" Ice 8.000 1" Ice 11.000	5.000 8.000 11.000	0.500 0.750 1.000
EEl 6-ft T-Arm (Verizon - Existing)	B	From Face	1.750 0.000 0.000	0.000	90.000	No Ice 5.000 1/2" Ice 8.000 1" Ice 11.000	5.000 8.000 11.000	0.500 0.750 1.000
EEl 6-ft T-Arm (Verizon - Existing)	C	From Face	1.750 0.000 0.000	0.000	90.000	No Ice 5.000 1/2" Ice 8.000 1" Ice 11.000	5.000 8.000 11.000	0.500 0.750 1.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	15001.060 - Hartford 9	Page	5 of 36
	Project	120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date	13:08:00 11/14/16
	Client	Verizon Wireless	Designed by	TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight
			Horz	Vert			Front	Side	
			Lateral	ft	°	ft	ft ²	ft ²	K
BXA-80063/6CF (Verizon - Existing)	A	From Face	3.000	0.000	90.000	No Ice	7.582	4.050	0.015
			-3.000			1/2" Ice	8.029	4.487	0.057
			0.000			1" Ice	8.484	4.931	0.105
SBNHH-1D65B (Verizon - Proposed)	A	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			-1.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
SBNHH-1D65B (Verizon - Proposed)	A	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			1.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
SBNHH-1D65B (Verizon - Proposed)	A	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			3.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
BXA-80063/6CF (Verizon - Existing)	B	From Face	3.000	0.000	90.000	No Ice	7.582	4.050	0.015
			-3.000			1/2" Ice	8.029	4.487	0.057
			0.000			1" Ice	8.484	4.931	0.105
SBNHH-1D65B (Verizon - Proposed)	B	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			-1.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
SBNHH-1D65B (Verizon - Proposed)	B	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			1.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
SBNHH-1D65B (Verizon - Proposed)	B	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			3.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
BXA-80063/6CF (Verizon - Existing)	C	From Face	3.000	0.000	90.000	No Ice	7.582	4.050	0.015
			-3.000			1/2" Ice	8.029	4.487	0.057
			0.000			1" Ice	8.484	4.931	0.105
SBNHH-1D65B (Verizon - Proposed)	C	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			-1.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
SBNHH-1D65B (Verizon - Proposed)	C	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			1.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
SBNHH-1D65B (Verizon - Proposed)	C	From Face	3.000	0.000	90.000	No Ice	8.079	5.342	0.042
			3.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
RRH2x60-07-U (Verizon - Proposed)	A	From Face	3.000	0.000	90.000	No Ice	2.100	1.406	0.050
			-1.000			1/2" Ice	2.287	1.565	0.068
			0.000			1" Ice	2.481	1.737	0.089
RRH2x60-07-U (Verizon - Proposed)	B	From Face	3.000	0.000	90.000	No Ice	2.100	1.406	0.050
			-1.000			1/2" Ice	2.287	1.565	0.068
			0.000			1" Ice	2.481	1.737	0.089
RRH2x60-07-U (Verizon - Proposed)	C	From Face	3.000	0.000	90.000	No Ice	2.100	1.406	0.050
			-1.000			1/2" Ice	2.287	1.565	0.068
			0.000			1" Ice	2.481	1.737	0.089
RRH4x45/2x90-AWS (Verizon - Proposed)	A	From Face	3.000	0.000	90.000	No Ice	2.580	1.688	0.075
			1.000			1/2" Ice	2.794	1.871	0.096
			0.000			1" Ice	3.015	2.060	0.120
RRH4x45/2x90-AWS (Verizon - Proposed)	B	From Face	3.000	0.000	90.000	No Ice	2.580	1.688	0.075
			1.000			1/2" Ice	2.794	1.871	0.096
			0.000			1" Ice	3.015	2.060	0.120
RRH4x45/2x90-AWS (Verizon - Proposed)	C	From Face	3.000	0.000	90.000	No Ice	2.580	1.688	0.075
			1.000			1/2" Ice	2.794	1.871	0.096
			0.000			1" Ice	3.015	2.060	0.120
RRH2x60-PCS (Verizon - Proposed)	A	From Face	3.000	0.000	90.000	No Ice	2.150	1.346	0.055
			3.000			1/2" Ice	2.340	1.504	0.073
			0.000			1" Ice	2.537	1.669	0.093

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	15001.060 - Hartford 9	Page	6 of 36
	Project	120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date	13:08:00 11/14/16
	Client	Verizon Wireless	Designed by	TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Vert			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	K	
RRH2x60-PCS (Verizon - Proposed)	B	From Face	3.000	0.000	0.000	90.000	No Ice	2.150	1.346	0.055
			3.000				1/2" Ice	2.340	1.504	0.073
			0.000				1" Ice	2.537	1.669	0.093
RRH2x60-PCS (Verizon - Proposed)	C	From Face	3.000	0.000	0.000	90.000	No Ice	2.150	1.346	0.055
			3.000				1/2" Ice	2.340	1.504	0.073
			0.000				1" Ice	2.537	1.669	0.093
DB-T1-6Z-8AB-0Z (Verizon - Proposed)	A	From Face	0.500	0.000	0.000	92.000	No Ice	4.800	2.000	0.044
			0.000				1/2" Ice	5.070	2.193	0.080
			0.000				1" Ice	5.348	2.393	0.120
DB-T1-6Z-8AB-0Z (Verizon - Existing)	C	From Face	0.500	0.000	0.000	92.000	No Ice	4.800	2.000	0.044
			0.000				1/2" Ice	5.070	2.193	0.080
			0.000				1" Ice	5.348	2.393	0.120
DB809K-XC (Town)	A	From Face	3.000	0.000	0.000	117.000	No Ice	3.660	3.660	0.030
			0.000				1/2" Ice	4.913	4.913	0.056
			0.000				1" Ice	6.183	6.183	0.091
DB809K-XC (Town)	C	From Face	3.000	0.000	0.000	117.000	No Ice	3.660	3.660	0.030
			0.000				1/2" Ice	4.913	4.913	0.056
			0.000				1" Ice	6.183	6.183	0.091
6'x2" Pipe Mount (Town)	A	None		0.000	0.000	110.000	No Ice	1.200	1.200	0.022
							1/2" Ice	1.802	1.802	0.031
							1" Ice	2.170	2.170	0.045
6'x2" Pipe Mount (Town)	B	None		0.000	0.000	110.000	No Ice	1.200	1.200	0.022
							1/2" Ice	1.802	1.802	0.031
							1" Ice	2.170	2.170	0.045
6'x2" Pipe Mount (Town)	C	None		0.000	0.000	110.000	No Ice	1.200	1.200	0.022
							1/2" Ice	1.802	1.802	0.031
							1" Ice	2.170	2.170	0.045
(2) AIR21 B2A/B4P (MetroPCS - Existing)	A	From Face	3.000	0.000	0.000	105.000	No Ice	6.049	4.356	0.083
			0.000				1/2" Ice	6.419	4.705	0.125
			0.000				1" Ice	6.795	5.061	0.172
(2) AIR21 B2A/B4P (MetroPCS - Existing)	B	From Face	3.000	0.000	0.000	105.000	No Ice	6.049	4.356	0.083
			0.000				1/2" Ice	6.419	4.705	0.125
			0.000				1" Ice	6.795	5.061	0.172
(2) AIR21 B2A/B4P (MetroPCS - Existing)	C	From Face	3.000	0.000	0.000	105.000	No Ice	6.049	4.356	0.083
			0.000				1/2" Ice	6.419	4.705	0.125
			0.000				1" Ice	6.795	5.061	0.172
EEI 6-ft T-Arm (MetroPCS - Existing)	A	From Face	1.750	0.000	0.000	105.000	No Ice	5.000	5.000	0.500
			0.000				1/2" Ice	8.000	8.000	0.750
			0.000				1" Ice	11.000	11.000	1.000
EEI 6-ft T-Arm (MetroPCS - Existing)	B	From Face	1.750	0.000	0.000	105.000	No Ice	5.000	5.000	0.500
			0.000				1/2" Ice	8.000	8.000	0.750
			0.000				1" Ice	11.000	11.000	1.000
EEI 6-ft T-Arm (MetroPCS - Existing)	C	From Face	1.750	0.000	0.000	105.000	No Ice	5.000	5.000	0.500
			0.000				1/2" Ice	8.000	8.000	0.750
			0.000				1" Ice	11.000	11.000	1.000
Valmont Uni-Tri Bracket (MetroPCS - Existing)	C	None		0.000	0.000	105.000	No Ice	1.750	1.750	0.290
							1/2" Ice	1.940	1.940	0.306
							1" Ice	2.130	2.130	0.323
PD1142-1 (Town)	A	From Face	2.000	5.000	0.000	54.000	No Ice	1.316	1.316	0.010
			0.000				1/2" Ice	3.210	3.210	0.024
			0.000				1" Ice	5.121	5.121	0.049
DB404 (Town)	B	From Face	2.000	4.000	0.000	54.000	No Ice	1.140	1.140	0.014
			0.000				1/2" Ice	2.052	2.052	0.018
			0.000				1" Ice	2.964	2.964	0.022
DB583 (Town)	A	From Face	2.000	-2.500	0.000	54.000	No Ice	0.537	0.537	0.006
			0.000				1/2" Ice	0.711	0.711	0.012
			0.000				1" Ice	0.894	0.894	0.019

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 7 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _{Front}	C _A A _{Side}	Weight	
			Horz	Lateral						Vert
DB583 (Town)	B	From Face	2.000		-2.500	54.000	No Ice	0.537	0.537	0.006
			0.000				1/2" Ice	0.711	0.711	0.012
			0.000				1" Ice	0.894	0.894	0.019
Pirod 4' Side Mount Standoff (1) (Town)	A	From Face	1.000		0.000	54.000	No Ice	2.720	2.720	0.050
			0.000				1/2" Ice	4.910	4.910	0.089
			0.000				1" Ice	7.100	7.100	0.128
Pirod 4' Side Mount Standoff (1) (Town)	B	From Face	1.000		0.000	54.000	No Ice	2.720	2.720	0.050
			0.000				1/2" Ice	4.910	4.910	0.089
			0.000				1" Ice	7.100	7.100	0.128
Pirod 4' Side Mount Standoff (1) (Town)	C	From Face	1.000		0.000	54.000	No Ice	2.720	2.720	0.050
			0.000				1/2" Ice	4.910	4.910	0.089
			0.000				1" Ice	7.100	7.100	0.128
5' x 1" dia. Omni (Town)	C	From Face	2.000		3.500	54.000	No Ice	0.500	0.500	0.010
			0.000				1/2" Ice	1.017	1.017	0.015
			0.000				1" Ice	1.426	1.426	0.023

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz	Lateral							Vert
2-ft dish (Town)	A	Paraboloid w/o Radome	From Face	1.000		Worst		110.000	2.000	No Ice	3.140	0.050
				2.000						1/2" Ice	3.410	0.080
				0.000						1" Ice	3.680	0.100
2-ft dish (Town)	B	Paraboloid w/o Radome	From Face	1.000		Worst		110.000	2.000	No Ice	3.140	0.050
				2.000						1/2" Ice	3.410	0.080
				0.000						1" Ice	3.680	0.100
2-ft dish (Town)	C	Paraboloid w/o Radome	From Face	1.000		Worst		110.000	2.000	No Ice	3.140	0.050
				2.000						1/2" Ice	3.410	0.080
				0.000						1" Ice	3.680	0.100
1-ft Dish (Town)	A	Paraboloid w/o Radome	From Face	1.000		Worst		110.000	1.000	No Ice	0.790	0.010
				0.500						1/2" Ice	0.920	0.020
				0.000						1" Ice	1.050	0.030
1-ft Dish (Town)	B	Paraboloid w/o Radome	From Face	1.000		Worst		110.000	1.000	No Ice	0.790	0.010
				0.500						1/2" Ice	0.920	0.020
				0.000						1" Ice	1.050	0.030

Tower Pressures - No Ice

$$G_H = 1.100$$

Section Elevation	z	K _Z	q _z	A _G	F	A _F	A _R	A _{leg}	Leg %	C _A A _{In}	C _A A _{Out}
ft	ft		ksf	ft ²	c	ft ²	ft ²	ft ²	%	ft ²	ft ²
					e						

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 8 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section Elevation ft	z ft	K _Z	q _z ksf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 120.000-89.750	104.274	1.277	0.029	47.722	A	0.000	47.722	47.722	100.00	0.000	0.000
					B	0.000	47.722	100.00	0.000	0.000	
					C	0.000	47.722	100.00	0.000	0.050	
L2 89.750-70.000	79.631	1.206	0.028	37.728	A	0.000	37.728	37.728	100.00	0.000	0.000
					B	0.000	37.728	100.00	0.000	0.000	
					C	0.000	37.728	100.00	0.000	3.910	
L3 70.000-44.417	56.848	1.124	0.026	57.342	A	0.000	57.342	57.342	100.00	0.000	0.000
					B	0.000	57.342	100.00	0.000	8.954	
					C	0.000	57.342	100.00	0.000	5.065	
L4 44.417-35.000	39.663	1.042	0.024	23.137	A	0.000	23.137	23.137	100.00	0.000	0.000
					B	0.000	23.137	100.00	0.000	3.296	
					C	0.000	23.137	100.00	0.000	1.865	
L5 35.000-0.000	17.462	0.876	0.021	97.557	A	0.000	97.557	97.557	100.00	0.000	0.000
					B	0.000	97.557	100.00	0.000	12.250	
					C	0.000	97.557	100.00	0.000	6.138	

Tower Pressure - With Ice

$$G_H = 1.100$$

Section Elevation ft	z ft	K _Z	q _z ksf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 120.000-89.750	104.274	1.277	0.008	2.244	59.035	A	0.000	59.035	59.035	100.00	0.000	0.000
						B	0.000	59.035	100.00	0.000	0.000	
						C	0.000	59.035	100.00	0.000	0.162	
L2 89.750-70.000	79.631	1.206	0.007	2.184	45.114	A	0.000	45.114	45.114	100.00	0.000	0.000
						B	0.000	45.114	100.00	0.000	0.000	
						C	0.000	45.114	100.00	0.000	12.774	
L3 70.000-44.417	56.848	1.124	0.007	2.112	66.347	A	0.000	66.347	66.347	100.00	0.000	0.000
						B	0.000	66.347	100.00	0.000	19.759	
						C	0.000	66.347	100.00	0.000	15.871	
L4 44.417-35.000	39.663	1.042	0.006	2.037	26.452	A	0.000	26.452	26.452	100.00	0.000	0.000
						B	0.000	26.452	100.00	0.000	7.273	
						C	0.000	26.452	100.00	0.000	5.842	
L5 35.000-0.000	17.462	0.876	0.005	1.877	108.504	A	0.000	108.504	108.504	100.00	0.000	0.000
						B	0.000	108.504	100.00	0.000	25.387	
						C	0.000	108.504	100.00	0.000	17.773	

Tower Pressure - Service

$$G_H = 1.100$$

Section Elevation ft	z ft	K _Z	q _z ksf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 120.000-89.750	104.274	1.277	0.010	47.722	A	0.000	47.722	47.722	100.00	0.000	0.000
					B	0.000	47.722	100.00	0.000	0.000	
					C	0.000	47.722	100.00	0.000	0.050	
L2	79.631	1.206	0.009	37.728	A	0.000	37.728	37.728	100.00	0.000	0.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 9 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJJ

Section Elevation ft	z ft	K _z	q _z ksf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
89.750-70.000					B	0.000	37.728		100.00	0.000	0.000
					C	0.000	37.728		100.00	0.000	3.910
L3 70.000-44.417	56.848	1.124	0.009	57.342	A	0.000	57.342	57.342	100.00	0.000	0.000
					B	0.000	57.342		100.00	0.000	8.954
					C	0.000	57.342		100.00	0.000	5.065
L4 44.417-35.000	39.663	1.042	0.008	23.137	A	0.000	23.137	23.137	100.00	0.000	0.000
					B	0.000	23.137		100.00	0.000	3.296
					C	0.000	23.137		100.00	0.000	1.865
L5 35.000-0.000	17.462	0.876	0.007	97.557	A	0.000	97.557	97.557	100.00	0.000	0.000
					B	0.000	97.557		100.00	0.000	12.250
					C	0.000	97.557		100.00	0.000	6.138

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.097	1.131	A	1	0.65	0.029	1	1	47.722	0.998	0.033	C
			B	1	0.65		1	1	47.722			
			C	1	0.65		1	1	47.722			
L2 89.750-70.000	0.365	1.006	A	1	0.65	0.028	1	1	37.728	0.863	0.044	C
			B	1	0.65		1	1	37.728			
			C	1	0.65		1	1	37.728			
L3 70.000-44.417	0.481	1.992	A	1	1.2	0.026	1	1	57.342	2.343	0.092	C
			B	1	1.2		1	1	57.342			
			C	1	1.2		1	1	57.342			
L4 44.417-35.000	0.181	1.098	A	1	0.817	0.024	1	1	23.137	0.631	0.067	C
			B	1	0.817		1	1	23.137			
			C	1	0.817		1	1	23.137			
L5 35.000-0.000	0.590	4.482	A	1	0.761	0.021	1	1	97.557	2.098	0.060	C
			B	1	0.761		1	1	97.557			
			C	1	0.761		1	1	97.557			
Sum Weight:	1.714	9.709						OTM	367.667 kip-ft	6.933		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.097	1.131	A	1	0.65	0.029	1	1	47.722	0.998	0.033	C
			B	1	0.65		1	1	47.722			
			C	1	0.65		1	1	47.722			
L2 89.750-70.000	0.365	1.006	A	1	0.65	0.028	1	1	37.728	0.863	0.044	C
			B	1	0.65		1	1	37.728			
			C	1	0.65		1	1	37.728			
L3 70.000-44.417	0.481	1.992	A	1	1.2	0.026	1	1	57.342	2.343	0.092	C
			B	1	1.2		1	1	57.342			
			C	1	1.2		1	1	57.342			

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 10 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L4 44.417-35.000	0.181	1.098	A	1	0.817	0.024	1	1	23.137	0.631	0.067	C
			B	1	0.817		1	1	23.137			
			C	1	0.817		1	1	23.137			
L5 35.000-0.000	0.590	4.482	A	1	0.761	0.021	1	1	97.557	2.098	0.060	C
			B	1	0.761		1	1	97.557			
			C	1	0.761		1	1	97.557			
Sum Weight:	1.714	9.709						OTM	367.667 kip-ft	6.933		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.097	1.131	A	1	0.65	0.029	1	1	47.722	0.998	0.033	C
			B	1	0.65		1	1	47.722			
			C	1	0.65		1	1	47.722			
L2 89.750-70.000	0.365	1.006	A	1	0.65	0.028	1	1	37.728	0.863	0.044	C
			B	1	0.65		1	1	37.728			
			C	1	0.65		1	1	37.728			
L3 70.000-44.417	0.481	1.992	A	1	1.2	0.026	1	1	57.342	2.343	0.092	C
			B	1	1.2		1	1	57.342			
			C	1	1.2		1	1	57.342			
L4 44.417-35.000	0.181	1.098	A	1	0.817	0.024	1	1	23.137	0.631	0.067	C
			B	1	0.817		1	1	23.137			
			C	1	0.817		1	1	23.137			
L5 35.000-0.000	0.590	4.482	A	1	0.761	0.021	1	1	97.557	2.098	0.060	C
			B	1	0.761		1	1	97.557			
			C	1	0.761		1	1	97.557			
Sum Weight:	1.714	9.709						OTM	367.667 kip-ft	6.933		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.097	1.131	A	1	0.65	0.029	1	1	47.722	0.998	0.033	C
			B	1	0.65		1	1	47.722			
			C	1	0.65		1	1	47.722			
L2 89.750-70.000	0.365	1.006	A	1	0.65	0.028	1	1	37.728	0.863	0.044	C
			B	1	0.65		1	1	37.728			
			C	1	0.65		1	1	37.728			
L3 70.000-44.417	0.481	1.992	A	1	1.2	0.026	1	1	57.342	2.343	0.092	C
			B	1	1.2		1	1	57.342			
			C	1	1.2		1	1	57.342			
L4 44.417-35.000	0.181	1.098	A	1	0.817	0.024	1	1	23.137	0.631	0.067	C

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 11 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
44.417-35.000			B	1	0.817		1	1	23.137			
			C	1	0.817		1	1	23.137			
L5 35.000-0.000	0.590	4.482	A	1	0.761	0.021	1	1	97.557	2.098	0.060	C
			B	1	0.761		1	1	97.557			
			C	1	0.761		1	1	97.557			
Sum Weight:	1.714	9.709						OTM	367.667 kip-ft	6.933		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.100	2.881	A	1	1.2	0.008	1	1	59.035	0.606	0.020	C
			B	1	1.2		1	1	59.035			
			C	1	1.2		1	1	59.035			
L2 89.750-70.000	0.604	2.325	A	1	1.2	0.007	1	1	45.114	0.540	0.027	C
			B	1	1.2		1	1	45.114			
			C	1	1.2		1	1	45.114			
L3 70.000-44.417	0.757	3.899	A	1	1.2	0.007	1	1	66.347	0.866	0.034	C
			B	1	1.2		1	1	66.347			
			C	1	1.2		1	1	66.347			
L4 44.417-35.000	0.283	1.834	A	1	1.2	0.006	1	1	26.452	0.313	0.033	C
			B	1	1.2		1	1	26.452			
			C	1	1.2		1	1	26.452			
L5 35.000-0.000	0.869	7.305	A	1	1.2	0.005	1	1	108.504	1.043	0.030	C
			B	1	1.2		1	1	108.504			
			C	1	1.2		1	1	108.504			
Sum Weight:	2.613	18.243						OTM	186.018 kip-ft	3.367		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.100	2.881	A	1	1.2	0.008	1	1	59.035	0.606	0.020	C
			B	1	1.2		1	1	59.035			
			C	1	1.2		1	1	59.035			
L2 89.750-70.000	0.604	2.325	A	1	1.2	0.007	1	1	45.114	0.540	0.027	C
			B	1	1.2		1	1	45.114			
			C	1	1.2		1	1	45.114			
L3 70.000-44.417	0.757	3.899	A	1	1.2	0.007	1	1	66.347	0.866	0.034	C
			B	1	1.2		1	1	66.347			
			C	1	1.2		1	1	66.347			
L4 44.417-35.000	0.283	1.834	A	1	1.2	0.006	1	1	26.452	0.313	0.033	C
			B	1	1.2		1	1	26.452			

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 12 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L5 35.000-0.000	0.869	7.305	C	1	1.2	0.005	1	1	26.452	1.043	0.030	C
			A	1	1.2		1	1	108.504			
			B	1	1.2		1	1	108.504			
			C	1	1.2		1	1	108.504			
Sum Weight:	2.613	18.243						OTM	186.018 kip-ft	3.367		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.75	0.100	2.881	A	1	1.2	0.008	1	1	59.035	0.606	0.020	C
			B	1	1.2		1	1	59.035			
			C	1	1.2		1	1	59.035			
L2 89.750-70.000	0.604	2.325	A	1	1.2	0.007	1	1	45.114	0.540	0.027	C
			B	1	1.2		1	1	45.114			
			C	1	1.2		1	1	45.114			
L3 70.000-44.417	0.757	3.899	A	1	1.2	0.007	1	1	66.347	0.866	0.034	C
			B	1	1.2		1	1	66.347			
			C	1	1.2		1	1	66.347			
L4 44.417-35.000	0.283	1.834	A	1	1.2	0.006	1	1	26.452	0.313	0.033	C
			B	1	1.2		1	1	26.452			
			C	1	1.2		1	1	26.452			
L5 35.000-0.000	0.869	7.305	A	1	1.2	0.005	1	1	108.504	1.043	0.030	C
			B	1	1.2		1	1	108.504			
			C	1	1.2		1	1	108.504			
Sum Weight:	2.613	18.243							OTM			

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.75	0.100	2.881	A	1	1.2	0.008	1	1	59.035	0.606	0.020	C
			B	1	1.2		1	1	59.035			
			C	1	1.2		1	1	59.035			
L2 89.750-70.000	0.604	2.325	A	1	1.2	0.007	1	1	45.114	0.540	0.027	C
			B	1	1.2		1	1	45.114			
			C	1	1.2		1	1	45.114			
L3 70.000-44.417	0.757	3.899	A	1	1.2	0.007	1	1	66.347	0.866	0.034	C
			B	1	1.2		1	1	66.347			
			C	1	1.2		1	1	66.347			
L4 44.417-35.000	0.283	1.834	A	1	1.2	0.006	1	1	26.452	0.313	0.033	C
			B	1	1.2		1	1	26.452			
			C	1	1.2		1	1	26.452			

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 13 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L5 35.000-0.000	0.869	7.305	A	1	1.2	0.005	1	1	108.504	1.043	0.030	C
			B	1	1.2		1	1	108.504			
			C	1	1.2		1	1	108.504			
Sum Weight:	2.613	18.243						OTM	186.018 kip-ft	3.367		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.097	1.131	A	1	0.65	0.010	1	1	47.722	0.342	0.011	C
			B	1	0.65		1	1	47.722			
			C	1	0.65		1	1	47.722			
L2 89.750-70.000	0.365	1.006	A	1	0.65	0.009	1	1	37.728	0.296	0.015	C
			B	1	0.65		1	1	37.728			
			C	1	0.65		1	1	37.728			
L3 70.000-44.417	0.481	1.992	A	1	1.2	0.009	1	1	57.342	0.802	0.031	C
			B	1	1.2		1	1	57.342			
			C	1	1.2		1	1	57.342			
L4 44.417-35.000	0.181	1.098	A	1	0.817	0.008	1	1	23.137	0.216	0.023	C
			B	1	0.817		1	1	23.137			
			C	1	0.817		1	1	23.137			
L5 35.000-0.000	0.590	4.482	A	1	0.761	0.007	1	1	97.557	0.718	0.021	C
			B	1	0.761		1	1	97.557			
			C	1	0.761		1	1	97.557			
Sum Weight:	1.714	9.709						OTM	125.866 kip-ft	2.374		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.097	1.131	A	1	0.65	0.010	1	1	47.722	0.342	0.011	C
			B	1	0.65		1	1	47.722			
			C	1	0.65		1	1	47.722			
L2 89.750-70.000	0.365	1.006	A	1	0.65	0.009	1	1	37.728	0.296	0.015	C
			B	1	0.65		1	1	37.728			
			C	1	0.65		1	1	37.728			
L3 70.000-44.417	0.481	1.992	A	1	1.2	0.009	1	1	57.342	0.802	0.031	C
			B	1	1.2		1	1	57.342			
			C	1	1.2		1	1	57.342			
L4 44.417-35.000	0.181	1.098	A	1	0.817	0.008	1	1	23.137	0.216	0.023	C
			B	1	0.817		1	1	23.137			
			C	1	0.817		1	1	23.137			
L5 35.000-0.000	0.590	4.482	A	1	0.761	0.007	1	1	97.557	0.718	0.021	C

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 14 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJJ

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
35.000-0.000			B	1	0.761		1	1	97.557			
			C	1	0.761		1	1	97.557			
Sum Weight:	1.714	9.709						OTM	125.866 kip-ft	2.374		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.097	1.131	A	1	0.65	0.010	1	1	47.722	0.342	0.011	C
			B	1	0.65		1	1	47.722			
			C	1	0.65		1	1	47.722			
L2 89.750-70.000	0.365	1.006	A	1	0.65	0.009	1	1	37.728	0.296	0.015	C
			B	1	0.65		1	1	37.728			
			C	1	0.65		1	1	37.728			
L3 70.000-44.417	0.481	1.992	A	1	1.2	0.009	1	1	57.342	0.802	0.031	C
			B	1	1.2		1	1	57.342			
			C	1	1.2		1	1	57.342			
L4 44.417-35.000	0.181	1.098	A	1	0.817	0.008	1	1	23.137	0.216	0.023	C
			B	1	0.817		1	1	23.137			
			C	1	0.817		1	1	23.137			
L5 35.000-0.000	0.590	4.482	A	1	0.761	0.007	1	1	97.557	0.718	0.021	C
			B	1	0.761		1	1	97.557			
			C	1	0.761		1	1	97.557			
Sum Weight:	1.714	9.709						OTM	125.866 kip-ft	2.374		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
L1 120.000-89.750	0.097	1.131	A	1	0.65	0.010	1	1	47.722	0.342	0.011	C
			B	1	0.65		1	1	47.722			
			C	1	0.65		1	1	47.722			
L2 89.750-70.000	0.365	1.006	A	1	0.65	0.009	1	1	37.728	0.296	0.015	C
			B	1	0.65		1	1	37.728			
			C	1	0.65		1	1	37.728			
L3 70.000-44.417	0.481	1.992	A	1	1.2	0.009	1	1	57.342	0.802	0.031	C
			B	1	1.2		1	1	57.342			
			C	1	1.2		1	1	57.342			
L4 44.417-35.000	0.181	1.098	A	1	0.817	0.008	1	1	23.137	0.216	0.023	C
			B	1	0.817		1	1	23.137			
			C	1	0.817		1	1	23.137			
L5 35.000-0.000	0.590	4.482	A	1	0.761	0.007	1	1	97.557	0.718	0.021	C
			B	1	0.761		1	1	97.557			

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 15 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e C	e	C _F	q _z ksf	D _F	D _R	A _E ft ²	F K	w klf	Ctrl. Face
Sum Weight:	1.714	9.709		1	0.761		1	1 OTM	97.557 125.866 kip-ft	2.374		

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	9.709					
Bracing Weight	0.000					
Total Member Self-Weight	9.709			0.139	0.298	
Total Weight	16.754			0.139	0.298	
Wind 0 deg - No Ice		-0.030	-12.350	-882.168	3.091	-0.224
Wind 30 deg - No Ice		6.131	-10.680	-762.565	-436.824	0.163
Wind 45 deg - No Ice		8.686	-8.711	-621.771	-619.331	0.346
Wind 60 deg - No Ice		10.650	-6.149	-438.596	-759.612	0.506
Wind 90 deg - No Ice		12.315	0.030	2.932	-878.783	0.713
Wind 120 deg - No Ice		10.680	6.201	443.711	-762.406	0.730
Wind 135 deg - No Ice		8.729	8.754	625.999	-623.282	0.663
Wind 150 deg - No Ice		6.184	10.710	765.635	-441.662	0.550
Wind 180 deg - No Ice		0.030	12.350	882.445	-2.496	0.224
Wind 210 deg - No Ice		-6.131	10.680	762.842	437.419	-0.163
Wind 225 deg - No Ice		-8.686	8.711	622.048	619.927	-0.346
Wind 240 deg - No Ice		-10.650	6.149	438.873	760.207	-0.506
Wind 270 deg - No Ice		-12.315	-0.030	-2.655	879.379	-0.713
Wind 300 deg - No Ice		-10.680	-6.201	-443.434	763.001	-0.730
Wind 315 deg - No Ice		-8.729	-8.754	-625.721	623.877	-0.663
Wind 330 deg - No Ice		-6.184	-10.710	-765.358	442.257	-0.550
Member Ice	8.534					
Total Weight Ice	40.749			0.834	2.356	
Wind 0 deg - Ice		-0.009	-6.143	-440.592	3.190	-0.334
Wind 30 deg - Ice		3.059	-5.316	-381.035	-217.153	-0.090
Wind 45 deg - Ice		4.330	-4.338	-310.712	-308.509	0.046
Wind 60 deg - Ice		5.307	-3.064	-219.157	-378.679	0.179
Wind 90 deg - Ice		6.133	0.009	1.667	-438.107	0.399
Wind 120 deg - Ice		5.316	3.080	222.268	-379.513	0.513
Wind 135 deg - Ice		4.343	4.350	313.558	-309.687	0.518
Wind 150 deg - Ice		3.074	5.325	383.536	-218.597	0.489
Wind 180 deg - Ice		0.009	6.143	442.259	1.523	0.334
Wind 210 deg - Ice		-3.059	5.316	382.703	221.866	0.090
Wind 225 deg - Ice		-4.330	4.338	312.379	313.221	-0.046
Wind 240 deg - Ice		-5.307	3.064	220.825	383.391	-0.179
Wind 270 deg - Ice		-6.133	-0.009	0.000	442.819	-0.399
Wind 300 deg - Ice		-5.316	-3.080	-220.601	384.225	-0.513
Wind 315 deg - Ice		-4.343	-4.350	-311.891	314.400	-0.518
Wind 330 deg - Ice		-3.074	-5.325	-381.869	223.310	-0.489
Total Weight	16.754			0.139	0.298	
Wind 0 deg - Service		-0.010	-4.228	-302.003	1.088	-0.149
Wind 30 deg - Service		2.099	-3.656	-261.059	-149.511	-0.117
Wind 45 deg - Service		2.974	-2.982	-212.860	-211.990	-0.088
Wind 60 deg - Service		3.646	-2.105	-150.152	-260.013	-0.053
Wind 90 deg - Service		4.216	0.010	0.999	-300.810	0.024

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 16 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJJ

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 120 deg - Service		3.656	2.123	151.894	-260.970	0.096
Wind 135 deg - Service		2.988	2.997	214.298	-213.342	0.123
Wind 150 deg - Service		2.117	3.667	262.101	-151.167	0.142
Wind 180 deg - Service		0.010	4.228	302.090	-0.824	0.149
Wind 210 deg - Service		-2.099	3.656	261.145	149.775	0.117
Wind 225 deg - Service		-2.974	2.982	212.946	212.254	0.088
Wind 240 deg - Service		-3.646	2.105	150.238	260.278	0.053
Wind 270 deg - Service		-4.216	-0.010	-0.913	301.075	-0.024
Wind 300 deg - Service		-3.656	-2.123	-151.808	261.234	-0.096
Wind 315 deg - Service		-2.988	-2.997	-214.212	213.607	-0.123
Wind 330 deg - Service		-2.117	-3.667	-262.015	151.432	-0.142

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 17 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Comb. No.	Description
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 89.75	Pole	Max Tension	47	0.000	-0.000	0.000
			Max. Compression	34	-16.572	0.525	-0.253
			Max. Mx	26	-3.893	79.204	-0.013
			Max. My	18	-3.891	0.048	-79.160
			Max. Vy	10	7.585	-49.370	-0.099
			Max. Vx	2	-7.614	0.125	49.494
			Max. Torque	32			0.717
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-26.558	1.473	-0.727
			Max. Mx	26	-8.360	314.274	1.041
L2	89.75 - 70	Pole	Max. My	18	-8.352	-0.966	-315.472
			Max. Vy	26	-11.754	314.274	1.041
			Max. Vx	18	11.812	-0.966	-315.472
			Max. Torque	32			0.915
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-31.971	2.194	-0.666
			Max. Mx	26	-11.212	609.633	2.155
			Max. My	18	-11.205	-2.026	-612.080
			Max. Vy	26	-15.413	609.633	2.155
			Max. Vx	18	15.471	-2.026	-612.080
L3	70 - 44.417	Pole	Max. Torque	30			0.933
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-35.370	2.417	-0.782
			Max. Mx	26	-13.362	820.584	2.796
			Max. My	18	-13.357	-2.643	-823.775
			Max. Vy	26	-16.886	820.584	2.796
			Max. Vx	18	16.944	-2.643	-823.775

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 18 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJJ

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L5	35 - 0	Pole	Max. Torque	30			0.925
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-44.558	2.826	-1.019
			Max. Mx	26	-20.086	1462.084	4.489
			Max. My	18	-20.085	-4.288	-1467.241
			Max. Vy	26	-19.723	1462.084	4.489
			Max. Vx	18	19.779	-4.288	-1467.241
			Max. Torque	28			1.164

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	47	44.558	6.133	0.009
	Max. H _x	26	20.105	19.703	0.049
	Max. H _z	2	20.105	0.049	19.759
	Max. M _x	2	1466.891	0.049	19.759
	Max. M _z	10	1461.331	-19.703	-0.049
	Max. Torsion	28	1.164	17.088	9.922
	Min. Vert	31	15.078	13.967	14.006
	Min. H _x	10	20.105	-19.703	-0.049
	Min. H _z	18	20.105	-0.049	-19.759
	Min. M _x	18	-1467.241	-0.049	-19.759
	Min. M _z	26	-1462.084	19.703	0.049
	Min. Torsion	12	-1.161	-17.088	-9.922

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	16.754	0.000	0.000	0.139	0.298	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	20.105	-0.049	-19.759	-1466.891	5.029	-0.355
0.9 Dead+1.6 Wind 0 deg - No Ice	15.078	-0.049	-19.759	-1451.950	4.881	-0.353
1.2 Dead+1.6 Wind 30 deg - No Ice	20.105	9.810	-17.088	-1268.029	-726.445	0.261
0.9 Dead+1.6 Wind 30 deg - No Ice	15.078	9.810	-17.088	-1255.121	-719.122	0.263
1.2 Dead+1.6 Wind 45 deg - No Ice	20.105	13.898	-13.938	-1033.923	-1029.918	0.553
0.9 Dead+1.6 Wind 45 deg - No Ice	15.078	13.898	-13.938	-1023.407	-1019.496	0.554
1.2 Dead+1.6 Wind 60 deg - No Ice	20.105	17.039	-9.838	-729.341	-1263.178	0.807
0.9 Dead+1.6 Wind 60 deg - No Ice	15.078	17.039	-9.838	-721.936	-1250.373	0.807
1.2 Dead+1.6 Wind 90 deg - No Ice	20.105	19.703	0.049	4.828	-1461.331	1.136
0.9 Dead+1.6 Wind 90 deg - No Ice	15.078	19.703	0.049	4.732	-1446.500	1.135

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	15001.060 - Hartford 9	Page	19 of 36
	Project	120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date	13:08:00 11/14/16
	Client	Verizon Wireless	Designed by	TJL

Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
1.2 Dead+1.6 Wind 120 deg - No Ice	20.105	17.088	9.922	737.736	-1267.815	1.161
0.9 Dead+1.6 Wind 120 deg - No Ice	15.078	17.088	9.922	730.154	-1254.959	1.160
1.2 Dead+1.6 Wind 135 deg - No Ice	20.105	13.967	14.006	1040.830	-1036.487	1.055
0.9 Dead+1.6 Wind 135 deg - No Ice	15.078	13.967	14.006	1030.153	-1025.992	1.053
1.2 Dead+1.6 Wind 150 deg - No Ice	20.105	9.894	17.136	1273.008	-734.503	0.877
0.9 Dead+1.6 Wind 150 deg - No Ice	15.078	9.894	17.136	1259.959	-727.092	0.875
1.2 Dead+1.6 Wind 180 deg - No Ice	20.105	0.049	19.759	1467.241	-4.288	0.358
0.9 Dead+1.6 Wind 180 deg - No Ice	15.078	0.049	19.759	1452.208	-4.333	0.356
1.2 Dead+1.6 Wind 210 deg - No Ice	20.105	-9.810	17.088	1268.382	727.194	-0.258
0.9 Dead+1.6 Wind 210 deg - No Ice	15.078	-9.810	17.088	1255.381	719.676	-0.260
1.2 Dead+1.6 Wind 225 deg - No Ice	20.105	-13.898	13.938	1034.274	1030.672	-0.551
0.9 Dead+1.6 Wind 225 deg - No Ice	15.078	-13.898	13.938	1023.666	1020.053	-0.552
1.2 Dead+1.6 Wind 240 deg - No Ice	20.105	-17.039	9.838	729.688	1263.934	-0.807
0.9 Dead+1.6 Wind 240 deg - No Ice	15.078	-17.039	9.838	722.192	1250.931	-0.807
1.2 Dead+1.6 Wind 270 deg - No Ice	20.105	-19.703	-0.049	-4.489	1462.084	-1.139
0.9 Dead+1.6 Wind 270 deg - No Ice	15.078	-19.703	-0.049	-4.482	1447.057	-1.138
1.2 Dead+1.6 Wind 300 deg - No Ice	20.105	-17.088	-9.922	-737.400	1268.560	-1.164
0.9 Dead+1.6 Wind 300 deg - No Ice	15.078	-17.088	-9.922	-729.905	1255.509	-1.163
1.2 Dead+1.6 Wind 315 deg - No Ice	20.105	-13.967	-14.006	-1040.492	1037.228	-1.057
0.9 Dead+1.6 Wind 315 deg - No Ice	15.078	-13.967	-14.006	-1029.903	1026.540	-1.055
1.2 Dead+1.6 Wind 330 deg - No Ice	20.105	-9.894	-17.136	-1272.666	735.242	-0.877
0.9 Dead+1.6 Wind 330 deg - No Ice	15.078	-9.894	-17.136	-1259.706	727.638	-0.875
1.2 Dead+1.0 Ice+1.0 Temp	44.558	-0.000	0.000	1.019	2.826	-0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	44.558	-0.009	-6.143	-495.620	3.832	-0.354
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	44.558	3.059	-5.316	-428.607	-244.077	-0.102
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	44.558	4.330	-4.338	-349.483	-346.863	0.039
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	44.558	5.307	-3.064	-246.471	-425.813	0.177
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	44.558	6.133	0.009	1.985	-492.680	0.408
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	44.558	5.316	3.080	250.188	-426.760	0.530
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	44.558	4.343	4.350	352.899	-348.202	0.539
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	44.558	3.074	5.325	431.633	-245.717	0.511

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 20 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

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
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	44.558	0.009	6.143	497.702	1.941	0.354
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	44.558	-3.059	5.316	430.690	249.854	0.102
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	44.558	-4.330	4.338	351.565	352.641	-0.039
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	44.558	-5.307	3.064	248.552	431.592	-0.177
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	44.558	-6.133	-0.009	0.093	498.458	-0.408
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	44.558	-5.316	-3.080	-248.111	432.535	-0.531
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	44.558	-4.343	-4.350	-350.822	353.975	-0.539
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	44.558	-3.074	-5.325	-429.554	251.489	-0.511
Dead+Wind 0 deg - Service	16.754	-0.010	-4.228	-312.119	1.304	-0.151
Dead+Wind 30 deg - Service	16.754	2.099	-3.656	-269.788	-154.389	-0.118
Dead+Wind 45 deg - Service	16.754	2.974	-2.982	-219.959	-218.982	-0.089
Dead+Wind 60 deg - Service	16.754	3.646	-2.105	-155.128	-268.629	-0.054
Dead+Wind 90 deg - Service	16.754	4.216	0.010	1.137	-310.807	0.025
Dead+Wind 120 deg - Service	16.754	3.656	2.123	157.136	-269.620	0.097
Dead+Wind 135 deg - Service	16.754	2.988	2.997	221.651	-220.384	0.124
Dead+Wind 150 deg - Service	16.754	2.117	3.667	271.070	-156.105	0.143
Dead+Wind 180 deg - Service	16.754	0.010	4.228	312.410	-0.678	0.151
Dead+Wind 210 deg - Service	16.754	-2.099	3.656	270.079	155.015	0.118
Dead+Wind 225 deg - Service	16.754	-2.974	2.982	220.250	219.608	0.089
Dead+Wind 240 deg - Service	16.754	-3.646	2.105	155.420	269.256	0.054
Dead+Wind 270 deg - Service	16.754	-4.216	-0.010	-0.846	311.433	-0.025
Dead+Wind 300 deg - Service	16.754	-3.656	-2.123	-156.845	270.247	-0.097
Dead+Wind 315 deg - Service	16.754	-2.988	-2.997	-221.360	221.010	-0.125
Dead+Wind 330 deg - Service	16.754	-2.117	-3.667	-270.779	156.731	-0.143

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-16.754	0.000	0.000	16.754	0.000	0.000%
2	-0.049	-20.105	-19.759	0.049	20.105	19.759	0.000%
3	-0.049	-15.078	-19.759	0.049	15.078	19.759	0.000%
4	9.810	-20.105	-17.088	-9.810	20.105	17.088	0.000%
5	9.810	-15.078	-17.088	-9.810	15.078	17.088	0.000%
6	13.898	-20.105	-13.938	-13.898	20.105	13.938	0.000%
7	13.898	-15.078	-13.938	-13.898	15.078	13.938	0.000%
8	17.039	-20.105	-9.838	-17.039	20.105	9.838	0.000%
9	17.039	-15.078	-9.838	-17.039	15.078	9.838	0.000%
10	19.703	-20.105	0.049	-19.703	20.105	-0.049	0.000%
11	19.703	-15.078	0.049	-19.703	15.078	-0.049	0.000%
12	17.088	-20.105	9.922	-17.088	20.105	-9.922	0.000%
13	17.088	-15.078	9.922	-17.088	15.078	-9.922	0.000%
14	13.967	-20.105	14.006	-13.967	20.105	-14.006	0.000%
15	13.967	-15.078	14.006	-13.967	15.078	-14.006	0.000%
16	9.894	-20.105	17.136	-9.894	20.105	-17.136	0.000%
17	9.894	-15.078	17.136	-9.894	15.078	-17.136	0.000%
18	0.049	-20.105	19.759	-0.049	20.105	-19.759	0.000%
19	0.049	-15.078	19.759	-0.049	15.078	-19.759	0.000%
20	-9.810	-20.105	17.088	9.810	20.105	-17.088	0.000%

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 21 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
21	-9.810	-15.078	17.088	9.810	15.078	-17.088	0.000%
22	-13.898	-20.105	13.938	13.898	20.105	-13.938	0.000%
23	-13.898	-15.078	13.938	13.898	15.078	-13.938	0.000%
24	-17.039	-20.105	9.838	17.039	20.105	-9.838	0.000%
25	-17.039	-15.078	9.838	17.039	15.078	-9.838	0.000%
26	-19.703	-20.105	-0.049	19.703	20.105	0.049	0.000%
27	-19.703	-15.078	-0.049	19.703	15.078	0.049	0.000%
28	-17.088	-20.105	-9.922	17.088	20.105	9.922	0.000%
29	-17.088	-15.078	-9.922	17.088	15.078	9.922	0.000%
30	-13.967	-20.105	-14.006	13.967	20.105	14.006	0.000%
31	-13.967	-15.078	-14.006	13.967	15.078	14.006	0.000%
32	-9.894	-20.105	-17.136	9.894	20.105	17.136	0.000%
33	-9.894	-15.078	-17.136	9.894	15.078	17.136	0.000%
34	0.000	-44.558	0.000	0.000	44.558	-0.000	0.000%
35	-0.009	-44.558	-6.143	0.009	44.558	6.143	0.000%
36	3.059	-44.558	-5.316	-3.059	44.558	5.316	0.000%
37	4.330	-44.558	-4.338	-4.330	44.558	4.338	0.000%
38	5.307	-44.558	-3.064	-5.307	44.558	3.064	0.000%
39	6.133	-44.558	0.009	-6.133	44.558	-0.009	0.000%
40	5.316	-44.558	3.080	-5.316	44.558	-3.080	0.000%
41	4.343	-44.558	4.350	-4.343	44.558	-4.350	0.000%
42	3.074	-44.558	5.325	-3.074	44.558	-5.325	0.000%
43	0.009	-44.558	6.143	-0.009	44.558	-6.143	0.000%
44	-3.059	-44.558	5.316	3.059	44.558	-5.316	0.000%
45	-4.330	-44.558	4.338	4.330	44.558	-4.338	0.000%
46	-5.307	-44.558	3.064	5.307	44.558	-3.064	0.000%
47	-6.133	-44.558	-0.009	6.133	44.558	0.009	0.000%
48	-5.316	-44.558	-3.080	5.316	44.558	3.080	0.000%
49	-4.343	-44.558	-4.350	4.343	44.558	4.350	0.000%
50	-3.074	-44.558	-5.325	3.074	44.558	5.325	0.000%
51	-0.010	-16.754	-4.228	0.010	16.754	4.228	0.000%
52	2.099	-16.754	-3.656	-2.099	16.754	3.656	0.000%
53	2.974	-16.754	-2.982	-2.974	16.754	2.982	0.000%
54	3.646	-16.754	-2.105	-3.646	16.754	2.105	0.000%
55	4.216	-16.754	0.010	-4.216	16.754	-0.010	0.000%
56	3.656	-16.754	2.123	-3.656	16.754	-2.123	0.000%
57	2.988	-16.754	2.997	-2.988	16.754	-2.997	0.000%
58	2.117	-16.754	3.667	-2.117	16.754	-3.667	0.000%
59	0.010	-16.754	4.228	-0.010	16.754	-4.228	0.000%
60	-2.099	-16.754	3.656	2.099	16.754	-3.656	0.000%
61	-2.974	-16.754	2.982	2.974	16.754	-2.982	0.000%
62	-3.646	-16.754	2.105	3.646	16.754	-2.105	0.000%
63	-4.216	-16.754	-0.010	4.216	16.754	0.010	0.000%
64	-3.656	-16.754	-2.123	3.656	16.754	2.123	0.000%
65	-2.988	-16.754	-2.997	2.988	16.754	2.997	0.000%
66	-2.117	-16.754	-3.667	2.117	16.754	3.667	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00016655
3	Yes	5	0.00000001	0.00007236
4	Yes	6	0.00000001	0.00013967
5	Yes	6	0.00000001	0.00004088

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	15001.060 - Hartford 9	Page	22 of 36
	Project	120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date	13:08:00 11/14/16
	Client	Verizon Wireless	Designed by	TJL

6	Yes	6	0.00000001	0.00015284
7	Yes	6	0.00000001	0.00004340
8	Yes	6	0.00000001	0.00014069
9	Yes	6	0.00000001	0.00004124
10	Yes	5	0.00000001	0.00013757
11	Yes	5	0.00000001	0.00005997
12	Yes	6	0.00000001	0.00014830
13	Yes	6	0.00000001	0.00004361
14	Yes	6	0.00000001	0.00015454
15	Yes	6	0.00000001	0.00004373
16	Yes	6	0.00000001	0.00013819
17	Yes	6	0.00000001	0.00004014
18	Yes	5	0.00000001	0.00011694
19	Yes	5	0.00000001	0.00005110
20	Yes	6	0.00000001	0.00014381
21	Yes	6	0.00000001	0.00004225
22	Yes	6	0.00000001	0.00015310
23	Yes	6	0.00000001	0.00004344
24	Yes	6	0.00000001	0.00014261
25	Yes	6	0.00000001	0.00004186
26	Yes	5	0.00000001	0.00008787
27	Yes	5	0.00000001	0.00003859
28	Yes	6	0.00000001	0.00013853
29	Yes	6	0.00000001	0.00004025
30	Yes	6	0.00000001	0.00015473
31	Yes	6	0.00000001	0.00004377
32	Yes	6	0.00000001	0.00014884
33	Yes	6	0.00000001	0.00004376
34	Yes	4	0.00000001	0.00013166
35	Yes	6	0.00000001	0.00032605
36	Yes	6	0.00000001	0.00056135
37	Yes	6	0.00000001	0.00063145
38	Yes	6	0.00000001	0.00056914
39	Yes	6	0.00000001	0.00031965
40	Yes	6	0.00000001	0.00059590
41	Yes	6	0.00000001	0.00064525
42	Yes	6	0.00000001	0.00056574
43	Yes	6	0.00000001	0.00032780
44	Yes	6	0.00000001	0.00060008
45	Yes	6	0.00000001	0.00065532
46	Yes	6	0.00000001	0.00059008
47	Yes	6	0.00000001	0.00032523
48	Yes	6	0.00000001	0.00057641
49	Yes	6	0.00000001	0.00065585
50	Yes	6	0.00000001	0.00060897
51	Yes	4	0.00000001	0.00020010
52	Yes	4	0.00000001	0.00083149
53	Yes	5	0.00000001	0.00004842
54	Yes	4	0.00000001	0.00089838
55	Yes	4	0.00000001	0.00010778
56	Yes	4	0.00000001	0.00096638
57	Yes	5	0.00000001	0.00004989
58	Yes	4	0.00000001	0.00083647
59	Yes	4	0.00000001	0.00018891
60	Yes	4	0.00000001	0.00095244
61	Yes	5	0.00000001	0.00004895
62	Yes	4	0.00000001	0.00087123
63	Yes	4	0.00000001	0.00010167
64	Yes	4	0.00000001	0.00085299
65	Yes	5	0.00000001	0.00005013
66	Yes	4	0.00000001	0.00099712

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 23 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 89.75	20.159	66	1.340	0.005
L2	92.42 - 70	12.524	66	1.268	0.003
L3	70 - 44.417	7.132	66	0.978	0.001
L4	48 - 35	3.323	66	0.665	0.001
L5	35 - 0	1.740	66	0.474	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
117.000	DB809K-XC	66	19.310	1.341	0.005	47661
110.000	2-ft dish	66	17.336	1.340	0.004	23830
105.000	(2) AIR21 B2A/B4P	66	15.940	1.332	0.004	15887
92.000	DB-T1-6Z-8AB-0Z	66	12.413	1.264	0.003	8223
90.000	EEl 6-ft T-Arm	66	11.889	1.245	0.003	7368
54.000	PD1142-1	66	4.219	0.750	0.001	4288

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 89.75	94.663	32	6.307	0.028
L2	92.42 - 70	58.835	32	5.968	0.015
L3	70 - 44.417	33.516	32	4.602	0.008
L4	48 - 35	15.617	32	3.126	0.004
L5	35 - 0	8.177	32	2.228	0.003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
117.000	DB809K-XC	32	90.678	6.312	0.026	10432
110.000	2-ft dish	32	81.416	6.305	0.023	5215
105.000	(2) AIR21 B2A/B4P	32	74.865	6.269	0.021	3475
92.000	DB-T1-6Z-8AB-0Z	32	58.315	5.951	0.015	1794
90.000	EEl 6-ft T-Arm	32	55.854	5.862	0.014	1604
54.000	PD1142-1	32	19.831	3.531	0.005	918

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 24 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	120 - 118.548	TP21.287x16x0.188	30.250	0.000	0.0	9.561	-0.145	710.364	0.000
	118.548 - 117.097					-0.109	721.582	0.000	
	117.097 - 115.645					9.863	-0.888	732.799	0.001
	115.645 - 114.194					10.014	-0.250	744.016	0.000
	114.194 - 112.742					10.165	-0.307	755.234	0.000
	112.742 - 111.291					10.316	-0.366	766.451	0.000
	111.291 - 109.839					10.467	-0.582	777.669	0.001
	109.839 - 108.387					10.618	-0.642	788.886	0.001
	108.387 - 106.936					10.769	-0.702	800.103	0.001
	106.936 - 105.484					10.920	-0.764	811.321	0.001
	105.484 - 104.033					11.071	-3.344	822.538	0.004
	104.033 - 102.581					11.222	-3.409	832.693	0.004
	102.581 - 101.129					11.373	-3.474	841.029	0.004
	101.129 - 99.6779					11.524	-3.541	849.289	0.004
	99.6779 - 98.2263					11.675	-3.609	857.473	0.004
	98.2263 - 96.7747					11.826	-3.678	865.581	0.004
	96.7747 - 95.3232					11.977	-3.748	873.612	0.004
	95.3232 - 93.8716					12.128	-3.820	881.568	0.004
	93.8716 - 92.42					12.279	-3.893	889.447	0.004
	92.42 - 89.75					12.557	-4.499	903.742	0.005
L2	92.42 - 89.75	TP24.252x20.445x0.188	22.420	0.000	0.0	12.326	-2.219	891.865	0.002
	89.75 - 88.7105					12.431	-6.795	897.285	0.008
	88.7105 - 87.6711					12.536	-6.872	902.668	0.008
	87.6711 - 86.6316					12.641	-6.950	908.015	0.008
	86.6316 - 85.5921					12.746	-7.028	913.324	0.008
	85.5921 - 84.5526					12.851	-7.109	918.597	0.008
	84.5526 - 83.5132					12.956	-7.191	923.833	0.008
	83.5132 - 82.4737					13.061	-7.274	929.032	0.008

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 25 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
	82.4737 - 81.4342					13.166	-7.357	934.194	0.008
	81.4342 - 80.3947					13.271	-7.442	939.320	0.008
	80.3947 - 79.3553					13.376	-7.528	944.408	0.008
	79.3553 - 78.3158					13.481	-7.615	949.460	0.008
	78.3158 - 77.2763					13.586	-7.703	954.475	0.008
	77.2763 - 76.2368					13.691	-7.793	959.453	0.008
	76.2368 - 75.1974					13.796	-7.883	964.394	0.008
	75.1974 - 74.1579					13.901	-7.974	969.299	0.008
	74.1579 - 73.1184					14.006	-8.066	974.166	0.008
	73.1184 - 72.0789					14.111	-8.159	978.997	0.008
	72.0789 - 71.0395					14.216	-8.253	983.791	0.008
	71.0395 - 70					14.321	-8.348	988.548	0.008
L3	70 - 68.8421	TP28.725x24.252x0.275	25.583	0.000	0.0	21.105	-8.477	1568.000	0.005
	68.8421 - 67.6842					21.282	-8.605	1581.130	0.005
	67.6842 - 66.5263					21.458	-8.735	1594.260	0.005
	66.5263 - 65.3684					21.635	-8.866	1607.380	0.006
	65.3684 - 64.2105					21.812	-8.998	1620.510	0.006
	64.2105 - 63.0526					21.989	-9.132	1633.640	0.006
	63.0526 - 61.8947					22.165	-9.267	1646.770	0.006
	61.8947 - 60.7368					22.342	-9.403	1659.900	0.006
	60.7368 - 59.5789					22.519	-9.541	1673.030	0.006
	59.5789 - 58.4211					22.695	-9.680	1686.160	0.006
	58.4211 - 57.2632					22.872	-9.821	1699.280	0.006
	57.2632 - 56.1053					23.049	-9.963	1712.410	0.006
	56.1053 - 54.9474					23.226	-10.107	1725.540	0.006
	54.9474 - 53.7895					23.402	-10.452	1738.670	0.006
	53.7895 - 52.6316					23.579	-10.599	1751.800	0.006
	52.6316 - 51.4737					23.756	-10.748	1764.930	0.006
	51.4737 - 50.3158					23.932	-10.898	1778.050	0.006
	50.3158 - 49.1579					24.109	-11.049	1789.480	0.006
	49.1579 - 48					24.286	-11.202	1799.270	0.006
	48 - 44.417					24.833	-6.067	1829.240	0.003

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 26 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio P _u φP _n					
L4	48 - 44.417	TP29.88x27.549x0.275	13.000	0.000	0.0	24.367	-5.926	1803.730	0.003					
	44.417 - 43.3707					24.530	-12.147	1812.730	0.007					
	43.3707 - 42.3243					24.694	-12.294	1821.700	0.007					
	42.3243 - 41.278					24.858	-12.443	1830.620	0.007					
	41.278 - 40.2317					25.022	-12.592	1839.500	0.007					
	40.2317 - 39.1853					25.186	-12.743	1848.340	0.007					
	39.1853 - 38.139					25.349	-12.894	1857.140	0.007					
	38.139 - 37.0927					25.513	-13.047	1865.900	0.007					
	37.0927 - 36.0463					25.677	-13.200	1874.610	0.007					
	36.0463 - 35 - 33.25					25.841	-13.355	1883.280	0.007					
	L5					35 - 33.25	TP36x29.88x0.364	35.000	0.000	0.0	34.454	-13.658	2559.790	0.005
						33.25 - 31.5					34.808	-13.967	2586.060	0.005
						31.5 - 29.75					35.161	-14.280	2612.320	0.005
						29.75 - 28					35.515	-14.596	2638.590	0.006
28 - 26.25		35.869	-14.916	2664.850	0.006									
26.25 - 24.5		36.222	-15.238	2691.120	0.006									
24.5 - 22.75		36.576	-15.564	2717.390	0.006									
22.75 - 21		36.929	-15.893	2743.650	0.006									
21 - 19.25		37.283	-16.225	2769.920	0.006									
19.25 - 17.5		37.636	-16.561	2796.180	0.006									
17.5 - 15.75		37.990	-16.899	2822.450	0.006									
15.75 - 14		38.343	-17.241	2848.710	0.006									
14 - 12.25		38.697	-17.586	2874.980	0.006									
12.25 - 10.5		39.050	-17.933	2901.250	0.006									
10.5 - 8.75	39.404	-18.284	2927.510	0.006										
8.75 - 7	39.757	-18.639	2953.780	0.006										
7 - 5.25	40.111	-18.996	2980.040	0.006										
5.25 - 3.5	40.465	-19.356	3006.310	0.006										
3.5 - 1.75	40.818	-19.719	3032.570	0.007										
1.75 - 0	41.172	-20.085	3058.840	0.007										

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{ux} kip-ft	Ratio M _{ux} φM _{ux}	M _{uy} kip-ft	φM _{uy} kip-ft	Ratio M _{uy} φM _{uy}
L1	120 - 118.548	TP21.287x16x0.188	0.024	233.802	0.000	0.000	233.802	0.000
	118.548 - 117.097		0.216	241.287	0.001	0.000	241.287	0.000
	117.097 - 115.645		1.282	248.891	0.005	0.000	248.891	0.000
	115.645 - 114.194		2.102	256.613	0.008	0.000	256.613	0.000
	114.194 - 112.742		3.166	264.452	0.012	0.000	264.452	0.000
	112.742 - 111.291		4.344	272.409	0.016	0.000	272.409	0.000
	111.291 - 111.291		5.810	280.484	0.021	0.000	280.484	0.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 27 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{rx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	M_{uy} kip-ft	ϕM_{ry} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
	109.839							
	109.839 - 108.387		8.909	288.678	0.031	0.000	288.678	0.000
	108.387 - 106.936		12.126	296.989	0.041	0.000	296.989	0.000
	106.936 - 105.484		15.463	305.418	0.051	0.000	305.418	0.000
	105.484 - 104.033		21.087	313.965	0.067	0.000	313.965	0.000
	104.033 - 102.581		27.919	322.219	0.087	0.000	322.219	0.000
	102.581 - 101.129		34.872	329.867	0.106	0.000	329.867	0.000
	101.129 - 99.6779		41.948	337.572	0.124	0.000	337.572	0.000
	99.6779 - 98.2263		49.148	345.332	0.142	0.000	345.332	0.000
	98.2263 - 96.7747		56.472	353.148	0.160	0.000	353.148	0.000
	96.7747 - 95.3232		63.922	361.018	0.177	0.000	361.018	0.000
	95.3232 - 93.8716		71.499	368.941	0.194	0.000	368.941	0.000
	93.8716 - 92.42		79.204	376.915	0.210	0.000	376.915	0.000
	92.42 - 89.75		49.592	391.712	0.127	0.000	391.712	0.000
L2	92.42 - 89.75	TP24.252x20.445x0.188	46.031	379.387	0.121	0.000	379.387	0.000
	89.75 - 88.7105		106.561	384.974	0.277	0.000	384.974	0.000
	88.7105 - 87.6711		117.570	390.586	0.301	0.000	390.586	0.000
	87.6711 - 86.6316		128.653	396.220	0.325	0.000	396.220	0.000
	86.6316 - 85.5921		139.808	401.878	0.348	0.000	401.878	0.000
	85.5921 - 84.5526		151.042	407.558	0.371	0.000	407.558	0.000
	84.5526 - 83.5132		162.351	413.259	0.393	0.000	413.259	0.000
	83.5132 - 82.4737		173.732	418.983	0.415	0.000	418.983	0.000
	82.4737 - 81.4342		185.186	424.728	0.436	0.000	424.728	0.000
	81.4342 - 80.3947		196.713	430.493	0.457	0.000	430.493	0.000
	80.3947 - 79.3553		208.314	436.280	0.477	0.000	436.280	0.000
	79.3553 - 78.3158		219.988	442.086	0.498	0.000	442.086	0.000
	78.3158 - 77.2763		231.735	447.913	0.517	0.000	447.913	0.000
	77.2763 - 76.2368		243.557	453.757	0.537	0.000	453.757	0.000
	76.2368 - 75.1974		255.452	459.622	0.556	0.000	459.622	0.000
	75.1974 - 74.1579		267.420	465.504	0.574	0.000	465.504	0.000
	74.1579 - 73.1184		279.462	471.405	0.593	0.000	471.405	0.000
	73.1184 -		291.579	477.323	0.611	0.000	477.323	0.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 28 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{rx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	M_{uy} kip-ft	ϕM_{ry} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
	72.0789							
	72.0789 - 71.0395		303.770	483.259	0.629	0.000	483.259	0.000
	71.0395							
	71.0395 - 70		316.035	489.211	0.646	0.000	489.211	0.000
L3	70 - 68.8421	TP28.725x24.252x0.275	329.829	776.914	0.425	0.000	776.914	0.000
	68.8421 - 67.6842		343.803	790.053	0.435	0.000	790.053	0.000
	67.6842							
	67.6842 - 66.5263		357.958	803.301	0.446	0.000	803.301	0.000
	66.5263							
	66.5263 - 65.3684		372.296	816.659	0.456	0.000	816.659	0.000
	65.3684							
	65.3684 - 64.2105		386.818	830.128	0.466	0.000	830.128	0.000
	64.2105							
	64.2105 - 63.0526		401.523	843.708	0.476	0.000	843.708	0.000
	63.0526							
	63.0526 - 61.8947		416.414	857.392	0.486	0.000	857.392	0.000
	61.8947							
	61.8947 - 60.7368		431.492	871.192	0.495	0.000	871.192	0.000
	60.7368							
	60.7368 - 59.5789		446.757	885.100	0.505	0.000	885.100	0.000
	59.5789							
	59.5789 - 58.4211		462.211	899.125	0.514	0.000	899.125	0.000
	58.4211							
	58.4211 - 57.2632		477.854	913.250	0.523	0.000	913.250	0.000
	57.2632							
	57.2632 - 56.1053		493.688	927.492	0.532	0.000	927.492	0.000
	56.1053							
	56.1053 - 54.9474		509.712	941.842	0.541	0.000	941.842	0.000
	54.9474							
	54.9474 - 53.7895		526.068	956.300	0.550	0.000	956.300	0.000
	53.7895							
	53.7895 - 52.6316		543.125	970.875	0.559	0.000	970.875	0.000
	52.6316							
	52.6316 - 51.4737		560.378	985.550	0.569	0.000	985.550	0.000
	51.4737							
	51.4737 - 50.3158		577.825	1000.342	0.578	0.000	1000.342	0.000
	50.3158							
	50.3158 - 49.1579		595.467	1014.283	0.587	0.000	1014.283	0.000
	49.1579							
	49.1579 - 48		613.308	1027.375	0.597	0.000	1027.375	0.000
	48		344.768	1068.242	0.323	0.000	1068.242	0.000
L4	48 - 44.417	TP29.88x27.549x0.275	325.080	1033.383	0.315	0.000	1033.383	0.000
	44.417 - 43.3707		686.713	1045.592	0.657	0.000	1045.592	0.000
	43.3707							
	43.3707 - 42.3243		703.681	1057.850	0.665	0.000	1057.850	0.000
	42.3243							
	42.3243 - 41.278		720.753	1070.150	0.674	0.000	1070.150	0.000
	41.278							
	41.278 - 40.2317		737.927	1082.492	0.682	0.000	1082.492	0.000
	40.2317							
	40.2317 - 39.1853		755.205	1094.883	0.690	0.000	1094.883	0.000
	39.1853							
	39.1853 - 38.139		772.588	1107.317	0.698	0.000	1107.317	0.000
	38.139							
	38.139 - 37.0927		790.075	1119.792	0.706	0.000	1119.792	0.000
	37.0927							
	37.0927 - 36.0463		807.667	1132.308	0.713	0.000	1132.308	0.000
	36.0463							
	36.0463 - 35		825.363	1144.875	0.721	0.000	1144.875	0.000
L5	35 - 33.25	TP36x29.88x0.364	855.183	1563.025	0.547	0.000	1563.025	0.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 29 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{rx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	M_{uy} kip-ft	ϕM_{ry} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
	33.25 - 31.5		885.267	1595.458	0.555	0.000	1595.458	0.000
	31.5 - 29.75		915.608	1628.225	0.562	0.000	1628.225	0.000
	29.75 - 28		946.217	1661.333	0.570	0.000	1661.333	0.000
	28 - 26.25		977.075	1694.767	0.577	0.000	1694.767	0.000
	26.25 - 24.5		1008.200	1728.533	0.583	0.000	1728.533	0.000
	24.5 - 22.75		1039.575	1762.633	0.590	0.000	1762.633	0.000
	22.75 - 21		1071.200	1797.067	0.596	0.000	1797.067	0.000
	21 - 19.25		1103.083	1831.842	0.602	0.000	1831.842	0.000
	19.25 - 17.5		1135.208	1866.942	0.608	0.000	1866.942	0.000
	17.5 - 15.75		1167.592	1902.375	0.614	0.000	1902.375	0.000
	15.75 - 14		1200.208	1938.142	0.619	0.000	1938.142	0.000
	14 - 12.25		1233.075	1974.242	0.625	0.000	1974.242	0.000
	12.25 - 10.5		1266.183	2010.675	0.630	0.000	2010.675	0.000
	10.5 - 8.75		1299.525	2047.442	0.635	0.000	2047.442	0.000
	8.75 - 7		1333.108	2084.542	0.640	0.000	2084.542	0.000
	7 - 5.25		1366.933	2121.975	0.644	0.000	2121.975	0.000
	5.25 - 3.5		1400.983	2159.742	0.649	0.000	2159.742	0.000
	3.5 - 1.75		1435.267	2197.842	0.653	0.000	2197.842	0.000
	1.75 - 0		1469.783	2236.275	0.657	0.000	2236.275	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	120 - 118.548	TP21.287x16x0.188	0.033	355.182	0.000	0.000	468.175	0.000
	118.548 - 117.097		0.150	360.791	0.000	0.000	483.165	0.000
	117.097 - 115.645		0.266	366.399	0.001	0.000	498.390	0.000
	115.645 - 114.194		0.694	372.008	0.002	0.000	513.852	0.000
	114.194 - 112.742		0.772	377.617	0.002	0.000	529.550	0.000
	112.742 - 111.291		0.851	383.226	0.002	0.000	545.484	0.000
	111.291 - 109.839		2.095	388.834	0.005	0.086	561.655	0.000
	109.839 - 108.387		2.176	394.443	0.006	0.086	578.061	0.000
	108.387 - 106.936		2.257	400.052	0.006	0.086	594.704	0.000
	106.936 - 105.484		2.340	405.660	0.006	0.086	611.583	0.000
	105.484 - 104.033		4.665	411.269	0.011	0.086	628.698	0.000
	104.033 - 102.581		4.749	416.346	0.011	0.086	645.227	0.000
	102.581 - 101.129		4.833	420.514	0.011	0.086	660.540	0.000
	101.129 - 99.6779		4.918	424.644	0.012	0.086	675.968	0.000
	99.6779 - 98.2263		5.004	428.736	0.012	0.086	691.509	0.000
	98.2263 - 96.7747		5.090	432.790	0.012	0.086	707.161	0.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 30 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
	96.7747 - 95.3232		5.178	436.806	0.012	0.240	722.920	0.000
	95.3232 - 93.8716		5.266	440.784	0.012	0.240	738.784	0.000
	93.8716 - 92.42		5.354	444.724	0.012	0.240	754.751	0.000
	92.42 - 89.75		7.618	451.871	0.017	0.363	784.382	0.000
L2	92.42 - 89.75	TP24.252x20.445x0.188	2.871	445.932	0.006	0.330	759.702	0.000
	89.75 - 88.7105		10.559	448.642	0.024	0.701	770.890	0.001
	88.7105 - 87.6711		10.629	451.334	0.024	0.710	782.127	0.001
	87.6711 - 86.6316		10.699	454.007	0.024	0.718	793.409	0.001
	86.6316 - 85.5921		10.777	456.662	0.024	0.774	804.737	0.001
	85.5921 - 84.5526		10.847	459.299	0.024	0.783	816.111	0.001
	84.5526 - 83.5132		10.918	461.917	0.024	0.792	827.529	0.001
	83.5132 - 82.4737		10.988	464.516	0.024	0.801	838.992	0.001
	82.4737 - 81.4342		11.059	467.097	0.024	0.810	850.492	0.001
	81.4342 - 80.3947		11.130	469.660	0.024	0.820	862.042	0.001
	80.3947 - 79.3553		11.200	472.204	0.024	0.829	873.625	0.001
	79.3553 - 78.3158		11.271	474.730	0.024	0.838	885.250	0.001
	78.3158 - 77.2763		11.342	477.238	0.024	0.847	896.917	0.001
	77.2763 - 76.2368		11.413	479.727	0.024	0.857	908.625	0.001
	76.2368 - 75.1974		11.484	482.197	0.024	0.866	920.367	0.001
	75.1974 - 74.1579		11.556	484.649	0.024	0.876	932.150	0.001
	74.1579 - 73.1184		11.627	487.083	0.024	0.886	943.967	0.001
	73.1184 - 72.0789		11.698	489.499	0.024	0.895	955.817	0.001
	72.0789 - 71.0395		11.770	491.896	0.024	0.905	967.700	0.001
	71.0395 - 70		11.842	494.274	0.024	0.915	979.617	0.001
L3	70 - 68.8421	TP28.725x24.252x0.275	11.996	783.999	0.015	0.916	1555.725	0.001
	68.8421 - 67.6842		12.152	790.563	0.015	0.917	1582.033	0.001
	67.6842 - 66.5263		12.309	797.128	0.015	0.918	1608.567	0.001
	66.5263 - 65.3684		12.467	803.692	0.016	0.919	1635.317	0.001
	65.3684 - 64.2105		12.627	810.256	0.016	0.921	1662.283	0.001
	64.2105 - 63.0526		12.786	816.821	0.016	0.922	1689.475	0.001
	63.0526 - 61.8947		12.947	823.385	0.016	0.923	1716.892	0.001
	61.8947 - 60.7368		13.109	829.949	0.016	0.924	1744.517	0.001

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 31 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by T.JL

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
	60.7368 - 59.5789		13.271	836.513	0.016	0.925	1772.375	0.001
	59.5789 - 58.4211		13.435	843.078	0.016	0.926	1800.442	0.001
	58.4211 - 57.2632		13.599	849.642	0.016	0.927	1828.742	0.001
	57.2632 - 56.1053		13.764	856.206	0.016	0.929	1857.250	0.001
	56.1053 - 54.9474		13.930	862.770	0.016	0.930	1885.992	0.000
	54.9474 - 53.7895		14.656	869.335	0.017	0.930	1914.942	0.000
	53.7895 - 52.6316		14.823	875.899	0.017	0.862	1944.117	0.000
	52.6316 - 51.4737		14.992	882.463	0.017	0.863	1973.517	0.000
	51.4737 - 50.3158		15.160	889.027	0.017	0.865	2003.133	0.000
	50.3158 - 49.1579		15.330	894.742	0.017	0.866	2031.042	0.000
	49.1579 - 48 - 44.417		15.501	899.635	0.017	0.867	2057.267	0.000
L4	48 - 44.417	TP29.88x27.549x0.275	8.414	914.621	0.009	0.449	2139.092	0.000
	44.417 - 43.3707		7.670	901.864	0.009	0.422	2069.292	0.000
	43.3707 - 42.3243		16.176	906.367	0.018	0.872	2093.742	0.000
	42.3243 - 41.278		16.275	910.849	0.018	0.873	2118.283	0.000
	41.278 - 40.2317		16.374	915.311	0.018	0.875	2142.908	0.000
	40.2317 - 39.1853		16.473	919.751	0.018	0.876	2167.633	0.000
	39.1853 - 38.139		16.573	924.171	0.018	0.877	2192.442	0.000
	38.139 - 37.0927		16.672	928.570	0.018	0.878	2217.342	0.000
	37.0927 - 36.0463		16.772	932.948	0.018	0.879	2242.325	0.000
	36.0463 - 35 - 33.25		16.873	937.306	0.018	0.880	2267.392	0.000
L5	35 - 33.25	TP36x29.88x0.364	16.973	941.642	0.018	0.881	2292.550	0.000
	33.25 - 31.5		17.128	1279.900	0.013	0.881	3129.867	0.000
	31.5 - 29.75		17.279	1293.030	0.013	0.881	3194.817	0.000
	29.75 - 28		17.428	1306.160	0.013	0.881	3260.433	0.000
	28 - 26.25		17.577	1319.290	0.013	0.880	3326.725	0.000
	26.25 - 24.5		17.724	1332.430	0.013	0.880	3393.675	0.000
	24.5 - 22.75		17.871	1345.560	0.013	0.880	3461.292	0.000
	22.75 - 21		18.017	1358.690	0.013	0.880	3529.583	0.000
	21 - 19.25		18.161	1371.830	0.013	0.879	3598.533	0.000
	19.25 - 17.5		18.304	1384.960	0.013	0.879	3668.158	0.000
	17.5 - 15.75		18.446	1398.090	0.013	0.879	3738.442	0.000
	15.75 - 14		18.587	1411.220	0.013	0.879	3809.400	0.000
	14 - 12.25		18.727	1424.360	0.013	0.879	3881.025	0.000
	12.25 - 10.5		18.866	1437.490	0.013	0.878	3953.308	0.000
	10.5 - 8.75		19.004	1450.620	0.013	0.878	4026.267	0.000
	8.75 - 7		19.141	1463.760	0.013	0.878	4099.892	0.000
	7 - 5.25		19.276	1476.890	0.013	0.878	4174.183	0.000
	5.25 - 3.5		19.411	1490.020	0.013	0.878	4249.142	0.000
	3.5 - 1.75		19.544	1503.150	0.013	0.878	4324.767	0.000
	1.75 - 0		19.676	1516.290	0.013	0.877	4401.058	0.000
			19.807	1529.420	0.013	0.877	4478.017	0.000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 32 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
-------------	--------------	------	----------------	--------------	------------------------------	---------------------	-------------------	------------------------------

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 118.548	0.000	0.000	0.000	0.000	0.000	0.000	1.000	4.8.2 ✓
	118.548 - 117.097	0.000	0.001	0.000	0.000	0.000	0.001	1.000	4.8.2 ✓
	117.097 - 115.645	0.001	0.005	0.000	0.001	0.000	0.006	1.000	4.8.2 ✓
	115.645 - 114.194	0.000	0.008	0.000	0.002	0.000	0.009	1.000	4.8.2 ✓
	114.194 - 112.742	0.000	0.012	0.000	0.002	0.000	0.012	1.000	4.8.2 ✓
	112.742 - 111.291	0.000	0.016	0.000	0.002	0.000	0.016	1.000	4.8.2 ✓
	111.291 - 109.839	0.001	0.021	0.000	0.005	0.000	0.021	1.000	4.8.2 ✓
	109.839 - 108.387	0.001	0.031	0.000	0.006	0.000	0.032	1.000	4.8.2 ✓
	108.387 - 106.936	0.001	0.041	0.000	0.006	0.000	0.042	1.000	4.8.2 ✓
	106.936 - 105.484	0.001	0.051	0.000	0.006	0.000	0.052	1.000	4.8.2 ✓
	105.484 - 104.033	0.004	0.067	0.000	0.011	0.000	0.071	1.000	4.8.2 ✓
	104.033 - 102.581	0.004	0.087	0.000	0.011	0.000	0.091	1.000	4.8.2 ✓
	102.581 - 101.129	0.004	0.106	0.000	0.011	0.000	0.110	1.000	4.8.2 ✓
	101.129 - 99.6779	0.004	0.124	0.000	0.012	0.000	0.129	1.000	4.8.2 ✓
	99.6779 - 98.2263	0.004	0.142	0.000	0.012	0.000	0.147	1.000	4.8.2 ✓
	98.2263 - 96.7747	0.004	0.160	0.000	0.012	0.000	0.164	1.000	4.8.2 ✓
	96.7747 - 95.3232	0.004	0.177	0.000	0.012	0.000	0.181	1.000	4.8.2 ✓
	95.3232 - 93.8716	0.004	0.194	0.000	0.012	0.000	0.198	1.000	4.8.2 ✓
	93.8716 - 92.42	0.004	0.210	0.000	0.012	0.000	0.215	1.000	4.8.2 ✓
	92.42 - 89.75	0.005	0.127	0.000	0.017	0.000	0.132	1.000	4.8.2 ✓
L2	92.42 - 89.75	0.002	0.121	0.000	0.006	0.000	0.124	1.000	4.8.2 ✓

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 33 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P_u	M_{ux}	M_{uy}	V_u	T_u			
	89.75 - 88.7105	0.008	0.277	0.000	0.024	0.001	0.285	1.000	4.8.2 ✓
	88.7105 - 87.6711	0.008	0.301	0.000	0.024	0.001	0.309	1.000	4.8.2 ✓
	87.6711 - 86.6316	0.008	0.325	0.000	0.024	0.001	0.333	1.000	4.8.2 ✓
	86.6316 - 85.5921	0.008	0.348	0.000	0.024	0.001	0.356	1.000	4.8.2 ✓
	85.5921 - 84.5526	0.008	0.371	0.000	0.024	0.001	0.379	1.000	4.8.2 ✓
	84.5526 - 83.5132	0.008	0.393	0.000	0.024	0.001	0.401	1.000	4.8.2 ✓
	83.5132 - 82.4737	0.008	0.415	0.000	0.024	0.001	0.423	1.000	4.8.2 ✓
	82.4737 - 81.4342	0.008	0.436	0.000	0.024	0.001	0.444	1.000	4.8.2 ✓
	81.4342 - 80.3947	0.008	0.457	0.000	0.024	0.001	0.465	1.000	4.8.2 ✓
	80.3947 - 79.3553	0.008	0.477	0.000	0.024	0.001	0.486	1.000	4.8.2 ✓
	79.3553 - 78.3158	0.008	0.498	0.000	0.024	0.001	0.506	1.000	4.8.2 ✓
	78.3158 - 77.2763	0.008	0.517	0.000	0.024	0.001	0.526	1.000	4.8.2 ✓
	77.2763 - 76.2368	0.008	0.537	0.000	0.024	0.001	0.545	1.000	4.8.2 ✓
	76.2368 - 75.1974	0.008	0.556	0.000	0.024	0.001	0.565	1.000	4.8.2 ✓
	75.1974 - 74.1579	0.008	0.574	0.000	0.024	0.001	0.583	1.000	4.8.2 ✓
	74.1579 - 73.1184	0.008	0.593	0.000	0.024	0.001	0.602	1.000	4.8.2 ✓
	73.1184 - 72.0789	0.008	0.611	0.000	0.024	0.001	0.620	1.000	4.8.2 ✓
	72.0789 - 71.0395	0.008	0.629	0.000	0.024	0.001	0.638	1.000	4.8.2 ✓
	71.0395 - 70	0.008	0.646	0.000	0.024	0.001	0.655	1.000	4.8.2 ✓
L3	70 - 68.8421	0.005	0.425	0.000	0.015	0.001	0.430	1.000	4.8.2 ✓
	68.8421 - 67.6842	0.005	0.435	0.000	0.015	0.001	0.441	1.000	4.8.2 ✓
	67.6842 - 66.5263	0.005	0.446	0.000	0.015	0.001	0.451	1.000	4.8.2 ✓
	66.5263 - 65.3684	0.006	0.456	0.000	0.016	0.001	0.462	1.000	4.8.2 ✓
	65.3684 - 64.2105	0.006	0.466	0.000	0.016	0.001	0.472	1.000	4.8.2 ✓
	64.2105 - 63.0526	0.006	0.476	0.000	0.016	0.001	0.482	1.000	4.8.2 ✓
	63.0526 - 61.8947	0.006	0.486	0.000	0.016	0.001	0.492	1.000	4.8.2 ✓

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 34 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P_u	M_{ux}	M_{uy}	V_u	T_u			
	61.8947 - 60.7368	0.006	0.495	0.000	0.016	0.001	0.501	1.000	4.8.2 ✓
	60.7368 - 59.5789	0.006	0.505	0.000	0.016	0.001	0.511	1.000	4.8.2 ✓
	59.5789 - 58.4211	0.006	0.514	0.000	0.016	0.001	0.520	1.000	4.8.2 ✓
	58.4211 - 57.2632	0.006	0.523	0.000	0.016	0.001	0.529	1.000	4.8.2 ✓
	57.2632 - 56.1053	0.006	0.532	0.000	0.016	0.001	0.538	1.000	4.8.2 ✓
	56.1053 - 54.9474	0.006	0.541	0.000	0.016	0.000	0.547	1.000	4.8.2 ✓
	54.9474 - 53.7895	0.006	0.550	0.000	0.017	0.000	0.556	1.000	4.8.2 ✓
	53.7895 - 52.6316	0.006	0.559	0.000	0.017	0.000	0.566	1.000	4.8.2 ✓
	52.6316 - 51.4737	0.006	0.569	0.000	0.017	0.000	0.575	1.000	4.8.2 ✓
	51.4737 - 50.3158	0.006	0.578	0.000	0.017	0.000	0.584	1.000	4.8.2 ✓
	50.3158 - 49.1579	0.006	0.587	0.000	0.017	0.000	0.594	1.000	4.8.2 ✓
	49.1579 - 48	0.006	0.597	0.000	0.017	0.000	0.604	1.000	4.8.2 ✓
	48 - 44.417	0.003	0.323	0.000	0.009	0.000	0.326	1.000	4.8.2 ✓
L4	48 - 44.417	0.003	0.315	0.000	0.009	0.000	0.318	1.000	4.8.2 ✓
	44.417 - 43.3707	0.007	0.657	0.000	0.018	0.000	0.664	1.000	4.8.2 ✓
	43.3707 - 42.3243	0.007	0.665	0.000	0.018	0.000	0.672	1.000	4.8.2 ✓
	42.3243 - 41.278	0.007	0.674	0.000	0.018	0.000	0.681	1.000	4.8.2 ✓
	41.278 - 40.2317	0.007	0.682	0.000	0.018	0.000	0.689	1.000	4.8.2 ✓
	40.2317 - 39.1853	0.007	0.690	0.000	0.018	0.000	0.697	1.000	4.8.2 ✓
	39.1853 - 38.139	0.007	0.698	0.000	0.018	0.000	0.705	1.000	4.8.2 ✓
	38.139 - 37.0927	0.007	0.706	0.000	0.018	0.000	0.713	1.000	4.8.2 ✓
	37.0927 - 36.0463	0.007	0.713	0.000	0.018	0.000	0.721	1.000	4.8.2 ✓
	36.0463 - 35	0.007	0.721	0.000	0.018	0.000	0.728	1.000	4.8.2 ✓
L5	35 - 33.25	0.005	0.547	0.000	0.013	0.000	0.553	1.000	4.8.2 ✓
	33.25 - 31.5	0.005	0.555	0.000	0.013	0.000	0.560	1.000	4.8.2 ✓
	31.5 - 29.75	0.005	0.562	0.000	0.013	0.000	0.568	1.000	4.8.2 ✓

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 15001.060 - Hartford 9	Page 35 of 36
	Project 120-ft ROHN Monopole - 250 Silas Deane Hwy., Wethersfield, CT	Date 13:08:00 11/14/16
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Ratio P_u	Ratio M_{ux}	Ratio M_{uy}	Ratio V_u	Ratio T_u	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		ϕP_n	ϕM_{ax}	ϕM_{ay}	ϕV_n	ϕT_n			
	29.75 - 28	0.006	0.570	0.000	0.013	0.000	0.575	1.000	4.8.2 ✓
	28 - 26.25	0.006	0.577	0.000	0.013	0.000	0.582	1.000	4.8.2 ✓
	26.25 - 24.5	0.006	0.583	0.000	0.013	0.000	0.589	1.000	4.8.2 ✓
	24.5 - 22.75	0.006	0.590	0.000	0.013	0.000	0.596	1.000	4.8.2 ✓
	22.75 - 21	0.006	0.596	0.000	0.013	0.000	0.602	1.000	4.8.2 ✓
	21 - 19.25	0.006	0.602	0.000	0.013	0.000	0.608	1.000	4.8.2 ✓
	19.25 - 17.5	0.006	0.608	0.000	0.013	0.000	0.614	1.000	4.8.2 ✓
	17.5 - 15.75	0.006	0.614	0.000	0.013	0.000	0.620	1.000	4.8.2 ✓
	15.75 - 14	0.006	0.619	0.000	0.013	0.000	0.625	1.000	4.8.2 ✓
	14 - 12.25	0.006	0.625	0.000	0.013	0.000	0.631	1.000	4.8.2 ✓
	12.25 - 10.5	0.006	0.630	0.000	0.013	0.000	0.636	1.000	4.8.2 ✓
	10.5 - 8.75	0.006	0.635	0.000	0.013	0.000	0.641	1.000	4.8.2 ✓
	8.75 - 7	0.006	0.640	0.000	0.013	0.000	0.646	1.000	4.8.2 ✓
	7 - 5.25	0.006	0.644	0.000	0.013	0.000	0.651	1.000	4.8.2 ✓
	5.25 - 3.5	0.006	0.649	0.000	0.013	0.000	0.655	1.000	4.8.2 ✓
	3.5 - 1.75	0.007	0.653	0.000	0.013	0.000	0.660	1.000	4.8.2 ✓
	1.75 - 0	0.007	0.657	0.000	0.013	0.000	0.664	1.000	4.8.2 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
L1	120 - 89.75	Pole	TP21.287x16x0.188	1	-3.893	889.447	21.5	Pass	
L2	89.75 - 70	Pole	TP24.252x20.445x0.188	2	-8.348	988.548	65.5	Pass	
L3	70 - 44.417	Pole	TP28.725x24.252x0.275	3	-11.202	1799.270	60.4	Pass	
L4	44.417 - 35	Pole	TP29.88x27.549x0.275	4	-13.355	1883.280	72.8	Pass	
L5	35 - 0	Pole	TP36x29.88x0.364	5	-20.085	3058.840	66.4	Pass	
							Summary		
							Pole (L4)	72.8	Pass
							RATING =	72.8	Pass

Reinforced Anchor Bolt and Base Plate Analysis:

Input Data:

Note:

Base plate and anchor bolt information obtained from original ROHN design documents, ROHN Eng File No. 50576RA, dated 07/11/02. Anchor bolt reinforcement information obtained from design documents prepared by Structural Components for Verizon Wireless, Structural Components No. 100346/110361, dated 03/25/11.

Tower Reactions:

Overtuming Moment =	OM := 1470-ft-kips	(Input From tnxTower)
Shear Force =	Shear := 20-kips	(Input From tnxTower)
Axial Force =	Axial := 20-kips	(Input From tnxTower)

Original ROHN Anchor Bolt Data:

ASTM A615 Grade 75

Number of Anchor Bolts =	N := 6	(User Input)
Diameter of Bolt Circle =	D _{bc} := 41.50-in	(User Input)
Bolt "Column" Distance =	l := 3.50-in	(User Input)
Bolt Ultimate Strength =	F _u := 100-ksi	(User Input)
Bolt Yield Strength =	F _y := 75-ksi	(User Input)
Bolt Modulus =	E := 29000-ksi	(User Input)
Diameter of Anchor Bolts =	D := 2.25-in	(User Input)
Threads per Inch =	n := 4.5	(User Input)
Top of Concrete to Bot Leveling Nut =	l _{ar} := 2-in	(User Input)

Existing Structural Components Anchor Bolt Reinf. Data

ASTM A615 Grade 75

Number of Anchor Bolts =	No := 6	(User Input)
Diameter of Bolt Circle =	D _{bco} := 50.375-in	(User Input)
Bolt "Column" Distance =	lo := 3.0-in	(User Input)
Bolt Ultimate Strength =	F _{uo} := 100-ksi	(User Input)
Bolt Yield Strength =	F _{yo} := 75-ksi	(User Input)
Bolt Modulus =	Eo := 29000-ksi	(User Input)
Diameter of Anchor Bolts =	Do := 2.75-in	(User Input)
Threads per Inch =	no := 4.0	(User Input)

Base Plate Data:

Use ASTM A572 50		
Plate Yield Strength =	F _{ybp} := 50-ksi	(User Input) Based on field measurements by Structural Components pre-construction and TIA inspection report, dated 08/25/10. Note original ROHN design documents noted base plate as 2.00in thick.
Base Plate Thickness =	t _{bp} := 2.25-in	(User Input)
Base Plate Diameter =	D _{bp} := 47.50-in	(User Input)
Outer Pole Diameter =	D _{pole} := 36.00-in	(User Input)
	η := 0.5	per TIA-222-G Section 4.9.9

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

$d_1 := 10.38\text{in}$ (User Input)

$d_2 := 20.75\text{in}$ (User Input)

$d_3 := 12.69\text{in}$ (User Input)

$d_4 := 25.38\text{in}$ (User Input)

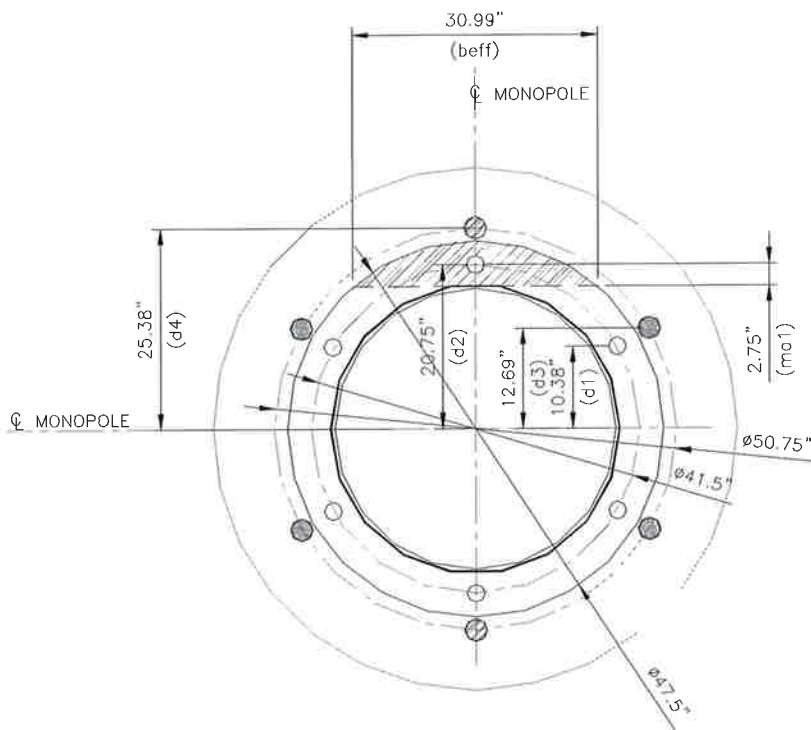
Critical Distances For Bending in Plate:

$ma_1 := 2.75\text{in}$ (User Input)

(User Input)

Effective Width of Baseplate for Bending =

$B_{\text{eff}} := 30.99\text{in}$ (User Input)



MONOPOLE ANCHOR BOLT AND BASE
 PLATE GEOMETRY w/ ANCHOR BOLT
 REINFORCEMENT

Anchor Bolt Analysis (Inner Bolts):

Calculated Anchor Bolt Properties:

Total Polar Moment of Inertia = $I_p := [(d_1)^2 \cdot 4 + (d_2)^2 \cdot 2 + (d_3)^2 \cdot 4 + (d_4)^2 \cdot 2] = 3224.54 \cdot \text{in}^2$

Gross Area of Inner Bolts = $A_{gi} := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot \text{in}^2$

Net Area of Inner Bolt = $A_{ni} := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 = 3.248 \cdot \text{in}^2$

Net Diameter of Inner Bolt = $D_{ni} := \frac{2 \cdot \sqrt{A_{ni}}}{\sqrt{\pi}} = 2.033 \cdot \text{in}$

Radius of Gyration of Inner Bolt = $r_i := \frac{D_{ni}}{4} = 0.508 \cdot \text{in}$

Section Modulus of Inner Bolt = $S_{xi} := \frac{\pi \cdot D_{ni}^3}{32} = 0.826 \cdot \text{in}^3$

Plastic Section Modulus = $Z := \frac{D_{ni}^3}{6} = 1.401 \cdot \text{in}^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{d_2}{I_p} - \frac{\text{Axial}}{N} = 110.2 \cdot \text{kips}$

Maximum Compressive Force = $P_u := OM \cdot \frac{d_2}{I_p} + \frac{\text{Axial}}{N} = 116.8 \cdot \text{kips}$

Maximum Shear Force = $V_u := \frac{\text{Shear}}{N} = 3.3 \cdot \text{kips}$

Design Tensile Strength = $\Phi R_{nt} := 0.8 \cdot F_u \cdot A_{ni} = 259.815 \cdot \text{k}$

Bolt % of Capacity = $\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \cdot 100 = 47.5$

Condition1 = $\left[\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right]$

Condition1 = "OK"

Design Shear Strength =

$$\Phi R_{nv} := 0.75 \cdot 0.45 \cdot F_u \cdot A_{gi} = 134.193 \cdot k$$

Design Flexural Strength =

$$\Phi R_{nm} := 0.9 \cdot F_y \cdot Z = 94.597 \cdot \text{in} \cdot k$$

$$M_u := \begin{cases} 0 & \text{if } l_{ar} < D \\ 0.65 \cdot l_{ar} \cdot V_u & \text{otherwise} \end{cases} = 0 \cdot \text{in} \cdot k$$

Bolt % of Capacity =

$$\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \right] \cdot 100 = 20.3$$

Condition2 =

$$\text{Condition2} := \text{if} \left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right]$$

Condition2 = "OK"

Anchor Bolt Analysis (Outer Bolts):

Calculated Anchor Bolt Properties:

Gross Area of Inner Bolts =

$$A_{go} := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot \text{in}^2$$

Net Area of Inner Bolt =

$$A_{no} := \frac{\pi}{4} \cdot \left(D_o - \frac{0.9743 \cdot \text{in}}{n} \right)^2 = 5.041 \cdot \text{in}^2$$

Net Diameter of Inner Bolt =

$$D_{no} := \frac{2 \cdot \sqrt{A_{no}}}{\sqrt{\pi}} = 2.533 \cdot \text{in}$$

Radius of Gyration of Inner Bolt =

$$r_o := \frac{D_{no}}{4} = 0.633 \cdot \text{in}$$

Section Modulus of Inner Bolt =

$$S_{xo} := \frac{\pi \cdot D_{no}^3}{32} = 1.596 \cdot \text{in}^3$$

Plastic Section Modulus =

$$Z := \frac{D_{no}^3}{6} = 2.71 \cdot \text{in}^3$$

Check Anchor Bolt Tension Force:

Maximum Tensile Force =

$$T_{Max} := OM \cdot \frac{d_4}{I_p} - \frac{\text{Axial}}{N} = 135.5 \cdot \text{kips}$$

Maximum Compressive Force =

$$P_u := OM \cdot \frac{d_4}{I_p} + \frac{\text{Axial}}{N} = 142.2 \cdot \text{kips}$$

Maximum Shear Force = $V_u := \frac{\text{Shear}}{N} = 3.3\text{-kips}$

Design Tensile Strength = $\Phi R_{nt} := 0.8 \cdot F_u \cdot A_{no} = 403.29\text{-k}$

Bolt % of Capacity = $\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \cdot 100 = 36.9$

Condition1 = $\text{Condition1} := \text{if} \left[\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right]$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := 0.75 \cdot 0.45 \cdot F_u \cdot A_{go} = 134.193\text{-k}$

Design Flexural Strength = $\Phi R_{nm} := 0.9 \cdot F_y \cdot Z = 182.94\text{-in}\cdot\text{k}$

$M_u := \begin{cases} 0 & \text{if } l_{ar} < D \\ 0.65 \cdot l_{ar} \cdot V_u & \text{otherwise} \end{cases} = 0\text{-in}\cdot\text{k}$

Bolt % of Capacity = $\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \right] \cdot 100 = 12.5$

Condition2 = $\text{Condition2} := \text{if} \left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right]$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts = $C_1 := \frac{OM \cdot d_2}{I_p} + \frac{\text{Axial}}{N} = 116.847\text{-kips}$

Applied Bending Stress in Plate = $f_{bp} := \frac{4 \cdot (C_1 \cdot m a_1)}{B_{\text{eff}} \cdot t_{bp}^2} = 8.19\text{-ksi}$

Allowable Bending Stress in Plate = $F_{bp} := 0.9 \cdot F_y = 45\text{-ksi}$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} \cdot 100 = 18.2$

Condition5 = $\text{Condition1} := \text{if} \left[\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"} \right]$

Condition1 = "Ok"

Foundation:

Input Data:

Tower Data

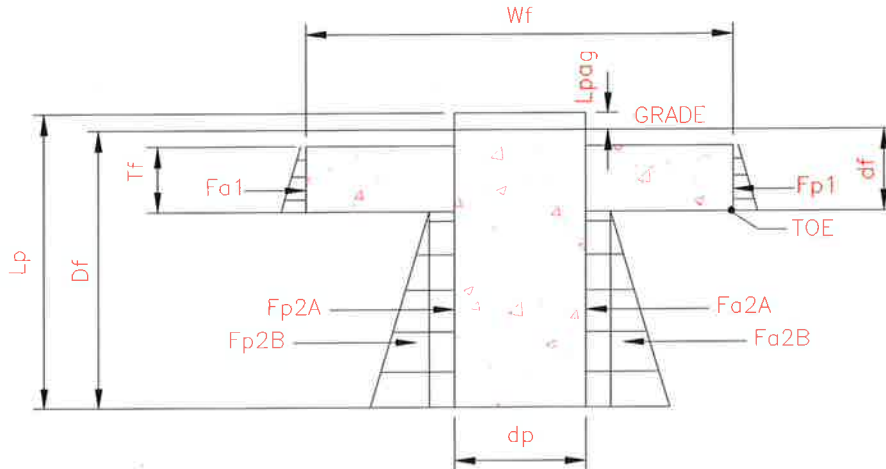
Overturing Moment = OM := 1470-ft-kips (User Input)
 Shear Force = Shear := 20-kip (User Input)
 Axial Force = Axial := 20-kip (User Input)
 Tower Height = H_t := 120-ft (User Input)

Footing Data:

Overall Depth of Footing = D_f := 19-ft (User Input)
 Length of Pier = L_p := 19.5-ft (User Input)
 Extension of Pier Above Grade = L_{pag} := 0.5-ft (User Input)
 Diameter of Cassion = d_p := 5.5-ft (User Input)
 Thickness of Footing = T_f := 2-ft (User Input)
 Width of Footing = W_f := 14.5-ft (User Input)
 Water Depth = D_{water} := 0-ft (User Input)
 Distance From Grade to Bottom of Pad = d_f := 4-ft (User Input)

Material Properties:

Concrete Compressive Strength = f_c := 3000-psi (User Input)
 Steel Reinforcement Yield Strength = f_y := 60000-psi (User Input)
 Anchor Bolt Yield Strength = f_{ya} := 75000-psi (User Input)
 Internal Friction Angle of Soil (mat) = Φ_{s1} := 33-deg (User Input)
 Internal Friction Angle of Soil (below mat) = Φ_{s2} := 33-deg (User Input)
 Unit Weight of Soil = γ_{soil1} := 120-pcf (User Input)
 Unit Weight of Soil = γ_{soil2} := 58-pcf (User Input)
 Ultimate Soil Bearing Capacity = q_s := 8000-psf (User Input)
 Unit Weight of Concrete = γ_{conc} := 150-pcf (User Input)
 Foundation Bouyancy = Bouyancy := 0 (User Input) (Yes=1 / No=0)
 Depth to Neglect = n := 0-ft (User Input)
 Cohesion of Clay Type Soil = c := 0-ksf (User Input) (Use 0 for Sandy Soil)
 Seismic Zone Factor = Z := 2 (User Input) (UBC-1997 Fig 23-2)



Calculated Factors:

Coefficient of Lateral Soil Pressure =

$$K_{p1} := \frac{1 + \sin(\Phi_{s1})}{1 - \sin(\Phi_{s1})} = 3.4 \quad K_{a1} := \frac{1 - \sin(\Phi_{s1})}{1 + \sin(\Phi_{s1})} = 0.295$$

$$K_{p2} := \frac{1 + \sin(\Phi_{s2})}{1 - \sin(\Phi_{s2})} = 3.4 \quad K_{a2} := \frac{1 - \sin(\Phi_{s2})}{1 + \sin(\Phi_{s2})} = 0.295$$

Stability of Footing:

Passive Pressure 1 =

$$P_{p1.top} := K_{p1} \cdot \gamma_{soil1} \cdot (d_f - T_f) = 0.814 \cdot \text{ksf}$$

$$P_{p1.bot} := K_{p1} \cdot \gamma_{soil1} \cdot d_f = 1.628 \cdot \text{ksf}$$

$$P_{p1.ave} := \frac{P_{p1.top} + P_{p1.bot}}{2} = 1.221 \cdot \text{ksf}$$

Active Pressure 1 =

$$P_{a1.top} := K_{a1} \cdot \gamma_{soil1} \cdot (d_f - T_f) = 0.071 \cdot \text{ksf}$$

$$P_{a1.bot} := K_{a1} \cdot \gamma_{soil1} \cdot d_f = 0.142 \cdot \text{ksf}$$

$$P_{a1.ave} := \frac{P_{a1.top} + P_{a1.bot}}{2} = 0.106 \cdot \text{ksf}$$

Area of Pressure 1 =

$$A_{p1} := T_f \cdot W_f = 29 \text{ft}^2$$

Forces 1 =

$$F_{p1} := P_{p1.ave} \cdot A_{p1} = 35.414 \cdot \text{kip}$$

$$F_{a1} := P_{a1.ave} \cdot A_{p1} = 3.078 \cdot \text{kip}$$

Ultimate Shear 1 =

$$S_{u1} := (F_{p1} - F_{a1}) = 32.3 \cdot \text{kip}$$

Passive Pressure 2 =	$P_{p2.top} := K_{p2} \cdot \gamma_{soil2} \cdot d_f = 0.787 \cdot \text{ksf}$
	$P_{p2.bot} := K_{p2} \cdot \gamma_{soil2} \cdot D_f = 3.738 \cdot \text{ksf}$
Active Pressure 2 =	$P_{a2.top} := K_{a2} \cdot \gamma_{soil2} \cdot d_f = 0.068 \cdot \text{ksf}$
	$P_{a2.bot} := K_{a2} \cdot \gamma_{soil2} \cdot D_f = 0.325 \cdot \text{ksf}$
Area of Pressure 2 =	$A_{p2} := (D_f - d_f) \cdot d_p = 82.5 \text{ft}^2$
Forces 2 =	$F_{p2A} := P_{p2.top} \cdot A_{p2} = 64.925 \cdot \text{kips}$
	$F_{a2A} := P_{a2.top} \cdot A_{p2} = 5.6 \cdot \text{kips}$
	$F_{p2B} := \frac{1}{2} \cdot (P_{p2.bot} - P_{p2.top}) \cdot A_{p2} = 121.735 \cdot \text{kips}$
	$F_{a2B} := \frac{1}{2} \cdot (P_{a2.bot} - P_{a2.top}) \cdot A_{p2} = 10.6 \cdot \text{kips}$
Ultimate Shear 2 =	$S_{u2A} := F_{p2A} - F_{a2A} = 59.3 \cdot \text{kip}$
	$S_{u2B} := F_{p2B} - F_{a2B} = 111.2 \cdot \text{kip}$
Weight of Concrete Mat =	$W_{Tmat} := \left(W_f^2 - \frac{d_p^2 \cdot \pi}{4} \right) \cdot T_f \cdot \gamma_{conc} = 55.95 \cdot \text{kip}$
Weight of Concrete Caission =	$W_{Tcaission} := \left(\frac{d_p^2 \cdot \pi}{4} \cdot L_p \right) \cdot \gamma_{conc} = 69.49 \cdot \text{kip}$
Weight of Soil Above Mat =	$W_{Ts} := \left[\left(W_f^2 - \frac{d_p^2 \cdot \pi}{4} \right) \cdot (d_f - T_f) \right] \cdot \gamma_{soil1} = 44.76 \cdot \text{kip}$
Total Weight =	$W_{tot} := 0.9W_{Tmat} + 0.9W_{Tcaission} + 0.75W_{Ts} + 0.9A_{xial} = 164.465 \cdot \text{kips}$
Overturing Moment =	$M_{ot} := OM + \text{Shear} \cdot (d_f + L_{pag}) = 1560 \cdot \text{kip} \cdot \text{ft}$
Resisting Moment =	$M_r := (W_{tot}) \cdot \frac{W_f}{2} + 0.75S_{u1} \cdot T_f \cdot \frac{1}{3} + 0.75S_{u2A} \cdot \frac{(D_f - d_f)}{2} + 0.75S_{u2B} \cdot \frac{2 \cdot (D_f - d_f)}{3} = 2376 \cdot \text{kip} \cdot \text{ft}$
Factor of Safety Actual =	$FS := \frac{M_r}{M_{ot}} = 1.52$
Factor of Safety Required =	$FS_{req} := 1$
	Overturing_Check := if(FS ≥ FS _{req} , "Okay", "No Good")
	Overturing_Check = "Okay"

Bearing Pressure Check:

Area of Mat = $A_{mat} := W_f^2 - \frac{d_p^2 \cdot \pi}{4} = 186.492 \text{ ft}^2$

Section Modulus of Mat = $S_{mat} := \frac{W_f^3}{6} - \frac{d_p^3 \cdot \pi}{32} = 492 \cdot \text{ft}^3$

Axial Force @ Base of Mat = $P_{mat} := WT_{mat} + WT_s = 100.706 \cdot \text{kips}$

Resisting Moment Capacity of Caisson = $M_{cap} := S_{u2A} \cdot \left[\frac{1}{2} \cdot (D_f - d_f) \right] + S_{u2B} \cdot \left[\frac{2}{3} \cdot (D_f - d_f) \right] = 1556 \cdot \text{kip} \cdot \text{ft}$

Residual Moment @ Base of Mat = $M_{mat} := \begin{cases} [(OM - M_{cap}) + \text{Shear} \cdot (d_f + L_{pag})] & \text{if } (OM - M_{cap}) + \text{Shear} \cdot (d_f + L_{pag}) \geq 0 \\ 0 & \text{otherwise} \end{cases} = 4 \cdot \text{kip} \cdot \text{ft}$

Maximum Pressure in Mat = $P_{max} := \frac{P_{mat}}{A_{mat}} + \frac{M_{mat}}{S_{mat}} = 0.548 \cdot \text{ksf}$

Max_Pressure_Check := if ($P_{max} < 0.75q_s$, "Okay", "No Good")

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{P_{mat}}{A_{mat}} - \frac{M_{mat}}{S_{mat}} = 0.532 \cdot \text{ksf}$

Min_Pressure_Check := if ($(P_{min} \geq 0) \cdot (P_{min} < 0.75q_s)$, "Okay", "No Good")

Min_Pressure_Check = "Okay"

SITE NAME	HARTFORD 9 CT		ECP - CELL #	AWS1	8	2
LATITUDE	41-43-14.15 N		LONGITUDE	72-39-57.76 W		
700 tilt change plus RET antenna swap outs and 40W to 60W RRH upgrades. The 60W 4 port 700 RRH will be connected to the low band ports on the AWS and PCS antenna. Please note the electrical tilt for 700 are on the SBNHH antennas			SAVE BUTTON			
			STRUCTURE TYPE	MONOPOLE		
700 Mhz - LTE Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	700 eNodeB		700 eNodeB		700 eNodeB	
ANTENNA TYPE	BXA-70063-6CF-2-750MHZ		BXA-70063-6CF-2-750MHZ		BXA-70063-6CF-750MHZ	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	40		180		300	
DOWN TILT (MECH/DEG)	3		0		0	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
700 Mhz - LTE Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	700 eNodeB		700 eNodeB		700 eNodeB	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	40		180		300	
DOWN TILT (MECH/DEG)	5 elect		3 elect		3 elect	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						
850 Cellular - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	BXA-80063/6CF		BXA-80063/6CF		BXA-80063/6CF	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		180		300	
DOWN TILT (MECH/DEG)	3		0		3	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L
850 Cellular - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Mod 4.0B		Cellular Mod 4.0B		Cellular Mod 4.0B	
ANTENNA TYPE	BXA-80063/6CF		BXA-80063/6CF		BXA-80063/6CF	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		180		300	
DOWN TILT (MECH/DEG)	3		0		3	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	0	FD9R6004/2C-3L	0	FD9R6004/2C-3L	0	FD9R6004/2C-3L
DIPLEX WITH LTE CABLE						
1900 PCS - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	BXA-185063/8CF		BXA-185063/8CF		BXA-185063/8CF	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		180		300	
DOWN TILT (MECH/DEG)	2		0		2	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
1900 PCS - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Mod 4.0B		PCS Mod 4.0B		PCS Mod 4.0B	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		180		300	
DOWN TILT (MECH/DEG)	2 elect		0		2 elect	
RAD CTR (FT AGL)	90		90		90	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	remove diplexing		remove diplexing		remove diplexing	
RRH - QTY/MODEL	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS	1	ALU RH_2X60-PCS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX	1				DB-T1-6Z-8AB-0Z	

AWS - LTE ANTENNA ADD				ALPHA				BETA				GAMMA							
EQUIPMENT TYPE				2100 MHz eNodeB				2100 MHz eNodeB				2100 MHz eNodeB							
ANTENNA TYPE				BXA-171063-8CF-EDIN-2				BXA-171063-8CF-EDIN-2				BXA-171063-8CF-EDIN-2							
QTY OF ANTENNAS PER FACE				1				1				1							
ORIENTATION (DEG)				30				180				300							
DOWN TILT (MECH/DEG)				0				0				0							
RAD CTR (FT AGL)				90				90				90							
TMA - QTY / MODEL																			
DIPLEXER - QTY / MODEL																			
RRH - QTY/MODEL				1		ALU RH_2X40-AWS		1		ALU RH_2X40-AWS		1		ALU RH_2X40-AWS					
SECTOR DISTRIBUTION BOX																			
MAIN DISTRIBUTION BOX				1								DB-T1-6Z-8AB-0Z							
AWS - LTE ANTENNA ADD				ALPHA				BETA				GAMMA							
EQUIPMENT TYPE				2100 MHz eNodeB				2100 MHz eNodeB				2100 MHz eNodeB							
ANTENNA TYPE				SBNHH-1D65B				SBNHH-1D65B				SBNHH-1D65B							
QTY OF ANTENNAS PER FACE				1				1				1							
ORIENTATION (DEG)				30				180				300							
DOWN TILT (MECH/DEG)				2 elect				2 elect				3 elect							
RAD CTR (FT AGL)				90				90				90							
TMA - QTY / MODEL																			
DIPLEXER - QTY / MODEL																			
RRH - QTY/MODEL				1		ALU RH_2X60-AWS		1		ALU RH_2X60-AWS		1		ALU RH_2X60-AWS					
SECTOR DISTRIBUTION BOX																			
MAIN DISTRIBUTION BOX				1								DB-T1-6Z-8AB-0Z							
NUMBER OF CABLE'S NEEDED								Fiber Lines Model number											
TOTAL # FIBER LINES		2		TOTAL # OF MAINLINES		12		FIBER LINE MODEL #		HB158-1-08U8-S8J18									
TOTAL # TOP JUMPERS		6		TOTAL # OF TOP JUMPERS		36		FIBER TOP JUMPER MODEL #		HB114-1-08U4-S4J18									
Equipment Cable Ordering				MAIN CABLE		12		+		0		TOP JUMPER #		24		+		12	
TX / RX FREQUENCIES								TX POWER OUTPUT											
Cellular A-Band				PCS F / AWS-Band				700 Mhz C - B				Cellular (Watts)				20			
TX - 869-880,890-891.5 MHz				TX - 1970-1975 / 2145-2155				TX - 746-757				PCS (Watts)				16			
RX - 824-835,845-846.5 MHz				RX - 1890-1895 / 1745-1755				RX - 776-787				LTE/ AWS (Watts)				40			
ALPHA				BETA				GAMMA											
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code								
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN								
A1-B	1900	Tx1/Rx0	RED/WHITE	A5-B	1900	Tx2/Rx0	BLUE/WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE								
A2	700	Tx1/Rx0	RED/ORANGE	A6	700	Tx2/Rx0	BLUE/ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE								
A3	700	Tx4/Rx1	RED/RED/ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ORANGE								
A4-B	1900	Tx4/Rx1	RED/RED/WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/WHITE								
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN								
F1-A	1700	Tx/Rx	RED/BROWN	F1-B	1700	Tx/Rx	BLUE/BROWN	F1-C	1700	Tx/Rx	GREEN/BROWN								
F1-D	1700	Tx/Rx	RED/RED/BROWN	F1-E	1700	Tx/Rx	BLUE/BLUE/BROWN	F1-F	1700	Tx/Rx	GREEN/GREEN/BROWN								
RF ENGINEER				RF MANAGER				INITIALS				DATE							
Prepared By: Mark Brauer				Robert Hesselbach								4/16/2015							



SBNHH-1D65B

Andrew® Tri-band Antenna, 698–896 and 2 x 1710–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS, dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
CPR at Boresight, dB	20	23	20	20	17	21
CPR at Sector, dB	14	10	12	10	9	1
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR Return Loss, dB	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0	1.5 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0° 14.6	0° 14.5	0° 17.4	0° 17.8	0° 18.1	0° 18.2
Gain by Beam Tilt, average, dBi	7° 14.6	7° 14.4	3° 17.5	3° 17.9	3° 18.3	3° 18.4
Gain by Beam Tilt, average, dBi	14° 14.2	14° 13.6	7° 17.4	7° 17.9	7° 18.2	7° 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® multiband with internal RET
Band	Multiband
Brand	DualPol® Teletilt®
Operating Frequency Band	1710 – 2360 MHz 698 – 896 MHz

Mechanical Specifications

Product Specifications

COMMSCOPE®

SBNHH-1D65B

POWERED BY



Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	6
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h 150.0 mph

Dimensions

Depth	181.0 mm 7.1 in
Length	1828.0 mm 72.0 in
Width	301.0 mm 11.9 in
Net Weight	18.4 kg 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10-30 Vdc
Power Consumption, idle state, maximum	2.0 W
Power Consumption, normal conditions, maximum	13.0 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Interface	8-pin DIN Female 8-pin DIN Male
RET Interface, quantity	1 female 1 male
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system



Included Products

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

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.

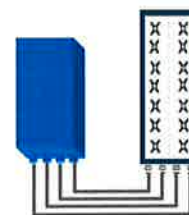


FEATURES

- 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) IP65
Wind load (@150km/h or 93mph)	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

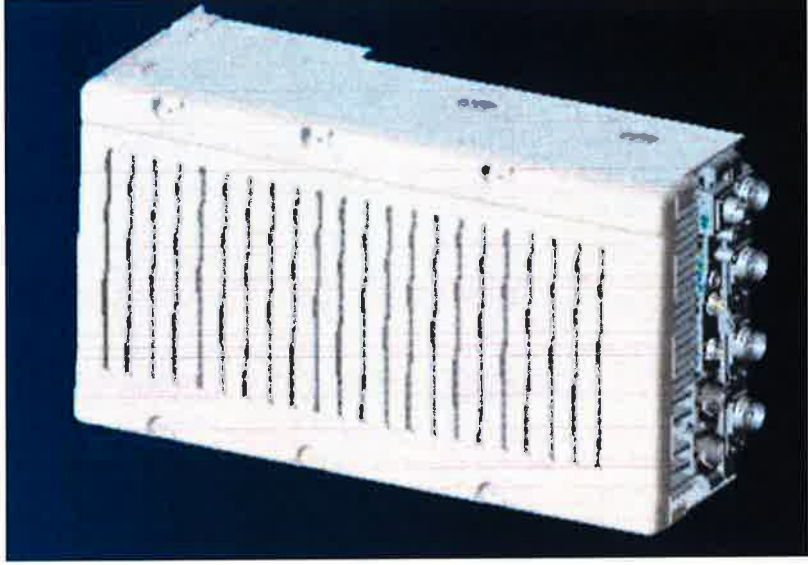
www.alcatel-lucent.com Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein.
Copyright © 2014 Alcatel-Lucent. All Rights Reserved

NEW PCS RF MODULES FOR VZW

RRH2X60 - HW CHARACTERISTICS

LR14.3

RRH2x60	
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w) x 9.4" (d)**
Weight	55lb**



** - Includes solar shield but not mounting brackets (8 lbs.)



ALCATEL-LUCENT – CONFIDENTIAL – SOLELY FOR AUTHORIZED PERSONS HAVING A NEED TO KNOW – PROPRIETARY – USE PURSUANT TO COMPANY INSTRUCTION

ALCATEL-LUCENT WIRELESS PRODUCT DATASHEET RRH2X60-AWS FOR BAND 4 APPLICATIONS

The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



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

The Alcatel-Lucent RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals

along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

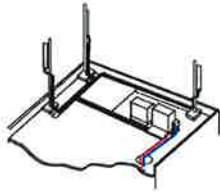
EASY INSTALLATION

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

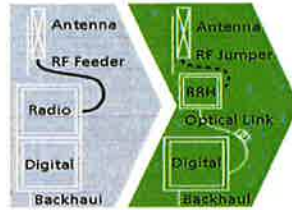
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

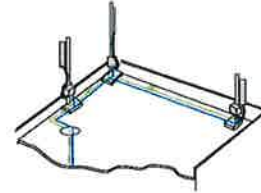
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and

silent solutions, with minimum impact on the neighborhood, which ease the deployment

- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

36.7"x10.6"x5.8"

Dimensions and weights

- HxWxD : ~~518x285x186mm~~
- (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisy chaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

www.alcatel-lucent.com Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners. The Information presented is subject to change without notice. Alcatel-Lucent assumes no responsibility for inaccuracies contained herein.

Copyright © 2012 Alcatel-Lucent. All rights reserved. M2012XXXXXX (March)



DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

The RFS Distribution Box design comes with the option for pluggable over voltage protection (OVP) for up to 6 remote radios and the connection for 6 pairs of optical fiber with LC optical fiber cable management. There is a hybrid cable input with a jumper configuration for power and optical fiber to the remote radio heads (RRHs). A custom wall, a 2-inch pole, and an H-Frame mounting bracket are included. Both the compact and standard design are available with lightning protection.



Features/Benefits

- Designed to accommodate varying diameters of HYBRIFLEX™ (combined power and fiber optic) cables – up to 2 inches
- Supports Single- and Multi-Mode Optical fiber
- NEMA 4x rated enclosure – allows flexibility for indoor or outdoor installation on a roof or tower top
- Weatherproof enclosure and ports – improves system reliability
- Modular design – makes replacement or addition of OVP easy without removal of other components within the box
- Strikesorb OVP technology – protects equipment from damaging surges up to 60 kA on an 8/20 waveform and up to 5 kA on a 10/350 waveform (certain models only)
- Low residual voltage and high impedance – ideally suited for RRH technology – won't shut down the RRH the way spark gap technology does (certain models only)



Technical Specifications

Mechanical Specifications

Model Number	DB-B1-6C-8AB-0Z	DB-T1-6Z-8AB-0Z
Enclosure Design	Standard, 6 OVP's	Standard without OVP
Dimensions - H x W x D, mm (in)	610 x 610 x 254 (24 x 24 x 10)	610 x 610 x 254 (24 x 24 x 10)
Weight, kg (lb)	20 (44)	20 (44)
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum	
Fiber Connection Method	LC-LC Single- or Multi-mode duplex	
Environmental Rating	NEMA 4x	
Operating Temperature, °C (°F)	-40 to +80 (-40 to +176)	
UV Protection	ISO 4892-2 Method A Xenon-Arc 2160 hrs	

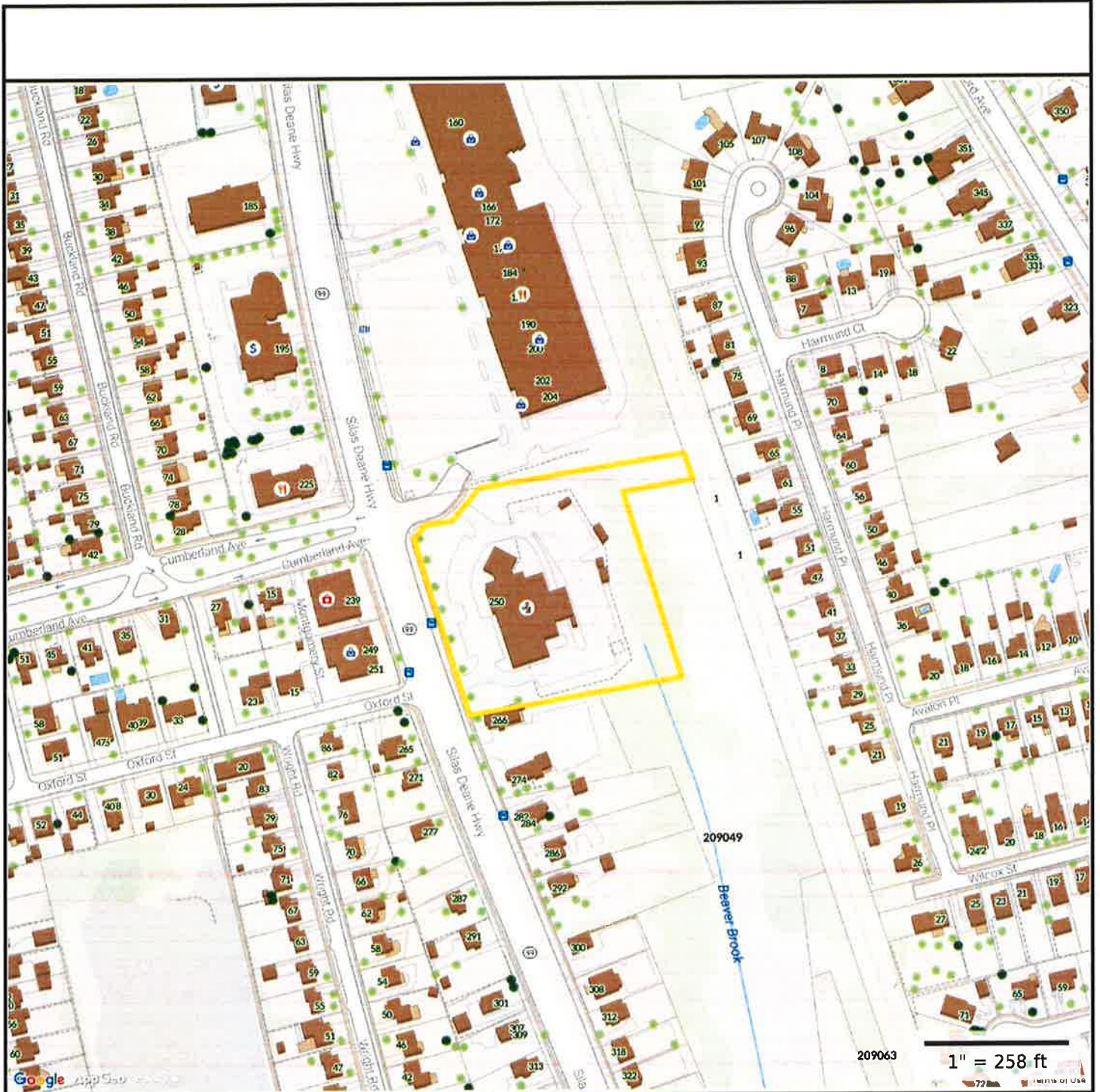
Electrical Specifications

Nominal Operating Voltage	48 VDC	
Nominal Discharge Current (I _n) per UL 1449 3rd Ed	20 kA 8/20 μs	N/A
Maximum Discharge Current (I _{max}) per NEMA LS-1	60 kA 8/20 μs	N/A
Maximum Impulse (Lightning) Current (I _{imp}) per IEC 61643-1	5 kA 10/350 μs	N/A
Maximum Continuous Operating Voltage (U _c)	75 VDC	N/A
Voltage Protection Rating per UL1449 3rd Ed	400 V	N/A
Protection Class as per IEC 61643-1	Class 1	N/A
Strikesorb OVP Compliance	ANSI/UL 1449-3rd Ed	N/A
	IEEE C62.41	N/A
	NEMA LS-1	N/A
	IEC 61643-1	N/A
	IEC 61643-12	N/A
	EN 61643-11	N/A

* This data is provisional and subject to change.

All information contained in the present datasheet is subject to confirmation at time of ordering.

ATTACHMENT 4



Property Information

Property ID 210010
Location 250 SILAS DEANE HWY
Owner WETHERSFIELD TOWN OF



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

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

Parcels updated 2/3/2016
 Properties updated 8/10/2016

Account # 210-010- Bldg #: 1 of 1 Card 1 of 1 Sec #: 1 of 1

Account # 210-010- Bldg #: 1 of 1 Card 1 of 1 Sec #: 1 of 1

TOPO.	UTILITIES	STRT./ROAD	LOCATION	DESCRIPTION	APPRAISED VALUE	ASSESSED VALUE
1 Level	1 All Public	1 Paved		EXEMPT	4,976,700	3,483,700
				EXEMPT	731,800	512,300
				EXEMPT	1,171,700	820,200
SUPPLEMENTAL DATA						
Other ID:		SIDE	E10/11			
LOT NO	3	SEQ NO	787380			
CALLBACK		PENALTY				
CENSUS	4923	Notice 1 Val				
SECTION	2	DISBLD EX				
GIS ID:	210010	ASSOC PID#			6,880,200	4,816,200

6159
WETHERSFIELD, C.

VISION

RECORD OF OWNERSHIP		BK-VOL/PAGE	SALE DATE	q/u	vi	SALE PRICE	V.C.
WETHERSFIELD, TOWN OF		784/ 051	01/12/2000	U	I	1,300,000	15
ROBERT JOSEPH L A & SCOVILLE HOMER		0333/0023	02/28/1983			725,000	
Total:						4,610,400	Total:

EXEMPTIONS		Amount	Description	Code	Number	Amount	Comm. Int.
Year	Type	Description	Code	Number	Amount	Comm. Int.	
Total:					4,610,400	Total:	4,610,400

This signature acknowledges a visit by a Data Collector or Assessor

OTHER ASSESSMENTS		Yr.	Code	Assessed Value	Yr.	Code	Assessed Value
2012	100	465,700	2010 BAAAX	3,521,100	2008 BAAAX	3,521,100	3,521,100
2012	200	4,144,700	2010 BAAAX	465,700	2008 BAAAX	465,700	465,700
			2010 BAAAX	623,600	2008 BAAAX	623,600	623,600
Total:				4,610,400	Total:	4,610,400	4,610,400

APPRAISED VALUE SUMMARY

Appraised Bldg. Value (Card) 4,920.1
 Appraised XF (B) Value (Bldg) 56.6
 Appraised OB (L) Value (Bldg) 1,171.7
 Appraised Land Value (Bldg) 731.8
 Special Land Value

Total Appraised Parcel Value 6,880.2
 Valuation Method:

Adjustment:

Net Total Appraised Parcel Value 6,880.2

BUILDING PERMIT RECORD		Permit ID	Issue Date	Type	Description	Amount	Insp. Date	% Comp.	Date Comp.	Comments
E-10-13	07/07/2010	EL	Electric	5,000	02/28/2008	100	0	100	10/22/2008	Install communication co
BP07044	01/31/2007	CM	Commercial	2,000	02/28/2008	100	0	100	7/17/2008	Expand 2nd fl room
BP05311	07/12/2005	CM	Commercial	0	10/22/2008	100	0	100	2/28/2008	4X8 partition w/3 door
BP05166	06/20/2005	EL	Electric	5,000	08/16/2005	100	0	100	8/16/2005	Power grid & phone con
BP05177	05/19/2005	CM	Commercial	100,000	08/16/2005	100	0	100	9/20/2002	12X30 Verizon shelter &
BP05126	05/18/2005	EL	Electric	11,000	08/16/2005	100	0	100		Wiring for shelter
BP05060	03/15/2005	CM	Commercial	45,000	08/16/2005	100	0	100		Shelter & antennas

LAND LINE VALUATION SECTION		Use Code	Description	Zone	D	Frontage	Depth	Units	Price	Unit Price
9011	Municipal MDL-96	GB						3.52 AC	207,900.00	207,900.00
Total Card Land Units:								3.52 AC	Parcel Total Land Area: 3.52 AC	

Notes- Adj	Special Pricing	Adj. Unit Price	Land Value
		207,900.00	731.8
Total Land Value:			731.8

