Robinson+Cole

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May 3, 2018

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
83 Reeds Gap Road, North Branford, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 90-foot level of an existing 92-foot tower at 83 Reeds Gap Road in North Branford, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 1986 (Docket No. 56). Cellco now intends to replace six (6) of its existing antennas with six (6) new antennas (two (2) model JAHH-65B-R3B 850 MHz antennas; two (2) model JAHH-65B-R3B, 700 MHz antennas; and two (2) model JAHH-65B-R3B, 2100 MHz antennas) all at the same 90-foot level on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") and two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cables.

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 Michael T. Paulhus, North Branford's Town Manager; Carey Duques, North Branford's Town Planner; David Tamulevich, the owner of the Property; and Crown, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's new antennas and RRHs will be attached to its existing antenna platform at the 90-foot level of the 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 installation of replacement antennas and RRHs will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report included in Attachment 3).

A copy of the parcel map and property owner information is included in Attachment 4. A Certificate of Mailing verifying that this filing was sent to municipal officials and the owner of the Property is included in Attachment 5.

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:
Michael T. Paulhus, Town Manager
Carey Duques, Town Planner
David Tamulevich
Crown Castle
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

JAHH-65B-R3B

8-port sector antenna, 2x 698–787, 2x 824-894 and 4x 1695–2360 MHz, 65° HPBW, 3x RET and low bands have diplexers. Internal SBT's on first LB(Port 1) and first HB (Port 5).

- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- One RET for 700MHz, one RET for 850MHz, and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO
- Internal filter on low band and interleaved dipole technology providing for attractive, low wind load mechanical package
- Separate RS-485 RET input/output for low and high band

Electrical Specifications

Frequency Band, MHz	698–787	824–894	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.5	15.8	18.0	18.4	18.5	18.8
Beamwidth, Horizontal, degrees	67	65	63	63	65	68
Beamwidth, Vertical, degrees	12.4	10.5	5.7	5.2	4.9	4.4
Beam Tilt, degrees	2–14	2–14	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	18	18	20	20	21	23
Front-to-Back Ratio at 180°, dB	32	34	31	35	36	38
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 at 50°C, maximum, watts	200	200	300	300	300	250
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	698–787	824–894	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.3	14.9	17.6	18.1	18.2	18.5
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.5	±0.6	±0.4	±0.5	±0.6
Gain by Beam Tilt, average, dBi	2 ° | 14.3	2 ° | 15.0	0 ° | 17.2	0 ° | 17.6	0 ° | 17.7	0 ° | 17.9
	8 ° | 14.3	8 ° | 14.9	5 ° | 17.6	5 ° | 18.2	5 ° | 18.3	5 ° | 18.7
	14 ° | 14.3	14 ° | 15.4	10 ° | 17.6	10 ° | 18.2	10 ° | 18.3	10 ° | 18.7
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.4	±4	±2.4	±2.9	±2.7
Beamwidth, Vertical Tolerance, degrees	±0.9	±0.5	±0.3	±0.2	±0.3	±0.1
USLS, beampeak to 20° above beampeak, dB	18	17	17	18	19	18
Front-to-Back Total Power at 180° ± 30°, dB	25	24	26	29	27	29
CPR at Boresight, dB	22	23	20	21	21	24
CPR at Sector, dB	11	12	11	11	11	8

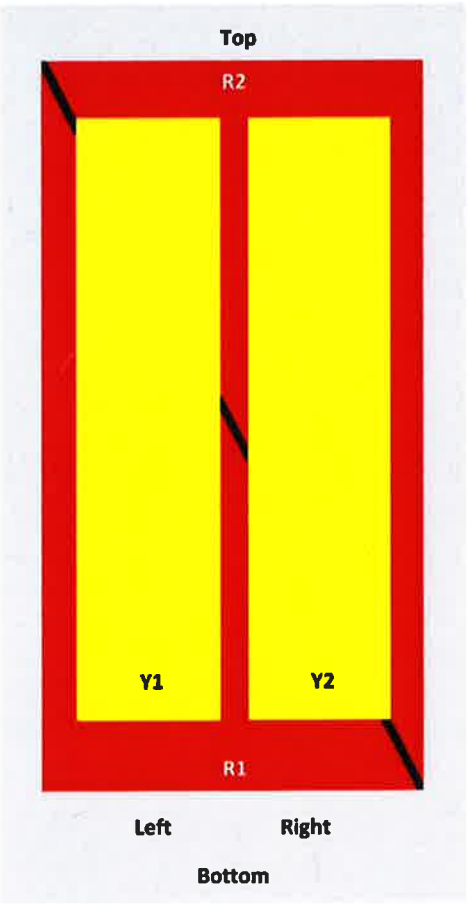
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Product Specifications

JAHH-65B-R3B

Array Layout

JAHH-65A-R3B JAHH-65B-R3B JAHH-65C-R3B



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-798	1-2	1	ANxxxxxxxxxxxxxxx1
R2	824-894	3-4	2	ANxxxxxxxxxxxxxxx2
Y1	1695-2360	5-6	3	ANxxxxxxxxxxxxxxx3
Y2	1695-2360	7-8		

View from the front of the antenna

(Sizes of colored boxes are not true depictions of array sizes)

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 787 MHz | 824 – 894 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female

Product Specifications

JAHH-65B-R3B

Color	Light gray
Grounding Type	RF connector body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	301.0 N @ 150 km/h 67.7 lbf @ 150 km/h
Wind Loading, lateral	254.0 N @ 150 km/h 57.1 lbf @ 150 km/h
Wind Loading, maximum	638.0 N @ 150 km/h 143.4 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	350.0 mm | 13.8 in
Depth	208.0 mm | 8.2 in
Net Weight, without mounting kit	28.7 kg | 63.3 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal Bias Tee	Port 1 | Port 5
Internal RET	High band (1) | Low band (2)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	13 W
Protocol	3GPP/AISG 2.0 (Single RET)
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	2 female | 2 male

Packed Dimensions

Length	1975.0 mm | 77.8 in
Width	456.0 mm | 18.0 in
Depth	357.0 mm | 14.1 in
Shipping Weight	42.0 kg | 92.6 lb

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

Product Specifications

JAHH-65B-R3B

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.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

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.

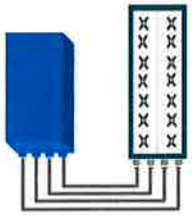
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

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.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

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.

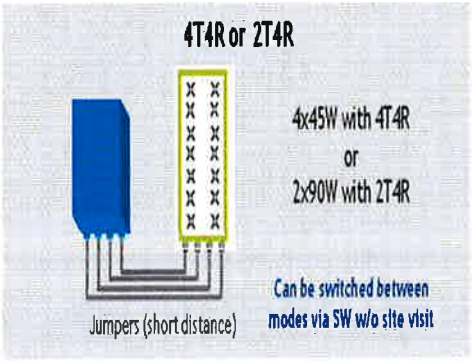
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

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

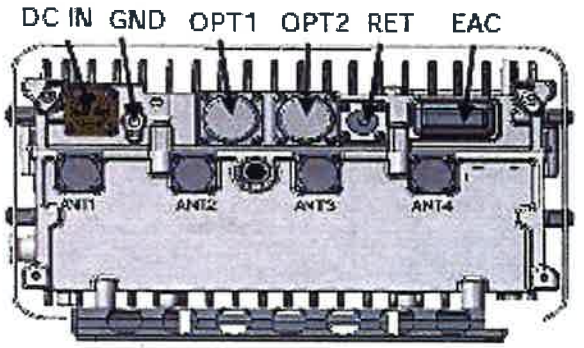
- Compact to reduce additional footprint when adding LTE in AWS 1-3 band
- Selection of MIMO configuration (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through 4Tx MIMO
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall

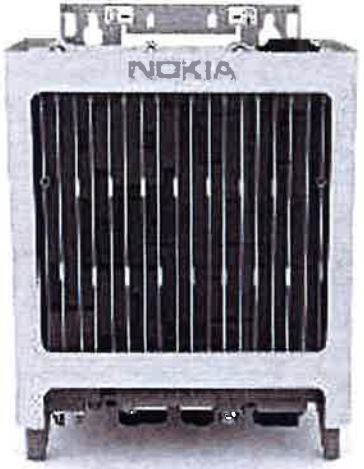
TECHNICAL SPECIFICATIONS

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 Sensivity (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.) Volume in Liters Weight in kg (lb) (w/o mounting HW)	655x299x182 (25.8x11.8x7.2) (with solar shield) 640x290x160 (25.2x11.4x6.3) (without solar shield) 35.5 (with solar shield) 29.7 (without solar shield) 25.8kg (56.8lb) (with solar shield)
DC voltage range DC power consumption	Nominal: -48V, -40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 750W typical @100% RF load (in 2Tx or 4Tx mode); Add 58W for 2A*29V for AISG
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) UL50E Type 4 Enclosure 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

AHCA AirScale RRH 4T4R B5 160W

Supported Frequency bands	3GPP band 5
Frequencies	DL 869-894MHz, UL 824-849MHz
Number of TX/RX paths/pipes	4TX/4RX
Instantaneous Bandwidth IBW	25MHz (Full Band)
Occupied Bandwidth OBW	25MHz (Full Band)
Output Power	4T4R @ 40W / 2T4R @ 60W
RF Sharing	LTE, WCDMA, LTE + NB-IoT supported
256 QAM Back Off	No backoff at 40W and 0.8dB at 60W.
Supply Voltage / Voltage Range	DC-48V / -36V to -60V
Typical Power Consumption	365W [50% ETSI Busy Hour Load at 4TX @ 40W]
	529W [100% RF Load at 4 TX @ 40W]
	574W [100% RF Load at 4 TX @ 40W with SBT and AISG ON]
Antenna Ports	4 Ports, 4.3-10+
Optical Ports	2x CPRI 9.8 Gbps
ALD Control Interfaces	AISG3.0 from ANT1,2, 3, 4 and RET (Power supply ANT1 and ANT3)
Other Interfaces	External Alarm MDR-26 Serial connector (4 inputs, 1 Output) DC Circular Power Connector





Operational Temperature Range	-40°C to 55°C (with solar cover)
Dimensions (mm) Height x width x depth	337 x 295 x 165 (radio only) 13.3" x 11.7" x 6.5" 428 x 324 x 208 (with bracket and enclosure) 16.9" x 12.8" x 8.2"
Volume (liters)	16.5
Weight (kg)	16/ 35.3 lb - w/o bracket
Ingress protection class	IP65
Installation options	Pole or Wall, Vertical or Horizontal Book Mount
Surge protection	Class II 5kA

NOKIA

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

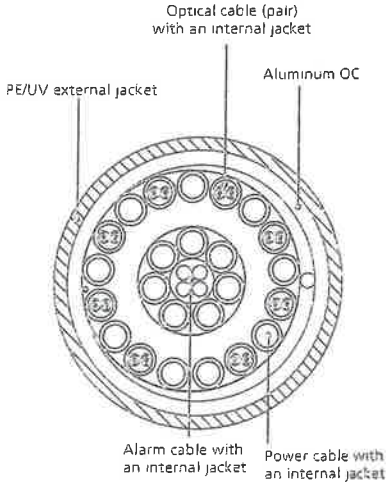


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

Site Name: *N BRANFORD CT*

Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissable Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
VZW 700	746	1	945	945	90	0.0420	0.4973	8.44%
VZW Cellular	876	3	415	1245	90	0.0553	0.5840	9.46%
VZW 850 LTE	869	1	1451	1451	90	0.0644	0.5793	11.12%
VZW PCS	1970	0	0	0	90	0.0000	1.0000	0.00%
VZW AWS	2145	1	4308	4308	90	0.1913	2.0000	9.56%
Total Percentage of Maximum Permissible Exposure								38.58%

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

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

Absolute worst case maximum values used.

ATTACHMENT 3

Date: **February 22, 2018**

Jay Patton
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(980) 209-8241

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351
crown@tepgroup.net

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	468991
	Carrier Site Name:	N Branford CT
Crown Castle Designation:	**Crown Castle BU Number:**	806386
	Crown Castle Site Name:	NHV 106 943628
	Crown Castle JDE Job Number:	473213
	Crown Castle Work Order Number:	1529890
	Crown Castle Application Number:	416920 Rev. 2
Engineering Firm Designation:	**TEP Project Number:**	48909.157742
Site Data:	**83 Reeds Gap Road, North Branford, New Haven County, CT 06472**	
	Latitude *41° 24' 12.47"*, Longitude *-72° 44' 38.90"*	
	92 Foot - Self-Supporting Tower	

Dear Jay Patton,

Tower Engineering Professionals is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 1145459, in accordance with application 416920, revision 2.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code (2012 International Building Code) based upon an ultimate 3-second gust wind speed of 126 mph converted to a nominal 3-second gust wind speed of 98 mph per Section 1609.3.1 as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category C and Risk Category II were used in this analysis.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Tables 1 and 2 and the attached drawing for the determined available structural capacity to be effective.

We at *Tower Engineering Professionals* appreciate the opportunity of providing our continuing professional services to you and *Crown Castle*. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Brendan K. Orner / LFC

Respectfully submitted by:

Aaron T. Rucker, P.E.

02/22/2018

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1) INTRODUCTION

This tower is a 92-ft self-supporting tower designed by Rohn in September of 1986. The tower was originally designed for a wind load of E.I.A. Zone A mph per EIA-222-C for the appurtenances listed in Table 3. The tower has been modified multiple times in the past to accommodate additional loading. TEP visited the site in October of 2013 to perform a post modification inspection. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the ANSI/TIA-222-G-2-2009 Structural Standard for Antenna Supporting Structures and Antennas – Addendum 2 using a nominal 3-second gust wind speed of 98 mph with no ice, 50 mph with 0.75 inch ice thickness, and 60 mph under service loads with the following design criteria:

Type of Analysis: **Rigorous Structural Analysis**
Classification of Structure: **Class II**
Exposure Category: **Exposure C**
Topographic Category: **Category 1**
Earthquake Category: **Not Considered**
Earthquake effects may be ignored per this standard for site locations where Ss does not exceed 1.0. (New Haven County Max Ss = 0.32).

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
90.0	90.0	6	Commscope	JAHH-65B-R3B w/ Mount Pipe	2	1-1/4	1
		3	Alcatel Lucent	B13 RRH4X30-4R			
		3	Alcatel Lucent	RRH4X45-AWS4 B66			
		3	Nokia	AIRSCALE RRH 4T4R B5 160W			
		2	RFS Celwave	DB-T1-6Z-8AB-0Z			

Notes:
1) See "Appendix B - Base Level Drawing" for assumed feed line configuration.

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
91.0	97.0	1	Sinclair	SD210-SF2P4SNM	3	7/8	1
	94.0	1	Sinclair	SD310-HF2P4SNM			
	91.0	2	Tower Mounts	Side Arm Mount [SO 304-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
90.0	90.0	2	Andrew	LNX-6514DS-A1M w/ Mount Pipe	1	7/8	2
		3	Antel	BXA-171063-8BF-2 w/ Mount Pipe			
		1	Antel	BXA-70063-6CF-2 w/ Mount Pipe			
		6	RFS Celwave	FD9R6004/2C-3L			
		4	Decibel	DB844G65ZAXY w/ Mount Pipe	12	1-5/8	1
		2	Antel	LPA-80063/6CF w/ Mount Pipe			
		1	Tower Mounts	Sector Mount [SM 506-3]			
	84.0	1	RFS Celwave	220-1N			
67.0	67.0	3	Ericsson	RRUS-11	-	-	1
		1	Raycap	DC6-48-60-18-8F			
		1	Tower Mounts	Pipe Mount [PM 601-3]			
65.0	66.0	3	KMW Communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe	12 2 1	7/8 7/16 3/8	1
		6	Powerwave Technologies	7770.00 w/ Mount Pipe			
		6	Powerwave Technologies	LGP21401			
		6	Powerwave Technologies	LGP21901			
	65.0	1	Tower Mounts	Sector Mount [SM 502-3]			
59.0	60.0	1	GPS	GPS_A	1	1/2	1
	59.0	1	Tower Mounts	Side Arm Mount [SO 305-1]			
34.0	35.0	1	Spectracom	8225	1	1/2	1

Notes:
1) Existing equipment
2) Existing equipment to be removed; not considered in this analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
90.0	90.0	4	RFS Celwave	PD10017	-	-
77.0	77.0	6	RFS Celwave	PD1132	-	-
68.0	68.0	2	Generic	6' Dia. Std. Dish	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Report	JGI Eastern, Inc.	1069632	CCISites
Foundation Calculations	Vertical Structures, Inc.	4063555	CCISites
Tower Manufacturer Drawings	Rohn	962042	CCISites
Tower Reinforcement Drawings	All-Points Technology Corp.	962041	CCISites
Tower Reinforcement Drawings	Vertical Structures, Inc.	1093271	CCISites
Post Modification Inspection	Vertical Structures, Inc.	1285457	CCISites
Tower Reinforcement Drawings	FDH Engineering	3841012	CCISites
Post Modification Inspection	TEP	4061638	CCISites

3.1) Analysis Method

tnxTower (version 7.0.5.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) The tower and foundation were built in accordance with the manufacturer's specifications.
2) The tower and foundation have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2, and "Appendix B – Base Level Drawing".
4) All tower components are in sufficient condition to carry their full design capacity.
5) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
6) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not analyze antennas supporting mounts as part of this structural analysis report.
7) The foundation steel reinforcement was assumed to be the minimum required per ACI 318.
8) The existing base plate grout was not considered in this analysis.

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	ΦP_{allow} (K)	% Capacity	Pass / Fail
T1	92 - 80	Leg	ROHN 2 STD	1	-11.75	36.84	31.9	Pass
T2	80 - 75	Leg	ROHN 2.5 STD	25	-16.74	57.14	29.3	Pass
T3	75 - 70	Leg	ROHN 2.5 STD	34	-22.88	57.14	40.1	Pass
T4	70 - 65	Leg	ROHN 2.5 STD	43	-28.06	57.14	49.1	Pass
T5	65 - 60	Leg	ROHN 2.5 STD	52	-35.75	57.14	62.6	Pass
T6	60 - 40	Leg	ROHN 2.5 X-STR	64	-62.78	87.57	71.7	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	ΦP_{allow} (K)	% Capacity	Pass / Fail
T7	40 - 20	Leg	ROHN 3 X-STR	94	-89.27	123.30	72.4	Pass
T8	20 - 13.3333	Leg	ROHN 3.5 X-STR	124	-97.70	153.96	63.5	Pass
T9	13.3333 - 6.66667	Leg	ROHN 3.5 X-STR	136	-106.31	153.99	69.0	Pass
T10	6.66667 - 0	Leg	ROHN 3.5 X-STR	148	-114.46	154.01	74.3	Pass
T1	92 - 80	Diagonal	L1 1/2x1 1/2x1/8	13	-3.10	3.78	82.1 89.6 (b)	Pass
T2	80 - 75	Diagonal	L1 3/4x1 3/4x1/8	32	-3.10	4.67	66.3 71.1 (b)	Pass
T3	75 - 70	Diagonal	L2x2x1/4	41	-2.95	12.09	24.4 41.7 (b)	Pass
T4	70 - 65	Diagonal	L1 3/4x1 3/4x1/8	50	-3.12	3.86	80.8	Pass
T5	65 - 60	Diagonal	L2x2x1/4	63	-4.29	10.05	42.7 58.4 (b)	Pass
T6	60 - 40	Diagonal	L2x2x1/4	72	-4.92	6.09	80.8	Pass
T7	40 - 20	Diagonal	L2 1/2x2 1/2x3/16	102	-5.29	7.25	72.9 83.0 (b)	Pass
T8	20 - 13.3333	Diagonal	L2 1/2x2 1/2x3/16	132	-5.42	6.69	80.9 83.9 (b)	Pass
T9	13.3333 - 6.66667	Diagonal	L2 1/2x2 1/2x3/8	144	-5.55	11.49	48.3 73.3 (b)	Pass
T10	6.66667 - 0	Diagonal	L2 1/2x2 1/2x3/8	156	-5.73	10.59	54.1 75.5 (b)	Pass
T6	60 - 40	Secondary Horizontal	L2 1/2x2 1/2x1/4	73	-1.09	18.20	6.0 15.2 (b)	Pass
T7	40 - 20	Secondary Horizontal	L2x2x1/4	103	-1.55	6.57	23.6	Pass
T8	20 - 13.3333	Secondary Horizontal	L2x2x1/4	133	-1.69	5.90	28.7	Pass
T9	13.3333 - 6.66667	Secondary Horizontal	L2x2x1/4	145	-1.84	5.30	34.8	Pass
T10	6.66667 - 0	Secondary Horizontal	L2x2x1/4	157	-1.99	4.78	41.5	Pass
T1	92 - 80	Top Girt	L2x2x1/8	5	-0.12	3.21	3.6	Pass
T5	65 - 60	Top Girt	L2 1/2x2 1/2x3/16	57	-0.10	5.98	1.7 4.3 (b)	Pass
							Summary	
						Leg (T10)	74.3	Pass
						Diagonal (T1)	89.6	Pass
						Secondary Horizontal (T10)	41.5	Pass
						Top Girt (T5)	4.3	Pass
						Bolt Checks	89.6	Pass
						RATING =	**89.6**	**Pass**

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	-	84.0	Pass
1	Base Foundation Soil Interaction	-	89.3	Pass
1	Base Foundation Structural	-	20.0	Pass

Structure Rating (max from all components) =	89.6%

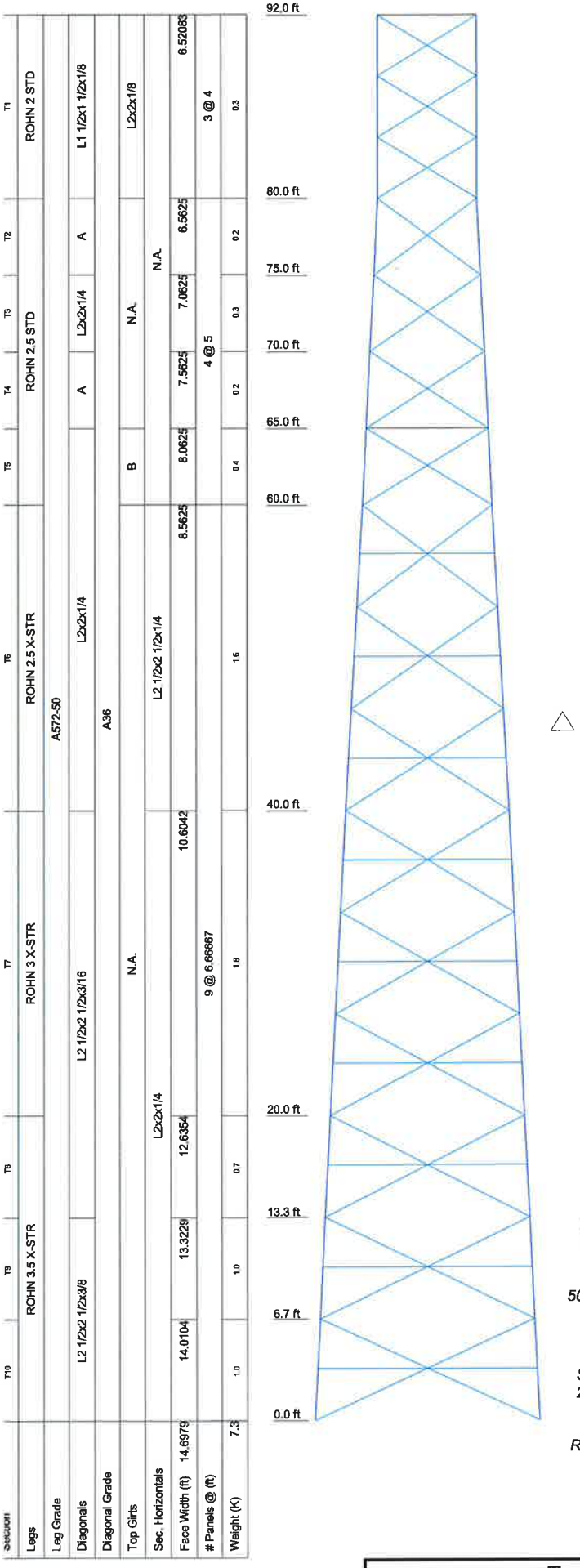
Notes:
1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.

4.1) Recommendations

1) If the load differs from that described in Tables 1 and 2 of this report, "Appendix B – Base Level Drawing" or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
SD310-HF2P4SNM	91	RRUS-11	67
SD210-SF2P4SNM	91	RRUS-11	67
Side Arm Mount [SO 304-1]	91	DC6-48-60-18-8F	67
Side Arm Mount [SO 304-1]	91	Pipe Mount [PM 601-3]	67
(2) DB844G65ZAXY w/ Mount Pipe	90	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
(2) DB844G65ZAXY w/ Mount Pipe	90	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
(2) LPA-80063/6CF w/ Mount Pipe	90	AM-X-CD-16-65-00T-RET w/ Mount Pipe	65
220-1N	90	(2) 7770.00 w/ Mount Pipe	65
(2) JAHH-65B-R3B w/ Mount Pipe	90	(2) 7770.00 w/ Mount Pipe	65
(2) JAHH-65B-R3B w/ Mount Pipe	90	(2) 7770.00 w/ Mount Pipe	65
(2) JAHH-65B-R3B w/ Mount Pipe	90	(2) LGP21401	65
B13 RRH4X30-4R	90	(2) LGP21401	65
B13 RRH4X30-4R	90	(2) LGP21401	65
B13 RRH4X30-4R	90	(2) LGP21901	65
RRH4X45-AWS4 B66	90	(2) LGP21901	65
RRH4X45-AWS4 B66	90	(2) LGP21901	65
RRH4X45-AWS4 B66	90	Sector Mount [SM 502-3]	65
AIRSCALE RRH 4T4R B5 160W	90	GPS_A	59
AIRSCALE RRH 4T4R B5 160W	90	Side Arm Mount [SO 305-1]	59
AIRSCALE RRH 4T4R B5 160W	90	8225	34
(2) DB-T1-6Z-8AB-0Z	90		
Sector Mount [SM 506-3]	90		
RRUS-11	67		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L1 3/4x1 3/4x1/8	B	L2 1/2x2 1/2x3/16

MATERIAL STRENGTH

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

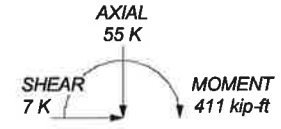
TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 98 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 89.6%

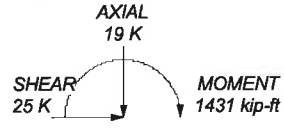
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 119 K
SHEAR: 15 K

UPLIFT: -103 K
SHEAR: 13 K



TORQUE 1 kip-ft
50 mph WIND - 0.7500 in ICE



TORQUE 5 kip-ft
REACTIONS - 98 mph WIND

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job: NHV 106 943628 (BU 806386)			
Project: TEP No. 48909.157742			
Client: Crown Castle	Drawn by: borner	App'd:	
Code: TIA-222-G	Date: 02/22/18	Scale: N	
Path: \\tep-netapp-01\Towers\48909\94411_157742_806386 NHV 106 943628 BA\ErixTower\806386_LCS.eri		Dwg No.	

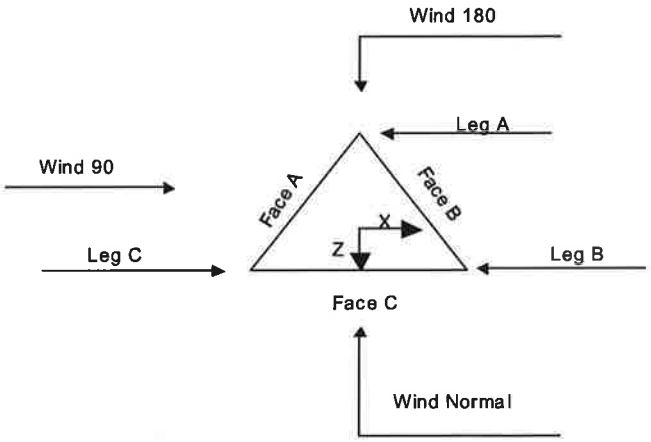
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 92.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 6.52 ft at the top and 14.70 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 98 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56.00 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.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member 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		



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	92.00-80.00			6.52	1	12.00
T2	80.00-75.00			6.56	1	5.00
T3	75.00-70.00			7.06	1	5.00
T4	70.00-65.00			7.56	1	5.00
T5	65.00-60.00			8.06	1	5.00
T6	60.00-40.00			8.56	1	20.00
T7	40.00-20.00			10.60	1	20.00
T8	20.00-13.33			12.64	1	6.67
T9	13.33-6.67			13.32	1	6.67
T10	6.67-0.00			14.01	1	6.67

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	92.00-80.00	4.00	X Brace	No	No	0.0000	0.0000
T2	80.00-75.00	5.00	X Brace	No	No	0.0000	0.0000
T3	75.00-70.00	5.00	X Brace	No	No	0.0000	0.0000
T4	70.00-65.00	5.00	X Brace	No	No	0.0000	0.0000
T5	65.00-60.00	5.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	60.00-40.00	6.67	X Brace	No	Yes	0.0000	0.0000
T7	40.00-20.00	6.67	X Brace	No	Yes	0.0000	0.0000
T8	20.00-13.33	6.67	X Brace	No	Yes	0.0000	0.0000
T9	13.33-6.67	6.67	X Brace	No	Yes	0.0000	0.0000
T10	6.67-0.00	6.67	X Brace	No	Yes	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 92.00-80.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)
T2 80.00-75.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x1/8	A36 (36 ksi)
T3 75.00-70.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T4 70.00-65.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x1/8	A36 (36 ksi)
T5 65.00-60.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T6 60.00-40.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T7 40.00-20.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T8 20.00-13.33	Pipe	ROHN 3.5 X-STR	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 13.33-6.67	Pipe	ROHN 3.5 X-STR	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/8	A36 (36 ksi)
T10 6.67-0.00	Pipe	ROHN 3.5 X-STR	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/8	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 92.00-80.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Pipe		A36 (36 ksi)
T5 65.00-60.00	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Pipe		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
ft						
T6 60.00-40.00	Equal Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)
T7 40.00-20.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)
T8 20.00-13.33	Equal Angle	L2x2x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)
T9 13.33-6.67	Equal Angle	L2x2x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)
T10 6.67-0.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Pipe		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft^2	in					in	in	in
T1 92.00-80.00	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T2 80.00-75.00	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T3 75.00-70.00	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T4 70.00-65.00	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T5 65.00-60.00	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T6 60.00-40.00	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T7 40.00-20.00	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T8 20.00-13.33	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T9 13.33-6.67	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000
T10 6.67-0.00	0.00	0.1793	A36 (36 ksi)	1.03	1	1.05	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
ft															
T1 92.00-80.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 80.00-75.00	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	No	1	1	1	1	1	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
75.00-70.00				1	1	1	1	1	1	1
T4	Yes	No	1	1	1	1	1	1	1	1
70.00-65.00				1	1	1	1	1	1	1
T5	Yes	No	1	1	1	1	1	1	1	1
65.00-60.00				1	1	1	1	1	1	1
T6	Yes	No	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	0.5	1
T7	Yes	No	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	0.5	1
T8	Yes	No	1	1	1	1	1	1	1	1
20.00-13.33				1	1	1	1	1	0.5	1
T9 13.33-6.67	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1
T10 6.67-0.00	Yes	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	0.5	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 92.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 80.00-75.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 75.00-70.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 70.00-65.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 65.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 20.00-13.33	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 13.33-6.67	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 6.67-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1 92.00-80.00	Flange	0.6250 A325X	4	0.5000 A325X	1	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0
T2 80.00-75.00	Flange	0.6250 A325X	0	0.5000 A325X	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T3 75.00-70.00	Flange	0.6250 A325X	0	0.5000 A325X	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0
T4 70.00-65.00	Flange	0.6250 A325X	0	0.5000 A325X	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0
T5 65.00-60.00	Flange	0.6250 A325X	4	0.5000 A325X	1	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	0
T6 60.00-40.00	Flange	0.7500 A325X	4	0.5000 A325N	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1
T7 40.00-20.00	Flange	0.8750 A325X	4	0.5000 A325X	1	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	1
T8 20.00-13.33	Flange	0.8750 A449	0	0.5000 A325X	1	0.5000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	1
T9 13.33-6.67	Flange	0.8750 A449	0	0.5000 A325X	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	1
T10 6.67-0.00	Flange	0.8750 A449	0	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	1

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
LDF5-50A(7/8)	A	No	Ar (CaAa)	91.00 - 0.00	-2.0000	0.15	3	2	0.5000	1.0900		0.00
LDF7-50A(1-5/8)	A	No	Ar (CaAa)	90.00 - 0.00	0.0000	0.1	12	12	0.5000	1.9800		0.00
HB114-1-0813U4-M5F(1-1/4)	A	No	Ar (CaAa)	90.00 - 0.00	2.0000	0.15	2	2	0.5000	1.5400		0.00
AVA5-50(7/8)	C	No	Ar (CaAa)	65.00 - 0.00	0.0000	-0.35	12	7	0.5000	1.1020		0.00
2.25" Flexible Conduit	C	No	Ar (CaAa)	65.00 - 0.00	0.0000	-0.3	1	1	2.2500	2.2500		0.00
FB-L98B-002-75000(3/8)	C	No	Ar (CaAa)	65.00 - 0.00	0.0000	-0.3	1	1	0.3937	0.0000		0.00
WR-VG122ST-BRDA(7/16)	C	No	Ar (CaAa)	65.00 - 0.00	0.0000	-0.3	2	2	0.4600	0.0000		0.00
LDF4-50A(1/2)	A	No	Ar (CaAa)	59.00 - 34.00	-1.0000	0.1	1	1	0.5000	0.6250		0.00
LDF4-50A(1/2)	A	No	Ar (CaAa)	34.00 - 0.00	-1.0000	0.1	2	2	0.5000	0.6250		0.00
Feedline Ladder (Af)	A	No	Af (CaAa)	92.00 - 0.00	0.0000	0.1	1	1	3.0000	3.0000		0.01
Feedline Ladder (Af)	C	No	Af (CaAa)	65.00 - 0.00	0.0000	-0.35	1	1	3.0000	3.0000		0.01

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	92.00-80.00	A	0.000	0.000	36.437	0.000	0.23
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	80.00-75.00	A	0.000	0.000	17.555	0.000	0.11
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	75.00-70.00	A	0.000	0.000	17.555	0.000	0.11
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T4	70.00-65.00	A	0.000	0.000	17.555	0.000	0.11
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T5	65.00-60.00	A	0.000	0.000	17.555	0.000	0.11
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	10.237	0.000	0.06
T6	60.00-40.00	A	0.000	0.000	71.407	0.000	0.44
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	40.948	0.000	0.25
T7	40.00-20.00	A	0.000	0.000	72.345	0.000	0.44
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	40.948	0.000	0.25
T8	20.00-13.33	A	0.000	0.000	24.240	0.000	0.15
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	13.649	0.000	0.08
T9	13.33-6.67	A	0.000	0.000	24.240	0.000	0.15
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	13.649	0.000	0.08
T10	6.67-0.00	A	0.000	0.000	24.240	0.000	0.15
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	13.649	0.000	0.08

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	92.00-80.00	A	1.651	0.000	0.000	73.345	0.000	1.08
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	80.00-75.00	A	1.634	0.000	0.000	35.212	0.000	0.51
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T3	75.00-70.00	A	1.623	0.000	0.000	35.147	0.000	0.51
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T4	70.00-65.00	A	1.611	0.000	0.000	35.079	0.000	0.50
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T5	65.00-60.00	A	1.599	0.000	0.000	35.005	0.000	0.50
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	20.903	0.000	0.31
T6	60.00-40.00	A	1.564	0.000	0.000	146.313	0.000	2.05
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	82.710	0.000	1.21
T7	40.00-20.00	A	1.486	0.000	0.000	149.880	0.000	1.99
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	80.717	0.000	1.15
T8	20.00-13.33	A	1.401	0.000	0.000	49.856	0.000	0.64

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	26.183	0.000	0.36
T9	13.33-6.67	A	1.331	0.000	0.000	49.142	0.000	0.61
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	25.588	0.000	0.35
T10	6.67-0.00	A	1.193	0.000	0.000	47.727	0.000	0.56
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	24.409	0.000	0.32

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	92.00-80.00	-2.8937	-3.4419	-2.1311	-2.4649
T2	80.00-75.00	-3.1234	-3.7153	-2.3698	-2.7451
T3	75.00-70.00	-3.2578	-3.8819	-2.4932	-2.8935
T4	70.00-65.00	-3.5138	-4.1935	-2.6606	-3.0929
T5	65.00-60.00	-0.0350	-0.7976	0.1409	-0.3779
T6	60.00-40.00	-0.0699	-0.9857	0.0306	-0.6092
T7	40.00-20.00	-0.1009	-1.1768	0.0901	-0.6602
T8	20.00-13.33	-0.1152	-1.2957	0.1026	-0.7279
T9	13.33-6.67	-0.1157	-1.3545	0.0816	-0.8002
T10	6.67-0.00	-0.1162	-1.4119	0.0247	-0.9207

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	LDF5-50A(7/8)	80.00 - 91.00	0.6000	0.6000
T1	3	LDF7-50A(1-5/8)	80.00 - 90.00	0.6000	0.6000
T1	4	HB114-1-0813U4-M5F(1-1/4)	80.00 - 90.00	0.6000	0.6000
T1	12	Feedline Ladder (Af)	80.00 - 92.00	0.6000	0.6000
T2	1	LDF5-50A(7/8)	75.00 - 80.00	0.6000	0.6000
T2	3	LDF7-50A(1-5/8)	75.00 - 80.00	0.6000	0.6000
T2	4	HB114-1-0813U4-M5F(1-1/4)	75.00 - 80.00	0.6000	0.6000
T2	12	Feedline Ladder (Af)	75.00 - 80.00	0.6000	0.6000
T3	1	LDF5-50A(7/8)	70.00 - 75.00	0.6000	0.6000
T3	3	LDF7-50A(1-5/8)	70.00 - 75.00	0.6000	0.6000
T3	4	HB114-1-0813U4-M5F(1-1/4)	70.00 - 75.00	0.6000	0.6000
T3	12	Feedline Ladder (Af)	70.00 - 75.00	0.6000	0.6000
T4	1	LDF5-50A(7/8)	65.00 - 70.00	0.6000	0.6000
T4	3	LDF7-50A(1-5/8)	65.00 - 70.00	0.6000	0.6000
T4	4	HB114-1-0813U4-M5F(1-1/4)	65.00 - 70.00	0.6000	0.6000
T4	12	Feedline Ladder (Af)	65.00 - 70.00	0.6000	0.6000
T5	1	LDF5-50A(7/8)	60.00 - 65.00	0.6000	0.6000
T5	3	LDF7-50A(1-5/8)	60.00 - 65.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T5	4	HB114-1-0813U4-M5F(1-1/4)	60.00 - 65.00	0.6000	0.6000
T5	6	AVA5-50(7/8)	60.00 - 65.00	0.6000	0.6000
T5	7	2.25" Flexible Conduit	60.00 - 65.00	0.6000	0.6000
T5	8	FB-L98B-002-75000(3/8)	60.00 - 65.00	0.6000	0.6000
T5	9	WR-VG122ST-BRDA(7/16)	60.00 - 65.00	0.6000	0.6000
T5	12	Feedline Ladder (Af)	60.00 - 65.00	0.6000	0.6000
T5	13	Feedline Ladder (Af)	60.00 - 65.00	0.6000	0.6000
T6	1	LDF5-50A(7/8)	40.00 - 60.00	0.6000	0.6000
T6	3	LDF7-50A(1-5/8)	40.00 - 60.00	0.6000	0.6000
T6	4	HB114-1-0813U4-M5F(1-1/4)	40.00 - 60.00	0.6000	0.6000
T6	6	AVA5-50(7/8)	40.00 - 60.00	0.6000	0.6000
T6	7	2.25" Flexible Conduit	40.00 - 60.00	0.6000	0.6000
T6	8	FB-L98B-002-75000(3/8)	40.00 - 60.00	0.6000	0.6000
T6	9	WR-VG122ST-BRDA(7/16)	40.00 - 60.00	0.6000	0.6000
T6	10	LDF4-50A(1/2)	40.00 - 59.00	0.6000	0.6000
T6	12	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T6	13	Feedline Ladder (Af)	40.00 - 60.00	0.6000	0.6000
T7	1	LDF5-50A(7/8)	20.00 - 40.00	0.6000	0.6000
T7	3	LDF7-50A(1-5/8)	20.00 - 40.00	0.6000	0.6000
T7	4	HB114-1-0813U4-M5F(1-1/4)	20.00 - 40.00	0.6000	0.6000
T7	6	AVA5-50(7/8)	20.00 - 40.00	0.6000	0.6000
T7	7	2.25" Flexible Conduit	20.00 - 40.00	0.6000	0.6000
T7	8	FB-L98B-002-75000(3/8)	20.00 - 40.00	0.6000	0.6000
T7	9	WR-VG122ST-BRDA(7/16)	20.00 - 40.00	0.6000	0.6000
T7	10	LDF4-50A(1/2)	34.00 - 40.00	0.6000	0.6000
T7	11	LDF4-50A(1/2)	20.00 - 34.00	0.6000	0.6000
T7	12	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T7	13	Feedline Ladder (Af)	20.00 - 40.00	0.6000	0.6000
T8	1	LDF5-50A(7/8)	13.33 - 20.00	0.6000	0.6000
T8	3	LDF7-50A(1-5/8)	13.33 - 20.00	0.6000	0.6000
T8	4	HB114-1-0813U4-M5F(1-1/4)	13.33 - 20.00	0.6000	0.6000
T8	6	AVA5-50(7/8)	13.33 - 20.00	0.6000	0.6000
T8	7	2.25" Flexible Conduit	13.33 - 20.00	0.6000	0.6000
T8	8	FB-L98B-002-75000(3/8)	13.33 - 20.00	0.6000	0.6000
T8	9	WR-VG122ST-BRDA(7/16)	13.33 - 20.00	0.6000	0.6000
T8	11	LDF4-50A(1/2)	13.33 - 20.00	0.6000	0.6000
T8	12	Feedline Ladder (Af)	13.33 - 20.00	0.6000	0.6000
T8	13	Feedline Ladder (Af)	13.33 - 20.00	0.6000	0.6000
T9	1	LDF5-50A(7/8)	6.67 - 13.33	0.6000	0.6000
T9	3	LDF7-50A(1-5/8)	6.67 - 13.33	0.6000	0.6000
T9	4	HB114-1-0813U4-M5F(1-1/4)	6.67 - 13.33	0.6000	0.6000
T9	6	AVA5-50(7/8)	6.67 - 13.33	0.6000	0.6000
T9	7	2.25" Flexible Conduit	6.67 - 13.33	0.6000	0.6000
T9	8	FB-L98B-002-75000(3/8)	6.67 - 13.33	0.6000	0.6000
T9	9	WR-VG122ST-BRDA(7/16)	6.67 - 13.33	0.6000	0.6000
T9	11	LDF4-50A(1/2)	6.67 - 13.33	0.6000	0.6000
T9	12	Feedline Ladder (Af)	6.67 - 13.33	0.6000	0.6000
T9	13	Feedline Ladder (Af)	6.67 - 13.33	0.6000	0.6000
T10	1	LDF5-50A(7/8)	0.00 - 6.67	0.6000	0.6000
T10	3	LDF7-50A(1-5/8)	0.00 - 6.67	0.6000	0.6000
T10	4	HB114-1-0813U4-M5F(1-1/4)	0.00 - 6.67	0.6000	0.6000
T10	6	AVA5-50(7/8)	0.00 - 6.67	0.6000	0.6000
T10	7	2.25" Flexible Conduit	0.00 - 6.67	0.6000	0.6000
T10	8	FB-L98B-002-75000(3/8)	0.00 - 6.67	0.6000	0.6000
T10	9	WR-VG122ST-BRDA(7/16)	0.00 - 6.67	0.6000	0.6000
T10	11	LDF4-50A(1/2)	0.00 - 6.67	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T10	12	Feedline Ladder (Af)	0.00 - 6.67	0.6000	0.6000
T10	13	Feedline Ladder (Af)	0.00 - 6.67	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
SD310-HF2P4SNM	C	From Leg	2.00	0.0000	91.00	No Ice	10.74	10.74	0.02
			0.00			1/2" Ice	15.26	15.26	0.18
			3.00			1" Ice	15.95	15.95	0.35
SD210-SF2P4SNM	B	From Leg	2.00	0.0000	91.00	No Ice	10.74	10.74	0.02
			0.00			1/2" Ice	15.26	15.26	0.18
			6.00			1" Ice	15.95	15.95	0.35
Side Arm Mount [SO 304-1]	B	From Leg	1.00	-41.0000	91.00	No Ice	0.63	0.94	0.02
			0.00			1/2" Ice	1.00	1.45	0.03
			0.00			1" Ice	1.37	1.96	0.04
Side Arm Mount [SO 304-1]	C	From Leg	1.00	79.0000	91.00	No Ice	0.63	0.94	0.02
			0.00			1/2" Ice	1.00	1.45	0.03
			0.00			1" Ice	1.37	1.96	0.04
**									
(2) DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.00	49.0000	90.00	No Ice	4.58	4.80	0.03
			0.00			1/2" Ice	4.96	5.42	0.08
			0.00			1" Ice	5.34	6.04	0.13
(2) DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.00	49.0000	90.00	No Ice	4.58	4.80	0.03
			0.00			1/2" Ice	4.96	5.42	0.08
			0.00			1" Ice	5.34	6.04	0.13
(2) LPA-80063/6CF w/ Mount Pipe	C	From Leg	4.00	59.0000	90.00	No Ice	10.06	10.45	0.06
			0.00			1/2" Ice	10.75	11.74	0.15
			0.00			1" Ice	11.40	12.87	0.25
220-1N	C	From Leg	4.00	59.0000	90.00	No Ice	5.00	5.00	0.03
			0.00			1/2" Ice	7.03	7.03	0.06
			-6.00			1" Ice	9.07	9.07	0.11
(2) JAHH-65B-R3B w/ Mount Pipe	A	From Leg	4.00	49.0000	90.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			0.00			1" Ice	10.46	9.73	0.25
(2) JAHH-65B-R3B w/ Mount Pipe	B	From Leg	4.00	49.0000	90.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			0.00			1" Ice	10.46	9.73	0.25
(2) JAHH-65B-R3B w/ Mount Pipe	C	From Leg	4.00	59.0000	90.00	No Ice	9.35	7.65	0.09
			0.00			1/2" Ice	9.92	8.83	0.16
			0.00			1" Ice	10.46	9.73	0.25
B13 RRH4X30-4R	A	From Leg	4.00	49.0000	90.00	No Ice	2.16	1.62	0.06
			2.67			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
B13 RRH4X30-4R	B	From Leg	4.00	49.0000	90.00	No Ice	2.16	1.62	0.06
			2.67			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
B13 RRH4X30-4R	C	From Leg	4.00	59.0000	90.00	No Ice	2.16	1.62	0.06
			2.67			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRH4X45-AWS4 B66	A	From Leg	4.00	49.0000	90.00	No Ice	2.66	1.59	0.06
			-2.67			1/2" Ice	2.88	1.77	0.08
			0.00			1" Ice	3.10	1.96	0.11
RRH4X45-AWS4 B66	B	From Leg	4.00	49.0000	90.00	No Ice	2.66	1.59	0.06
			-2.67			1/2" Ice	2.88	1.77	0.08
			0.00			1" Ice	3.10	1.96	0.11
RRH4X45-AWS4 B66	C	From Leg	4.00	59.0000	90.00	No Ice	2.66	1.59	0.06
			-2.67			1/2" Ice	2.88	1.77	0.08
			0.00			1" Ice	3.10	1.96	0.11
AIRSCALE RRH 4T4R B5 160W	A	From Leg	4.00	49.0000	90.00	No Ice	1.29	0.72	0.04
			2.67			1/2" Ice	1.43	0.83	0.05
			0.00			1" Ice	1.58	0.96	0.06
AIRSCALE RRH 4T4R B5 160W	B	From Leg	4.00	49.0000	90.00	No Ice	1.29	0.72	0.04
			2.67			1/2" Ice	1.43	0.83	0.05
			0.00			1" Ice	1.58	0.96	0.06
AIRSCALE RRH 4T4R B5 160W	C	From Leg	4.00	59.0000	90.00	No Ice	1.29	0.72	0.04
			2.67			1/2" Ice	1.43	0.83	0.05
			0.00			1" Ice	1.58	0.96	0.06
(2) DB-T1-6Z-8AB-0Z	A	From Leg	4.00	49.0000	90.00	No Ice	4.80	2.00	0.04
			2.67			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
Sector Mount [SM 506-3]	C	None		0.0000	90.00	No Ice	35.47	35.47	1.74
						1/2" Ice	50.60	50.60	2.35
						1" Ice	65.73	65.73	2.95
**									
RRUS-11	A	From Leg	1.00	19.0000	67.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			0.00			1" Ice	3.21	1.50	0.09
RRUS-11	B	From Leg	1.00	19.0000	67.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			0.00			1" Ice	3.21	1.50	0.09
RRUS-11	C	From Leg	1.00	19.0000	67.00	No Ice	2.79	1.19	0.05
			0.00			1/2" Ice	3.00	1.34	0.07
			0.00			1" Ice	3.21	1.50	0.09
DC6-48-60-18-8F	A	From Leg	1.00	19.0000	67.00	No Ice	1.21	1.21	0.03
			0.00			1/2" Ice	1.89	1.89	0.05
			0.00			1" Ice	2.11	2.11	0.08
Pipe Mount [PM 601-3]	C	None		0.0000	67.00	No Ice	4.39	4.39	0.20
						1/2" Ice	5.48	5.48	0.24
						1" Ice	6.57	6.57	0.28
**									
AM-X-CD-16-65-00T-RET w/ Mount Pipe	A	From Leg	4.00	69.0000	65.00	No Ice	8.26	6.30	0.07
			6.00			1/2" Ice	8.82	7.48	0.14
			1.00			1" Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00	69.0000	65.00	No Ice	8.26	6.30	0.07
			6.00			1/2" Ice	8.82	7.48	0.14
			1.00			1" Ice	9.35	8.37	0.21
AM-X-CD-16-65-00T-RET w/ Mount Pipe	C	From Leg	4.00	69.0000	65.00	No Ice	8.26	6.30	0.07
			6.00			1/2" Ice	8.82	7.48	0.14
			1.00			1" Ice	9.35	8.37	0.21
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00	69.0000	65.00	No Ice	5.75	4.25	0.06
			-2.00			1/2" Ice	6.18	5.01	0.10
			1.00			1" Ice	6.61	5.71	0.16
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00	69.0000	65.00	No Ice	5.75	4.25	0.06
			-2.00			1/2" Ice	6.18	5.01	0.10
			1.00			1" Ice	6.61	5.71	0.16
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00	69.0000	65.00	No Ice	5.75	4.25	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			-2.00			1/2" Ice	6.18	5.01	0.10
			1.00			1" Ice	6.61	5.71	0.16
(2) LGP21401	A	From Leg	4.00	69.0000	65.00	No Ice	1.10	0.21	0.01
			-2.00			1/2" Ice	1.24	0.27	0.02
			1.00			1" Ice	1.38	0.35	0.03
(2) LGP21401	B	From Leg	4.00	69.0000	65.00	No Ice	1.10	0.21	0.01
			-2.00			1/2" Ice	1.24	0.27	0.02
			1.00			1" Ice	1.38	0.35	0.03
(2) LGP21401	C	From Leg	4.00	69.0000	65.00	No Ice	1.10	0.21	0.01
			-2.00			1/2" Ice	1.24	0.27	0.02
			1.00			1" Ice	1.38	0.35	0.03
(2) LGP21901	A	From Leg	4.00	69.0000	65.00	No Ice	0.23	0.16	0.01
			-2.00			1/2" Ice	0.29	0.21	0.01
			1.00			1" Ice	0.36	0.28	0.01
(2) LGP21901	B	From Leg	4.00	69.0000	65.00	No Ice	0.23	0.16	0.01
			-2.00			1/2" Ice	0.29	0.21	0.01
			1.00			1" Ice	0.36	0.28	0.01
(2) LGP21901	C	From Leg	4.00	69.0000	65.00	No Ice	0.23	0.16	0.01
			-2.00			1/2" Ice	0.29	0.21	0.01
			1.00			1" Ice	0.36	0.28	0.01
Sector Mount [SM 502-3]	C	None		0.0000	65.00	No Ice	33.02	33.02	1.67
						1/2" Ice	47.36	47.36	2.22
						1" Ice	61.70	61.70	2.77
**									
GPS_A	C	From Leg	3.00	0.0000	59.00	No Ice	0.26	0.26	0.00
			0.00			1/2" Ice	0.32	0.32	0.00
			1.00			1" Ice	0.39	0.39	0.01
Side Arm Mount [SO 305-1]	C	From Leg	1.50	39.0000	59.00	No Ice	0.94	1.41	0.03
			0.00			1/2" Ice	1.48	2.17	0.04
			0.00			1" Ice	2.02	2.93	0.06
**									
8225	B	From Leg	2.00	0.0000	34.00	No Ice	0.89	0.89	0.00
			0.00			1/2" Ice	1.06	1.06	0.01
			1.00			1" Ice	1.23	1.23	0.02

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	92	Leg	A325X	0.6250	4	2.24	20.71	0.108	1	Bolt Tension
		Diagonal	A325X	0.5000	1	3.12	3.48	0.896	1	Member Block Shear
		Top Girt	A325X	0.5000	1	0.13	4.13	0.031	1	Member Bearing
T2	80	Diagonal	A325X	0.5000	1	2.94	4.13	0.711	1	Member Bearing
T3	75	Diagonal	A325X	0.5000	1	2.99	7.18	0.417	1	Gusset Bearing
T4	70	Diagonal	A325X	0.5000	1	3.01	4.13	0.728	1	Member Bearing
T5	65	Leg	A325X	0.6250	4	7.41	20.71	0.358	1	Bolt Tension
		Diagonal	A325X	0.5000	1	4.19	7.18	0.584	1	Gusset Bearing
		Top Girt	A325X	0.5000	1	0.27	6.20	0.043	1	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T6	60	Leg	A325X	0.7500	4	13.54	29.82	0.454	1	Bolt Tension
		Diagonal	A325N	0.5000	1	4.79	7.18	0.667	1	Gusset Bearing
		Secondary Horizontal	A325N	0.5000	1	1.09	7.18	0.152	1	Gusset Bearing
T7	40	Leg	A325X	0.8750	4	19.42	40.59	0.479	1	Bolt Tension
		Diagonal	A325X	0.5000	1	5.14	6.20	0.830	1	Member Bearing
		Secondary Horizontal	A325X	0.6250	1	1.55	6.86	0.226	1	Gusset Bearing
T8	20	Diagonal	A325X	0.5000	1	5.20	6.20	0.839	1	Member Bearing
		Secondary Horizontal	A325X	0.6250	1	1.69	6.86	0.247	1	Gusset Bearing
T9	13.3333	Diagonal	A325X	0.5000	1	5.26	7.18	0.733	1	Gusset Bearing
		Secondary Horizontal	A325X	0.6250	1	1.84	6.86	0.269	1	Gusset Bearing
T10	6.66667	Diagonal	A325X	0.5000	1	5.42	7.18	0.755	1	Gusset Bearing
		Secondary Horizontal	A325X	0.6250	1	1.99	6.86	0.289	1	Gusset Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	92 - 80	ROHN 2 STD	12.00	4.00	61.0 K=1.00	1.0745	-11.75	36.84	0.319 [1]
T2	80 - 75	ROHN 2.5 STD	5.01	5.01	63.4 K=1.00	1.7040	-16.74	57.14	0.293 [1]
T3	75 - 70	ROHN 2.5 STD	5.01	5.01	63.4 K=1.00	1.7040	-22.88	57.14	0.401 [1]
T4	70 - 65	ROHN 2.5 STD	5.01	5.01	63.4 K=1.00	1.7040	-28.06	57.14	0.491 [1]
T5	65 - 60	ROHN 2.5 STD	5.01	5.01	63.4 K=1.00	1.7040	-35.75	57.14	0.626 [1]
T6	60 - 40	ROHN 2.5 X-STR	20.03	3.45	44.8 K=1.00	2.2535	-62.78	87.57	0.717 [1]
T7	40 - 20	ROHN 3 X-STR	20.03	3.43	36.2 K=1.00	3.0159	-89.27	123.30	0.724 [1]
T8	20 - 13.3333	ROHN 3.5 X-STR	6.68	3.43	31.5 K=1.00	3.6784	-97.70	153.96	0.635 [1]
T9	13.3333 - 6.66667	ROHN 3.5 X-STR	6.68	3.42	31.4 K=1.00	3.6784	-106.31	153.99	0.690 [1]
T10	6.66667 - 0	ROHN 3.5 X-STR	6.68	3.42	31.4 K=1.00	3.6784	-114.46	154.01	0.743 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	92 - 80	L1 1/2x1 1/2x1/8	7.67	3.62	146.6 K=1.00	0.3594	-3.10	3.78	0.821 [1]
T2	80 - 75	L1 3/4x1 3/4x1/8	8.45	4.13	142.8 K=1.00	0.4219	-3.10	4.67	0.663 [1]
T3	75 - 70	L2x2x1/4	8.86	4.31	132.3 K=1.00	0.9380	-2.95	12.09	0.244 [1]
T4	70 - 65	L1 3/4x1 3/4x1/8	9.28	4.54	157.1 K=1.00	0.4219	-3.12	3.86	0.808 [1]
T5	65 - 60	L2x2x1/4	9.70	4.73	145.2 K=1.00	0.9380	-4.29	10.05	0.427 [1]
T6	60 - 40	L2x2x1/4	12.24	6.08	186.5 K=1.00	0.9380	-4.92	6.09	0.808 [1]
T7	40 - 20	L2 1/2x2 1/2x3/16	13.99	6.92	167.7 K=1.00	0.9020	-5.29	7.25	0.729 [1]
T8	20 - 13.3333	L2 1/2x2 1/2x3/16	14.59	7.20	174.5 K=1.00	0.9020	-5.42	6.69	0.809 [1]
T9	13.3333 - 6.66667	L2 1/2x2 1/2x3/8	15.21	7.48	184.4 K=1.00	1.7300	-5.55	11.49	0.483 [1]
T10	6.66667 - 0	L2 1/2x2 1/2x3/8	15.83	7.79	192.1 K=1.00	1.7300	-5.73	10.59	0.541 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T6	60 - 40	L2 1/2x2 1/2x1/4	10.25	4.86	119.4 K=1.01	1.1900	-1.09	18.20	0.060 [1]
T7	40 - 20	L2x2x1/4	12.29	5.85	179.6 K=1.00	0.9380	-1.55	6.57	0.236 [1]
T8	20 - 13.3333	L2x2x1/4	12.97	6.17	189.4 K=1.00	0.9380	-1.69	5.90	0.287 [1]
T9	13.3333 - 6.66667	L2x2x1/4	13.66	6.52	200.0 K=1.00	0.9380	-1.84	5.30	0.348 [1]
T10	6.66667 - 0	L2x2x1/4	14.35	6.86	210.6 K=1.00	0.9380	-1.99	4.78	0.415 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	92 - 80	L2x2x1/8	6.52	6.11	184.6 K=1.00	0.4844	-0.12	3.21	0.036 [1]

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T5	65 - 60	L2 1/2x2 1/2x3/16	8.06	7.61	184.6 K=1.00	0.9020	-0.10	5.98	0.017 [1]

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	92 - 80	ROHN 2 STD	12.00	4.00	61.0	1.0745	8.97	48.35	0.186 [1]
T2	80 - 75	ROHN 2.5 STD	5.01	5.01	63.4	1.7040	13.77	76.68	0.180 [1]
T3	75 - 70	ROHN 2.5 STD	5.01	5.01	63.4	1.7040	19.39	76.68	0.253 [1]
T4	70 - 65	ROHN 2.5 STD	5.01	5.01	63.4	1.7040	24.14	76.68	0.315 [1]
T5	65 - 60	ROHN 2.5 STD	5.01	5.01	63.4	1.7040	29.63	76.68	0.386 [1]
T6	60 - 40	ROHN 2.5 X-STR	20.03	3.23	41.9	2.2535	54.21	101.41	0.535 [1]
T7	40 - 20	ROHN 3 X-STR	20.03	3.25	34.3	3.0159	77.77	135.72	0.573 [1]
T8	20 - 13.3333	ROHN 3.5 X-STR	6.68	3.25	29.9	3.6784	85.18	165.53	0.515 [1]
T9	13.3333 - 6.66667	ROHN 3.5 X-STR	6.68	3.26	29.9	3.6784	92.57	165.53	0.559 [1]
T10	6.66667 - 0	ROHN 3.5 X-STR	6.68	3.26	29.9	3.6784	99.36	165.53	0.600 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	K	K	
T1	92 - 80	L1 1/2x1 1/2x1/8	7.67	3.62	96.0	0.2109	3.12	9.18	0.340 [1]
T2	80 - 75	L1 3/4x1 3/4x1/8	8.45	4.13	93.1	0.2578	2.94	11.21	0.262 [1]
T3	75 - 70	L2x2x1/4	8.86	4.31	87.4	0.5863	2.99	25.50	0.117 [1]
T4	70 - 65	L1 3/4x1 3/4x1/8	9.28	4.54	102.1	0.2578	3.01	11.21	0.268 [1]
T5	65 - 60	L2x2x1/4	9.70	4.73	95.7	0.5863	4.19	25.50	0.164 [1]
T6	60 - 40	L2x2x1/4	12.24	6.08	121.8	0.5863	4.79	25.50	0.188 [1]
T7	40 - 20	L2 1/2x2 1/2x3/16	13.99	6.92	108.3	0.5886	5.14	25.60	0.201 [1]
T8	20 - 13.3333	L2 1/2x2 1/2x3/16	14.59	7.20	112.6	0.5886	5.20	25.60	0.203 [1]
T9	13.3333 - 6.66667	L2 1/2x2 1/2x3/8	15.21	7.48	121.3	1.1217	5.26	48.79	0.108 [1]
T10	6.66667 - 0	L2 1/2x2 1/2x3/8	15.83	7.79	126.2	1.1217	5.42	48.79	0.111 [1]

[1] P_u / ϕP_n controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	60 - 40	L2 1/2x2 1/2x1/4	10.25	4.86	156.3	0.7753	1.09	33.73	0.032 [1]
T7	40 - 20	L2x2x1/4	12.29	5.85	236.4	0.5629	1.55	24.49	0.063 [1]
T8	20 - 13.3333	L2x2x1/4	12.97	6.17	249.0	0.5629	1.69	24.49	0.069 [1]
T9	13.3333 - 6.66667	L2x2x1/4	13.66	6.52	262.6	0.5629	1.84	24.49	0.075 [1]
T10	6.66667 - 0	L2x2x1/4	14.35	6.86	276.1	0.5629	1.99	24.49	0.081 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	92 - 80	L2x2x1/8	6.52	6.11	121.2	0.3047	0.13	13.25	0.010 [1]
T5	65 - 60	L2 1/2x2 1/2x3/16	8.06	7.61	120.7	0.5886	0.27	25.60	0.010 [1]

[1] P_u / ϕP_n controls

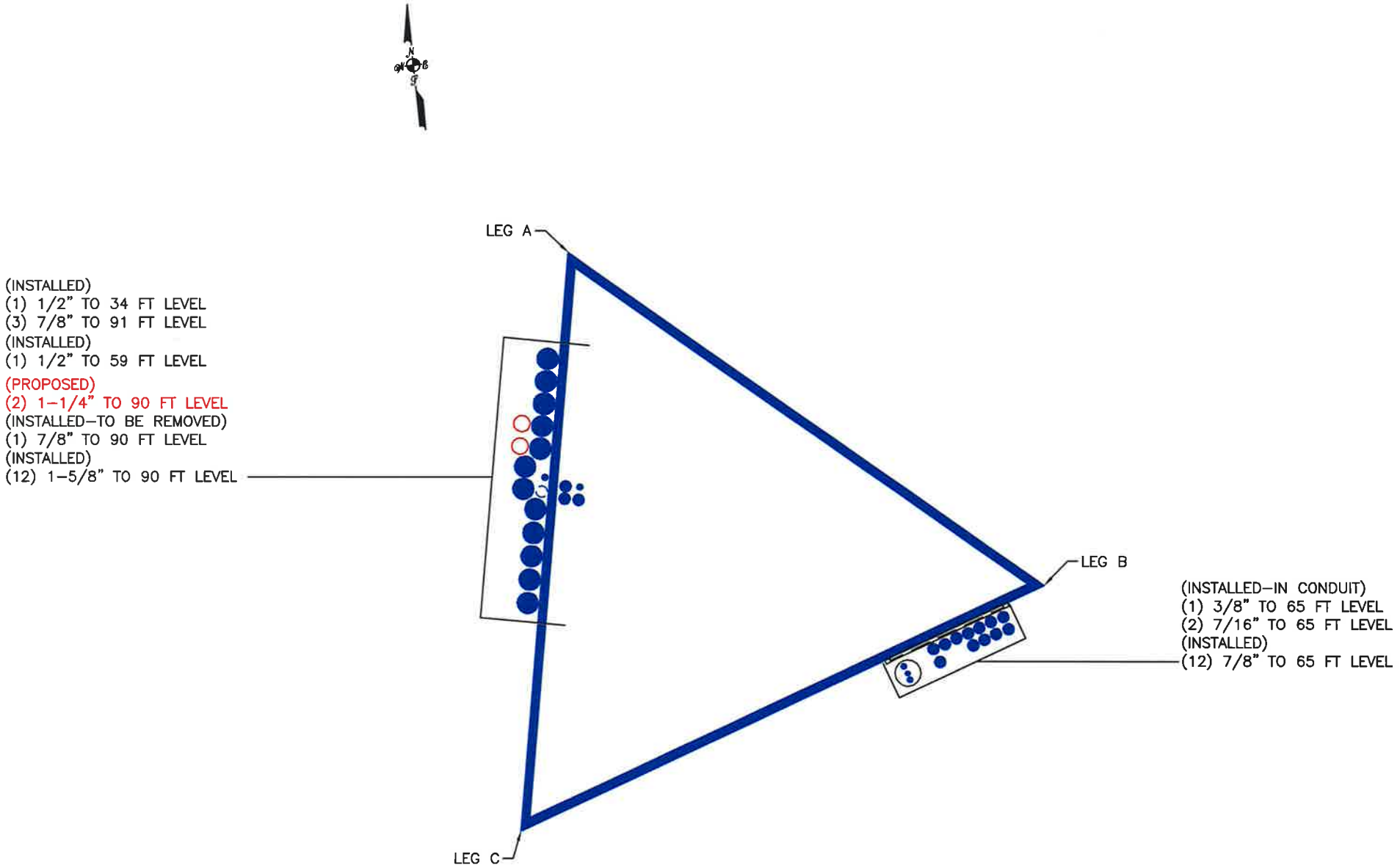
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	92 - 80	Leg	ROHN 2 STD	1	-11.75	36.84	31.9	Pass
T2	80 - 75	Leg	ROHN 2.5 STD	25	-16.74	57.14	29.3	Pass
T3	75 - 70	Leg	ROHN 2.5 STD	34	-22.88	57.14	40.1	Pass
T4	70 - 65	Leg	ROHN 2.5 STD	43	-28.06	57.14	49.1	Pass
T5	65 - 60	Leg	ROHN 2.5 STD	52	-35.75	57.14	62.6	Pass
T6	60 - 40	Leg	ROHN 2.5 X-STR	64	-62.78	87.57	71.7	Pass
T7	40 - 20	Leg	ROHN 3 X-STR	94	-89.27	123.30	72.4	Pass
T8	20 - 13.3333	Leg	ROHN 3.5 X-STR	124	-97.70	153.96	63.5	Pass
T9	13.3333 - 6.66667	Leg	ROHN 3.5 X-STR	136	-106.31	153.99	69.0	Pass
T10	6.66667 - 0	Leg	ROHN 3.5 X-STR	148	-114.46	154.01	74.3	Pass
T1	92 - 80	Diagonal	L1 1/2x1 1/2x1/8	13	-3.10	3.78	82.1 89.6 (b)	Pass
T2	80 - 75	Diagonal	L1 3/4x1 3/4x1/8	32	-3.10	4.67	66.3 71.1 (b)	Pass
T3	75 - 70	Diagonal	L2x2x1/4	41	-2.95	12.09	24.4 41.7 (b)	Pass
T4	70 - 65	Diagonal	L1 3/4x1 3/4x1/8	50	-3.12	3.86	80.8	Pass
T5	65 - 60	Diagonal	L2x2x1/4	63	-4.29	10.05	42.7 58.4 (b)	Pass
T6	60 - 40	Diagonal	L2x2x1/4	72	-4.92	6.09	80.8	Pass
T7	40 - 20	Diagonal	L2 1/2x2 1/2x3/16	102	-5.29	7.25	72.9 83.0 (b)	Pass
T8	20 - 13.3333	Diagonal	L2 1/2x2 1/2x3/16	132	-5.42	6.69	80.9 83.9 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T9	13.3333 - 6.66667	Diagonal	L2 1/2x2 1/2x3/8	144	-5.55	11.49	48.3 73.3 (b)	Pass
T10	6.66667 - 0	Diagonal	L2 1/2x2 1/2x3/8	156	-5.73	10.59	54.1 75.5 (b)	Pass
T6	60 - 40	Secondary Horizontal	L2 1/2x2 1/2x1/4	73	-1.09	18.20	6.0 15.2 (b)	Pass
T7	40 - 20	Secondary Horizontal	L2x2x1/4	103	-1.55	6.57	23.6	Pass
T8	20 - 13.3333	Secondary Horizontal	L2x2x1/4	133	-1.69	5.90	28.7	Pass
T9	13.3333 - 6.66667	Secondary Horizontal	L2x2x1/4	145	-1.84	5.30	34.8	Pass
T10	6.66667 - 0	Secondary Horizontal	L2x2x1/4	157	-1.99	4.78	41.5	Pass
T1	92 - 80	Top Girt	L2x2x1/8	5	-0.12	3.21	3.6	Pass
T5	65 - 60	Top Girt	L2 1/2x2 1/2x3/16	57	-0.10	5.98	1.7 4.3 (b)	Pass
							Summary	
						Leg (T10)	74.3	Pass
						Diagonal (T1)	89.6	Pass
						Secondary Horizontal (T10)	41.5	Pass
						Top Girt (T5)	4.3	Pass
						Bolt Checks	89.6	Pass
						RATING =	**89.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 806386 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Anchor Rod Check for Self Supporting Towers

TIA-222-G, Section 4.9.9 Rev. 6.1

CROWN CASTLE

Site Data	
BU#:	806386
Site Name:	NHV 106 943628
App #:	416920 Rev. 2

Anchor Rod Data		
Qty:	4	
Diam:	0.875	in
Rod Material:	A449 (1/4 to 1 Incl.)	
Strength (Fu):	120	ksi
Yield (Fy):	92	ksi

* Rod Circle:		in
* e:		in
* # of Rods		1 or 2

Mu= Pu x e:		ft-kips

** Only enter rod circle, offset (e) and number of anchor rods at the extreme fiber to consider if eccentric load due to leg reinforcement exist.*

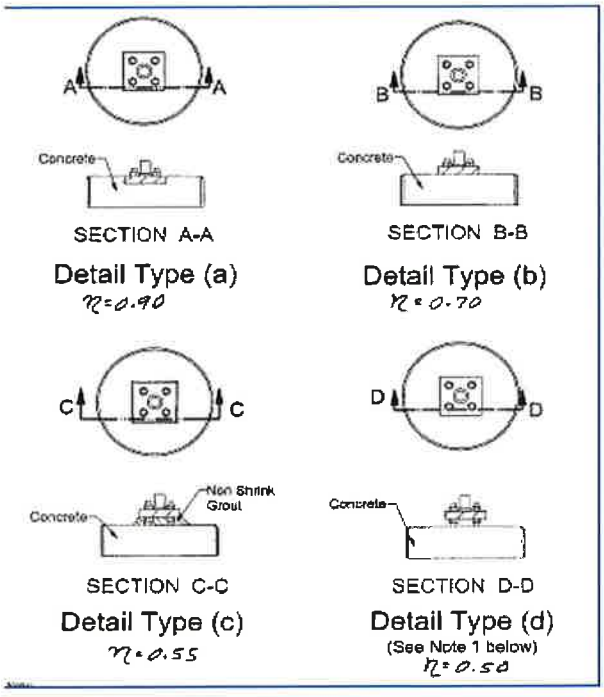


Figure 4-4 of TIA-222-G

Reactions		
Eta Factor, η	0.5	Detail Type
Down load, Pu:	119	kips
Shear, Vu:	15	kips

l_{ar}:		in
Mu = 0.65*l_{ar}*V_u		ft-kips

Anchor Rod Results:

Max Rod (Cu+ Vu/ń):	37.3	Kips
Design Axial, Φ*Fu*Anet:	44.4	Kips
Anchor Rod Stress Ratio:	84.0%	

If Applicable;

Anchor Rod Results with Bending Considered:

When the clear distance from the top of concrete to the bottom of level nut excceeds 1.0 times the diameter of the anchor rod, the following interaction equation shall also be satisfied (see Figure 4-4 of Rev. G):

$$(V_u/\phi R_{nv})^2 + [(P_u/\phi R_{nt}) + (M_u/\phi R_{nm})]^2 <= 1$$

$\phi R_{nv}=\phi*0.45*F_{ub}*A_b=$		kips
$\phi R_{nt}=\phi*F_u*A_{net}=$		kips
$\phi R_{nm}=\phi*F_y*Z=$		ft-kips

Maximum Acceptable Ratio:	105	%
Governing Stress Ratio:	84.0%	**Pass**

SST Unit Base Foundation

BU # :	806386
Site Name:	NHV 106 943628
App. Number:	416920 Rev. 2

TIA-222 Revision: G

Tower Centroid Offset?:	☐
Block Foundation?:	☑

Superstructure Analysis Reactions		
Global Moment, **M**:	1431	ft-kips
Global Axial, **P**:	19	kips
Global Shear, **V**:	25	kips
Leg Compression, P_{comp}:	119	kips
Leg Comp. Shear, V_{u_comp}:	15	kips
Leg Uplift, P_{uplift}:	103	kips
Leg Uplift. Shear, V_{u_uplift}:	13	kips
Tower Height, **H**:	92	ft
Base Face Width, **BW**:	14.6679	ft
BP Dist. Above Fdn, bp_{dist}:	1	in
Anchor Bolt Circle, **BC**:	7.0625	in

Foundation Analysis Checks				
	Capacity	**Demand**	**Rating**	**Check**
Lateral (Sliding) (kips)	41.59	25.00	**60.1%**	**Pass**
Bearing Pressure (ksf)	22.50	5.11	**22.7%**	**Pass**
*Overturning (kip*ft)*	1702.54	1520.58	**89.3%**	**Pass**
*Pad Flexure (kip*ft)*	2862.74	572.67	**20.0%**	**Pass**
Pad Shear - 1-way (kips)	702.45	118.96	**16.9%**	**Pass**
Pad Shear - 2-way (ksi)	0.16	0.02	**13.5%**	**Pass**

Soil Rating:	**89.3%**
Structural Rating:	**20.0%**

Pad Properties		
Depth, **D**:	2.00	ft
Pad Width, **W**:	19.00	ft
Pad Thickness, **T**:	3.50	ft
Pad Rebar Size (Bottom), **Sp**:	8	
Pad Rebar Quantity (Bottom), **mp**:	22	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties		
Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	3000	psi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties		
Total Soil Unit Weight, γ:		pcf
Ultimate Net Bearing, Qnet:	30.000	ksf
Cohesion, **Cu**:		ksf
Friction Angle, φ:		degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.3	
Neglected Depth, **N**:	99.0	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, **gw**:	99	ft

<-- Toggle between Gross and Net

Seismic Design Category:	D

ATTACHMENT 4


10
3.17 AC
5497
58
9
4.44 AC
4481
59
7
6.5 AC
4399
6
4.69 AC
4398
83
REEDS GAP RD
61.00
289.00
319.44
1338.49
380.00

83 REEDS GAP RD

Location	83 REEDS GAP RD	**Mblu**	70/B 6/ / /
Acct#	002385	**Owner**	TAMULEVICH DAVID
Assessment	$269,400	**Appraisal**	$384,800
PID	4398	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$186,100	$198,700	$384,800
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$130,300	$139,100	$269,400

Owner of Record

Owner TAMULEVICH DAVID
Co-Owner
Address 83 REEDS GAP RD
NORTHFORD, CT 06472-1122

Sale Price $120,000
Certificate
Book & Page 465/1113
Sale Date 01/02/2014
Instrument 08

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
TAMULEVICH DAVID	$120,000		465/1113	08	01/02/2014
LISKA MARY TRUSTEE	$0		451/ 511		06/14/2012
LISKA MARY	$0		212/ 677		09/20/1991

Building Information

Building 1 : Section 1

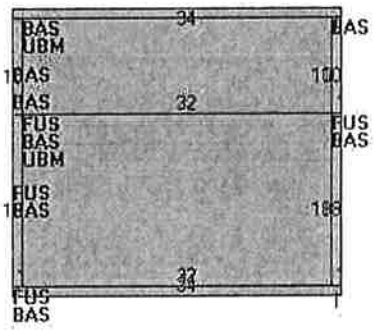
Year Built: 1983
Living Area: 1,666
Replacement Cost: $140,202
Building Percent Good: 86
Replacement Cost Less Depreciation: $120,600

Building Attributes	
Field	**Description**
Style	Colonial
Model	Residential
Grade:	Average
Stories:	2 Stories
Occupancy	1
Exterior Wall 1	Cedar or Redwd
Exterior Wall 2	
Roof Structure:	Salt Box
Roof Cover	Asphalt Shingl
Interior Wall 1	Drywall/Sheet
Interior Wall 2	Knotty Pine Pa
Interior Flr 1	Pine/Soft Wood
Interior Flr 2	Carpet
Heat Fuel	Electric
Heat Type:	Geothermal
AC Type:	Heat Pump
Total Bedrooms:	2 Bedrooms
Total Bthrms:	2
Total Half Baths:	0
Total Xtra Fixtrs:	
Total Rooms:	4 Rooms
Bath Style:	Average
Kitchen Style:	Average

Building Photo

(http://images.vgsi.com/photos/NorthBranfordCTPhotos//\00\0(

Building Layout



(http://images.vgsi.com/photos/NorthBranfordCTPhotos//Sketcl

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	1,020	1,020
FUS	Full Upper Story	646	646
UBM	Basement, Unfinished	896	0
		2,562	1,666

Extra Features

Extra Features				Legend
Code	**Description**	**Size**	**Value**	**Bldg #**
FPL1	FIREPLACE 1STY	1 UNITS	$3,400	1
FPO	EXTRA FPL OPEN	1 UNITS	$1,300	1

Land

Land Use

Land Line Valuation

Use Code	1010	**Size (Acres)**	4.69
Description	SINGLE FAM MDL-01	**Frontage**	0
Zone	R80	**Depth**	0
Neighborhood		**Assessed Value**	$139,100
Alt Land Appr	No	**Appraised Value**	$198,700
Category			

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
BRN3	BARN 1 STY W/LOFT			1200 S.F.	$29,300	1
ELCB	ELECTRONIC COMM BLDG			200 S.F.	$31,500	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$186,100	$198,700	$384,800
2016	$186,100	$198,700	$384,800
2015	$186,100	$198,700	$384,800

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$130,300	$139,100	$269,400
2016	$130,300	$139,100	$269,400
2015	$130,300	$139,100	$269,400

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	3	3	neopost 05/03/2018 US POSTAGE $002.38⁰ ZIP 06103 041L12203360
	Postmaster, per *(name of receiving employee)* Y.P.		

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Michael T. Paulhus, Town Manger Town of North Branford 909 Foxon Road North Branford, CT 06471				
2.	Carey Duques, Town Planner Town of North Branford 909 Foxon Road North Branford, CT 06471	OLD STATE HOUSE STATION 06103 MAY 3 2018 USPS			
3.	David Tamulevich 83 Reeds Gap Road North Branford, CT 06471				
4.					
5.					
6.					