Robinson+Cole

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December 20, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
55 King Spring Road, Windsor Locks, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 90-foot level of the existing 100-foot tower at 55 King Spring Road in Windsor Locks, Connecticut (the "Property"). The tower and underlying property are owned by Kingspring Tower LLC. The Council approved Cellco's use of the existing tower in 2008. Cellco now intends to replace six (6) of its existing antennas with three (3) model SBNHH-1D65B, 1900 MHz antennas and three (3) model SBNHH-1D65B, 700/2100 MHz antennas, all at the same level on the tower. Cellco also intends to install six (6) 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 to J. Christopher Kervick, First Selectman of the Town of Windsor Locks. A copy of this letter is also being sent to Kingspring Tower LLC, the owner of the Property and the 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).

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRH's will be located on its existing platform at the 90-foot level on the 100-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. A cumulative worst-case General Power Density table for Cellco's modified facility is included in Attachment 2.

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

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

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

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
J. Christopher Kervick, Windsor Locks First Selectman
Kingspring Tower LLC
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

SBNHH-1D65B

Multiband Antenna, 698–896 and 2x 1695–2360 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	1695–1880	1850–1990	1920–2200	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 (First Lobe), dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
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	1695–1880	1850–1990	1920–2200	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
	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
	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, beampeak to 20° above beampeak, 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

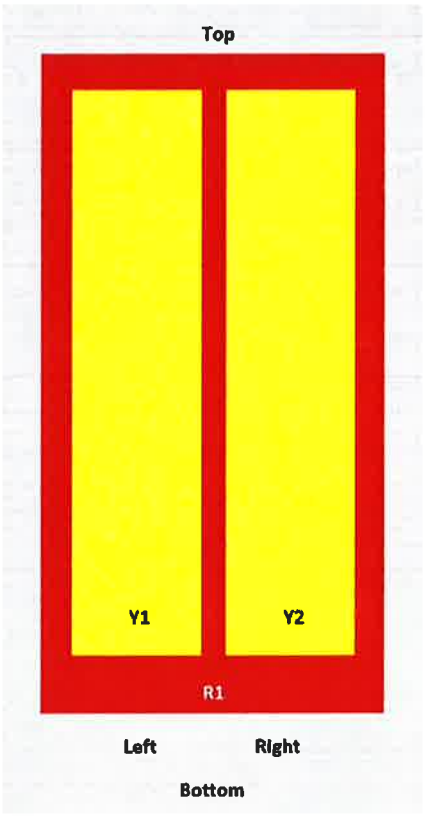
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

Product Specifications

SBNHH-1D65B

SBNHH 65



Array	Freq (MHz)	Conns	RET (MRET)	AISG RET UID
R1	698-896	1-2	1	ARxxxxxxxxxxxxxxxx 1
Y1	1695-2360	3-4	2	ARxxxxxxxxxxxxxxxx 2
Y2	1695-2360	5-6		

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 – 896 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

RF Connector Quantity, total	6
RF Connector Quantity, low band	2
RF Connector Quantity, high band	4
RF Connector Interface	7-16 DIN Female
Color	Light gray

Product Specifications

SBNHH-1D65B

Grounding Type	RF connector inner conductor and 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	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Depth	180.0 mm | 7.1 in
Net Weight, without mounting kit	18.4 kg | 40.6 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (1) | Low band (1)
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

Packed Dimensions

Length	2025.0 mm | 79.7 in
Width	390.0 mm | 15.4 in
Depth	296.0 mm | 11.7 in
Shipping Weight	31.0 kg | 68.3 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

Included Products

Product Specifications

SBNHH-1D65B

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.

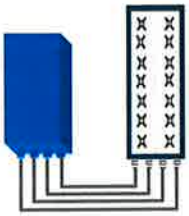
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

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.

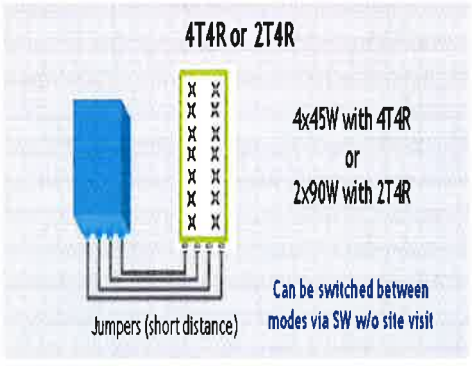
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

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.)	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

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 CELLFLEX³ 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)

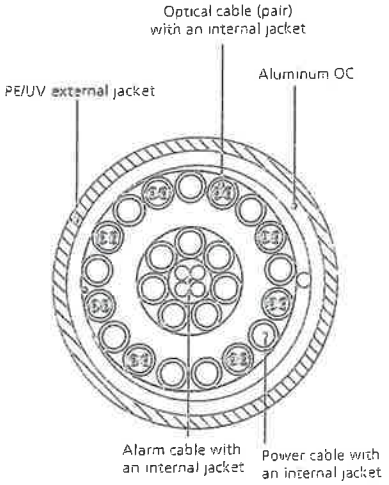


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Suffield S (Windsor Locks)								
Tower Height: 100'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Arch	1	100	41	28000	0.0294	1.0000	0.29%	
*Arch	1	500	85	931.86	0.0288	0.6212	0.46%	
*AT&T	2	1077	100	1900	0.0877	1.0000	0.88%	
*AT&T	2	565	100	880	0.0460	0.5867	0.78%	
*AT&T	1	283	100	880	0.0115	0.5867	0.20%	
*AT&T	4	646	100	1900	0.1052	1.0000	1.05%	
*AT&T	1	1615	100	734	0.0657	0.4893	1.34%	
Verizon	**0**	**0**	**90.8**	**0.0000**	**1970**	**1.0000**	**0.00%**	
Verizon	**9**	**398**	**90.8**	**0.1562**	**869**	**0.5793**	**26.97%**	
Verizon	**1**	**7469**	**90.8**	**0.3257**	**2145**	**1.0000**	**32.57%**	
Verizon	**1**	**2033**	**90.8**	**0.0887**	**698**	**0.4973**	**17.83%**	
								82.4%
* Source: Siting Council								

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

100-ft Existing ROHN Lattice Tower

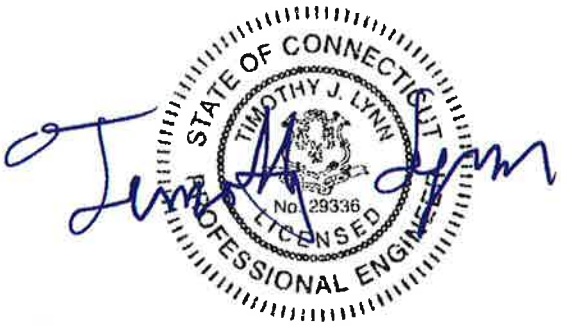
Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Suffield South

55 King Spring Road
Windsor Locks, CT

CENTEK Project No. 16001.33

Date: September 9, 2016



Prepared for:

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

Table of Contents

Introduction

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

The host tower is a 100-ft, three legged, tapered lattice tower originally designed and manufactured by ROHN Industries Inc. ROHN's design documents were not available for use in this report. The tower geometry, structure member sizes and foundation system information were taken from a previous structural report prepared by Centek Engineering. job no. 12001.CO91 dated August 10, 2012

Antenna and appurtenance information were obtained from the aforementioned structural report, visual verification from grade conducted by Centek personnel on September 7, 2016 and a Verizon RF data sheet.

The tower is made of five (5) tapered vertical sections consisting of A572-50 steel pipe legs. Horizontal and diagonal lateral support bracing consists of A36 steel angle shapes. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by welded and bolted gusset connections. The width of the tower face is 6.52-ft at the top and 14.7-ft at the base.

Verizon proposes the removal of six (6) panel antennas and six (6) diplexers and the installation of six (6) panel antennas, six (6) remote radio heads and two (2) main distribution boxes mounted to the existing three (3) 12-ft T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- AT&T (EXISTING):
  Antennas: Three (3) Kathrein 800-10121 panel antennas, two (2) Powerwave P65-17-XLH-RR panel antennas, one (1) KMW AMX-CD-16-65-00T-RET panel antenna, six (6) Powerwave LGP21401 TMA's and six (6) Ericsson RRUS-11 mounted on three (3) existing dual standoff mounts with a RAD center elevation of 100-ft above grade.
  Coax Cables: Six (6) 7/8" ∅ coax cables running on a leg/face of the existing tower.
- AT&T (EXISTING):
  Antennas: One (1) Raycap DC6-48-60-18-8F surge arrestor leg mounted with an elevation of elevation of 100-ft above exiting grade.
  Coax Cables: One (1) fiber cable and two (2) dc control cables running on a face of the existing tower as specified in Section 3 of this report.
- VERIZON (EXISTING TO REMAIN):
  Antennas: Six (6) Antel LPA-70063-6CF panel antennas mounted on three (3) existing 12-ft T-Frames with a RAD center elevation of 90.8-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on a leg of the existing tower.

- VERIZON (EXISTING TO REMOVE):
  Antennas: Three (3) Antel BXA-70063-6CF panel antennas, three (3) Antel BXA-171063-12BF panel antennas and six (6) RFS FD9R6004/2C-3L Diplexers mounted on three (3) existing 12-ft T-Frames with a RAD center elevation of 90.8-ft above grade.
- **VERIZON (PROPOSED):**
  Antennas: Six (6) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH4x30-B13 remote radio heads, three (3) Alcatel-Lucent RRH4x45-AWS remote radio heads and two (2) Raycap RC2DC-3315-PF-48 main distribution boxes mounted on three (3) existing 12-ft T-Frames with a RAD center elevation of 90.8-ft above grade.
  Coax Cables: Two (2) 1-5/8" ∅ 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 shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

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

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

Tower Loading

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

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

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

Tower Capacity

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

- Calculated stresses were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **92.7%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T4)	20.00'-40.00'	87.8%	**PASS**
Diagonal (T4)	20.00'-40.00'	92.7%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 1.5-ft square x 5.0-ft long reinforced concrete piers on 8.5-ft square x 2.5-ft thick reinforced concrete pads bearing directly on existing sub grade. The foundation was reinforced with a 4-ft thick concrete mat placed on the interior of the three (3) original pad and pier foundations per Natcomm drawing S-2; job no. 08070 dated 11/30/2009. Tower legs are connected to the foundation by means of (4) 7/8"∅, ASTM A354-BC anchor bolts per leg, embedded into the concrete foundation structure.

- 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	16 kips
	Compression	11 kips
	Moment	1047 kip-ft
Leg	Compression	88 kips
	Uplift	76 kips
	Shear	10 kips

- 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	Tension	56.1%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Mat and Piers (3)	OTM[2]	2.0	2.18	**PASS**

Note 1: FS denotes Factor of Safety.
Note 2: OTM denotes Overturning Moment

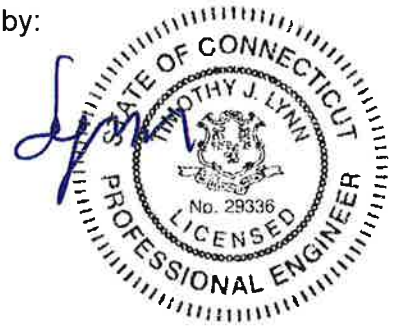
Conclusion

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

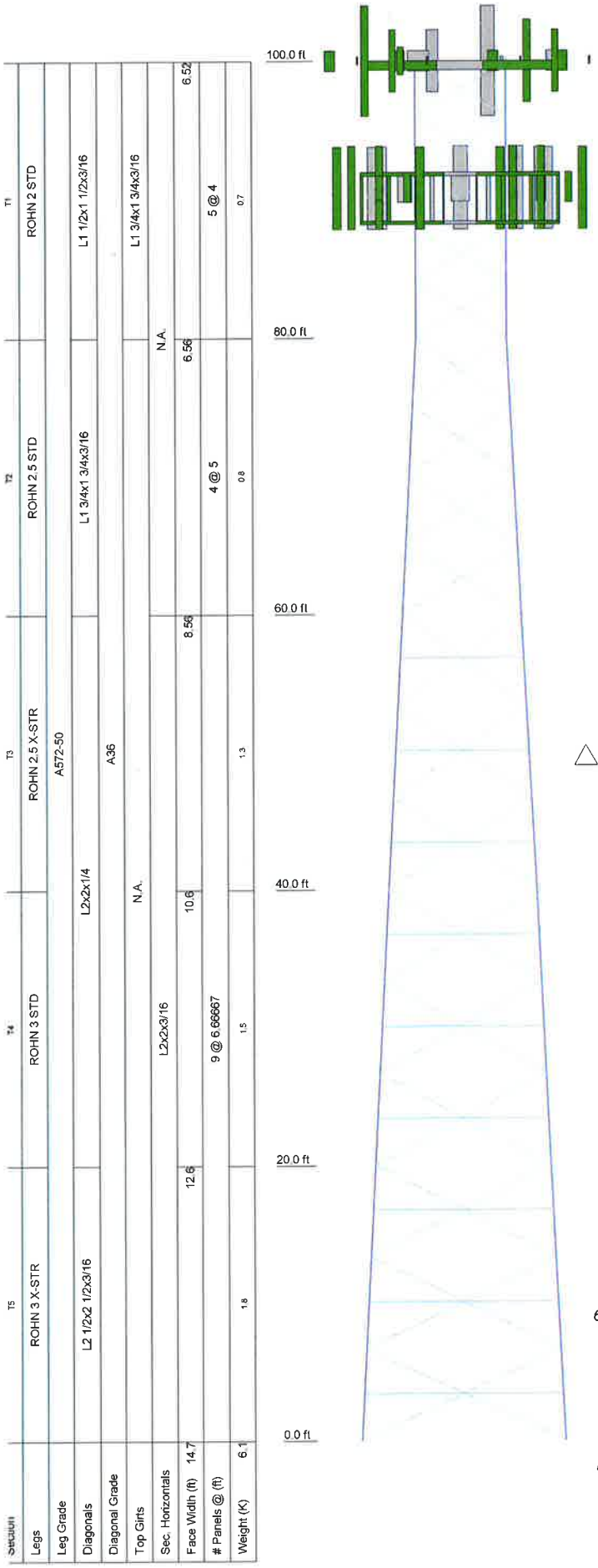
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
800-10121 (ATI - Existing)	100	LPA-70063-6CF (Verizon - Existing)	90.8
800-10121 (ATI - Existing)	100	SBNHH-1D65B (Verizon - Proposed)	90.8
800-10121 (ATI - Existing)	100	SBNHH-1D65B (Verizon - Proposed)	90.8
(2) 860 10025 RCU (ATI - Existing)	100	LPA-70063-6CF (Verizon - Existing)	90.8
(2) 860 10025 RCU (ATI - Existing)	100	LPA-70063-6CF (Verizon - Existing)	90.8
(2) 860 10025 RCU (ATI - Existing)	100	SBNHH-1D65B (Verizon - Proposed)	90.8
P65-17-XLH-RR (ATI - Existing)	100	SBNHH-1D65B (Verizon - Proposed)	90.8
AM-X-CD-16-65-00T-RET(72") (ATI - Existing)	100	LPA-70063-6CF (Verizon - Existing)	90.8
P65-17-XLH-RR (ATI - Existing)	100	RRH4x45/2x90-AWS (Verizon - Proposed)	90.8
(2) LPG21401 TMA (ATI - Existing)	100	RRH4x45/2x90-AWS (Verizon - Proposed)	90.8
(2) LPG21401 TMA (ATI - Existing)	100	RRH4x45/2x90-AWS (Verizon - Proposed)	90.8
(2) LPG21401 TMA (ATI - Existing)	100	RRH4x30-B13 (Verizon - Proposed)	90.8
(2) RRUS-11 (ATI - Existing)	100	RRH4x30-B13 (Verizon - Proposed)	90.8
(2) RRUS-11 (ATI - Existing)	100	RRH4x30-B13 (Verizon - Proposed)	90.8
(2) RRUS-11 (ATI - Existing)	100	RC2DC-3315-PF-48 (Verizon - Proposed)	90.8
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	100	RC2DC-3315-PF-48 (Verizon - Proposed)	90.8
Site Pro Compact Tower Mount CWT8 (ATI - Existing)	100	Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	90
Site Pro Compact Tower Mount CWT8 (ATI - Existing)	100	Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	90
Site Pro Compact Tower Mount CWT8 (ATI - Existing)	100	Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	90
LPA-70063-6CF (Verizon - Existing)	90.8		
SBNHH-1D65B (Verizon - Proposed)	90.8		
SBNHH-1D65B (Verizon - Proposed)	90.8		
LPA-70063-6CF (Verizon - Existing)	90.8		

MATERIAL STRENGTH

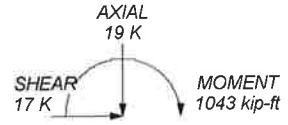
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

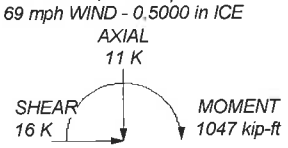
1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 92.7%

MAX. CORNER REACTIONS AT BASE:
DOWN: 88 K
SHEAR: 10 K

UPLIFT: -76 K
SHEAR: 9 K



TORQUE 10 kip-ft
69 mph WIND - 0.5000 in ICE

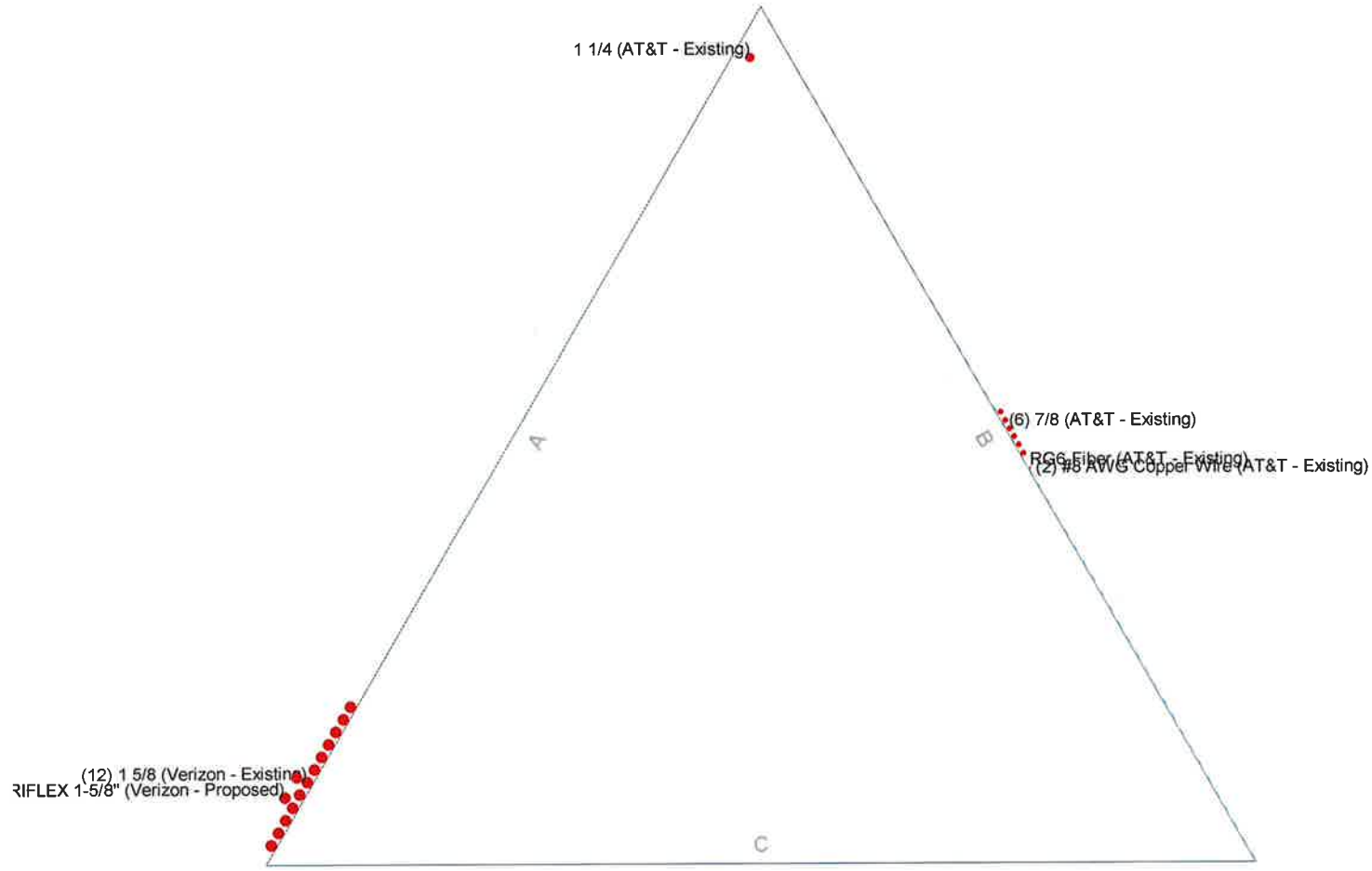


TORQUE 11 kip-ft
REACTIONS - 80 mph WIND

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

Job: 16001.33 - Suffield South			
Project: 100' ROHN Lattice - 55 King Spring Road, Windsor Locks,			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 09/09/16	Scale: NTS	
Path:		Dwg No. E-1	

Round Flat App In Face App Out Face



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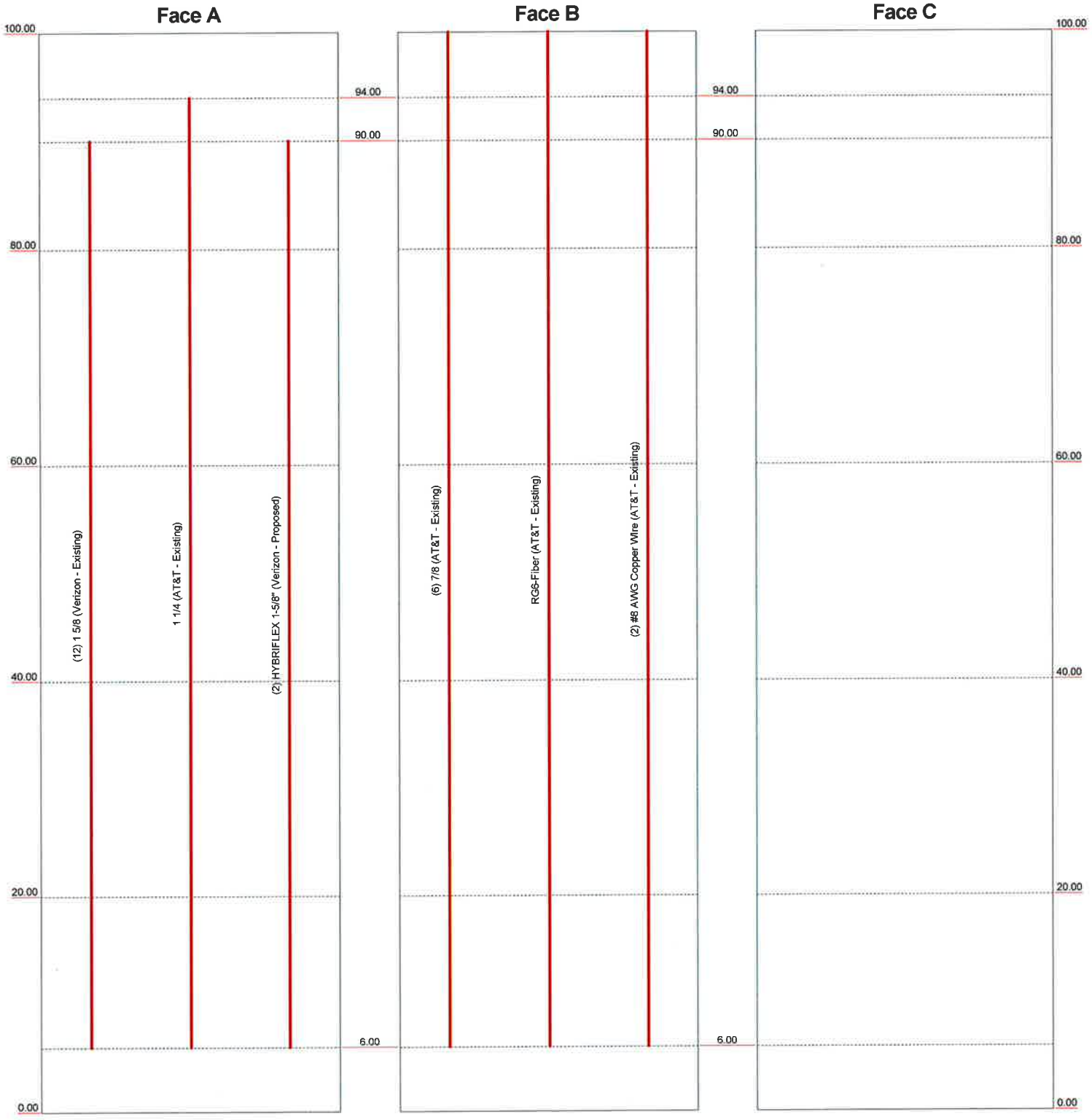
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 09/09/16	Scale: NTS	
Path:		Dwg No. E-7	



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FAX: (203) 488-8587

Job: **16001.33 - Suffield South**			
Project: **100' ROHN Lattice - 55 King Spring Road, Windsor Locks,**			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 09/09/16	Scale: NTS	
Path:		Dwg No. E-7	

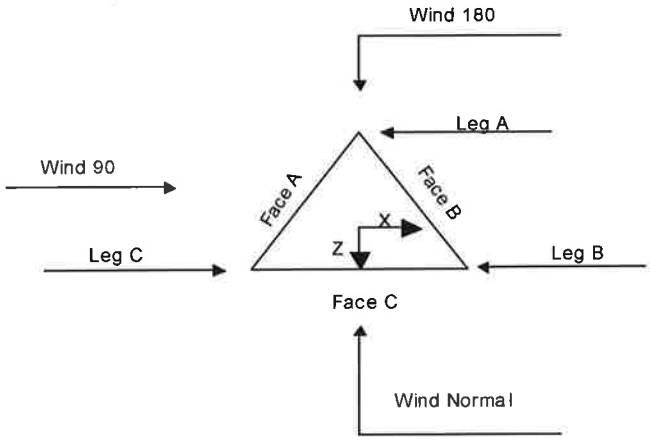
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 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/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, 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	100.00-80.00			6.52	1	20.00
T2	80.00-60.00			6.56	1	20.00
T3	60.00-40.00			8.56	1	20.00
T4	40.00-20.00			10.60	1	20.00
T5	20.00-0.00			12.60	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	100.00-80.00	4.00	X Brace	No	No	0.0000	0.0000
T2	80.00-60.00	5.00	X Brace	No	No	0.0000	0.0000
T3	60.00-40.00	6.67	X Brace	No	Yes	0.0000	0.0000
T4	40.00-20.00	6.67	X Brace	No	Yes	0.0000	0.0000
T5	20.00-0.00	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 100.00-80.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T2 80.00-60.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T3 60.00-40.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T4 40.00-20.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T5 20.00-0.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 100.00-80.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T3 60.00-40.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T4 40.00-20.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T5 20.00-0.00	Equal Angle	L2x2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 40.00-20.00	0.00	0.0000	A36	1	1	1	36.0000	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T5 20.00-0.00	0.00	0.0000	(36 ksi) A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T3	No	Yes	1	1	1	1	1	1	0.5	1
60.00-40.00				1	1	1	1	1	1	1
T4	No	Yes	1	1	1	1	1	1	0.5	1
40.00-20.00				1	1	1	1	1	1	1
T5 20.00-0.00	No	Yes	1	1	1	1	1	1	0.5	1
				1	1	1	1	1	1	1

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

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
100.00-80.00														
T2 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

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 100.00-80.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1
T2 80.00-60.00	Flange	0.6250 A325N	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
T3 60.00-40.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1
T4 40.00-20.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.5000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	1
T5 20.00-0.00	Flange	0.8750 A354-BC	4	0.5000 A325N	1	0.5000 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.5000 A325N	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 plf
7/8 (AT&T - Existing)	B	Yes	Ar (CfAe)	100.00 - 6.00	0.0000	0	6	6	0.5000	1.1100		0.54
1 5/8 (Verizon - Existing)	A	Yes	Ar (CfAe)	90.00 - 6.00	0.0000	-0.4	12	12	0.5000	1.9800		1.04
RG6-Fiber (AT&T - Existing)	B	Yes	Ar (CfAe)	100.00 - 6.00	0.0000	0.04	1	1	0.5000	0.5000		1.00
#8 AWG Copper Wire (AT&T - Existing)	B	Yes	Ar (CfAe)	100.00 - 6.00	0.0000	0.05	2	1	0.2500	0.1285		0.05
1 1/4 (AT&T - Existing)	A	Yes	Ar (CfAe)	94.00 - 6.00	-2.0000	0.45	1	1	1.5500	1.5500		0.66
HYBRIFLEX 1-5/8" (Verizon - Proposed)	A	Yes	Ar (CfAe)	90.00 - 6.00	2.0000	-0.42	2	2	1.9800	1.9800		1.90

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	100.00-80.00	A	24.908	0.000	0.000	0.000	0.17
		B	12.148	0.000	0.000	0.000	0.09
		C	0.000	0.000	0.000	0.000	0.00
T2	80.00-60.00	A	48.783	0.000	0.000	0.000	0.34
		B	12.148	0.000	0.000	0.000	0.09
		C	0.000	0.000	0.000	0.000	0.00
T3	60.00-40.00	A	48.783	0.000	0.000	0.000	0.34
		B	12.148	0.000	0.000	0.000	0.09

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
		C	0.000	0.000	0.000	0.000	0.00
T4	40.00-20.00	A	48.783	0.000	0.000	0.000	0.34
		B	12.148	0.000	0.000	0.000	0.09
		C	0.000	0.000	0.000	0.000	0.00
T5	20.00-0.00	A	34.148	0.000	0.000	0.000	0.24
		B	8.503	0.000	0.000	0.000	0.06
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	100.00-80.00	A	0.500	10.425	22.733	0.000	0.000	0.42
		B		7.898	13.417	0.000	0.000	0.23
		C		0.000	0.000	0.000	0.000	0.00
T2	80.00-60.00	A	0.500	19.150	45.467	0.000	0.000	0.82
		B		7.898	13.417	0.000	0.000	0.23
		C		0.000	0.000	0.000	0.000	0.00
T3	60.00-40.00	A	0.500	19.150	45.467	0.000	0.000	0.82
		B		7.898	13.417	0.000	0.000	0.23
		C		0.000	0.000	0.000	0.000	0.00
T4	40.00-20.00	A	0.500	19.150	45.467	0.000	0.000	0.82
		B		7.898	13.417	0.000	0.000	0.23
		C		0.000	0.000	0.000	0.000	0.00
T5	20.00-0.00	A	0.500	13.405	31.827	0.000	0.000	0.58
		B		5.528	9.392	0.000	0.000	0.16
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	100.00-80.00	A	0.000	1.758	2.006	2.671
		B	0.000	1.130	0.979	1.717
		C	0.000	0.000	0.000	0.000
T2	80.00-60.00	A	0.000	2.588	3.419	4.529
		B	0.000	0.854	0.851	1.494
		C	0.000	0.000	0.000	0.000
T3	60.00-40.00	A	0.000	2.779	4.195	5.557
		B	0.000	0.917	1.045	1.833
		C	0.000	0.000	0.000	0.000
T4	40.00-20.00	A	0.000	2.672	4.035	5.344
		B	0.000	0.881	1.005	1.763
		C	0.000	0.000	0.000	0.000
T5	20.00-0.00	A	0.000	1.824	3.230	4.278
		B	0.000	0.602	0.804	1.411
		C	0.000	0.000	0.000	0.000

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	100.00-80.00	-6.2229	1.5120	-4.2581	0.7567
T2	80.00-60.00	-13.2797	4.3803	-10.3300	3.0816
T3	60.00-40.00	-14.4203	4.8340	-11.2014	3.4025
T4	40.00-20.00	-15.7527	5.3362	-12.3602	3.7993
T5	20.00-0.00	-12.2863	4.1889	-9.7597	3.0215

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert ft / ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
800-10121 (AT&T - Existing)	A	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.46 5.88	3.29 3.64	0.05 0.08
800-10121 (AT&T - Existing)	B	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.46 5.88	3.29 3.64	0.05 0.08
800-10121 (AT&T - Existing)	C	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.46 5.88	3.29 3.64	0.05 0.08
(2) 860 10025 RCU (AT&T - Existing)	A	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	0.16 0.22	0.13 0.19	0.00 0.00
(2) 860 10025 RCU (AT&T - Existing)	B	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	0.16 0.22	0.13 0.19	0.00 0.00
(2) 860 10025 RCU (AT&T - Existing)	C	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	0.16 0.22	0.13 0.19	0.00 0.00
P65-17-XLH-RR (AT&T - Existing)	A	From Leg	3.00 2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	11.47 12.08	6.80 7.38	0.06 0.12
AM-X-CD-16-65-00T-RET(72") (AT&T - Existing)	B	From Leg	3.00 2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	8.26 8.81	4.64 5.09	0.05 0.10
P65-17-XLH-RR (AT&T - Existing)	C	From Leg	3.00 2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	11.47 12.08	6.80 7.38	0.06 0.12
(2) LPG21401 TMA (AT&T - Existing)	A	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LPG21401 TMA (AT&T - Existing)	B	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LPG21401 TMA (AT&T - Existing)	C	From Leg	3.00 -2.00 0.00	0.0000	100.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) RRUS-11 (AT&T - Existing)	A	From Leg	3.00 2.00	0.0000	100.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	0.05 0.07

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
			0.00						
(2) RRUS-11	B	From Leg	3.00	0.0000	100.00	No Ice	2.99	1.25	0.05
(AT&T - Existing)			2.00			1/2" Ice	3.23	1.41	0.07
			0.00						
(2) RRUS-11	C	From Leg	3.00	0.0000	100.00	No Ice	2.99	1.25	0.05
(AT&T - Existing)			2.00			1/2" Ice	3.23	1.41	0.07
			0.00						
DC6-48-60-18-8F Surge Arrestor	C	From Leg	0.00	0.0000	100.00	No Ice	2.23	2.23	0.02
(AT&T - Existing)			2.00			1/2" Ice	2.45	2.45	0.04
			0.00						
Site Pro Compact Tower Mount CWT8	A	From Leg	1.00	0.0000	100.00	No Ice	2.85	2.85	0.15
(AT&T - Existing)			0.00			1/2" Ice	4.05	4.05	0.20
			0.00						
Site Pro Compact Tower Mount CWT8	B	From Leg	1.00	0.0000	100.00	No Ice	2.85	2.85	0.15
(AT&T - Existing)			0.00			1/2" Ice	4.05	4.05	0.20
			0.00						
Site Pro Compact Tower Mount CWT8	C	From Leg	1.00	0.0000	100.00	No Ice	2.85	2.85	0.15
(AT&T - Existing)			0.00			1/2" Ice	4.05	4.05	0.20
			0.00						
LPA-70063-6CF	A	From Leg	3.00	0.0000	90.80	No Ice	10.51	9.06	0.03
(Verizon - Existing)			-6.00			1/2" Ice	11.07	9.61	0.10
			0.00						
SBNHH-1D65B	A	From Leg	3.00	0.0000	90.80	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			0.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	A	From Leg	3.00	0.0000	90.80	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
LPA-70063-6CF	A	From Leg	3.00	0.0000	90.80	No Ice	10.51	9.06	0.03
(Verizon - Existing)			6.00			1/2" Ice	11.07	9.61	0.10
			0.00						
LPA-70063-6CF	B	From Leg	3.00	0.0000	90.80	No Ice	10.51	9.06	0.03
(Verizon - Existing)			-6.00			1/2" Ice	11.07	9.61	0.10
			0.00						
SBNHH-1D65B	B	From Leg	3.00	0.0000	90.80	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			0.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	B	From Leg	3.00	0.0000	90.80	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
LPA-70063-6CF	B	From Leg	3.00	0.0000	90.80	No Ice	10.51	9.06	0.03
(Verizon - Existing)			6.00			1/2" Ice	11.07	9.61	0.10
			0.00						
LPA-70063-6CF	C	From Leg	3.00	0.0000	90.80	No Ice	10.51	9.06	0.03
(Verizon - Existing)			-6.00			1/2" Ice	11.07	9.61	0.10
			0.00						
SBNHH-1D65B	C	From Leg	3.00	0.0000	90.80	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			0.00			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	C	From Leg	3.00	0.0000	90.80	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
LPA-70063-6CF	C	From Leg	3.00	0.0000	90.80	No Ice	10.51	9.06	0.03
(Verizon - Existing)			6.00			1/2" Ice	11.07	9.61	0.10
			0.00						
RRH4x45/2x90-AWS	A	From Leg	3.00	0.0000	90.80	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			-4.00			1/2" Ice	3.26	2.13	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
			0.00						
RRH4x45/2x90-AWS	B	From Leg	3.00	0.0000	90.80	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			-4.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH4x45/2x90-AWS	C	From Leg	3.00	0.0000	90.80	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			-4.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH4x30-B13	A	From Leg	3.00	0.0000	90.80	No Ice	2.52	1.89	0.06
(Verizon - Proposed)			0.00			1/2" Ice	2.74	2.09	0.08
			0.00						
RRH4x30-B13	B	From Leg	3.00	0.0000	90.80	No Ice	2.52	1.89	0.06
(Verizon - Proposed)			0.00			1/2" Ice	2.74	2.09	0.08
			0.00						
RRH4x30-B13	C	From Leg	3.00	0.0000	90.80	No Ice	2.52	1.89	0.06
(Verizon - Proposed)			0.00			1/2" Ice	2.74	2.09	0.08
			0.00						
RC2DC-3315-PF-48	A	From Leg	3.00	0.0000	90.80	No Ice	3.52	2.29	0.03
(Verizon - Proposed)			0.00			1/2" Ice	3.77	2.51	0.05
			0.00						
RC2DC-3315-PF-48	B	From Leg	3.00	0.0000	90.80	No Ice	3.52	2.29	0.03
(Verizon - Proposed)			0.00			1/2" Ice	3.77	2.51	0.05
			0.00						
Pirod 12' T-Frame Sector	A	From Leg	1.00	0.0000	90.00	No Ice	12.60	12.60	0.36
Mount (1)			0.00			1/2" Ice	17.60	17.60	0.49
(Verizon - Existing)			0.00						
Pirod 12' T-Frame Sector	B	From Leg	1.00	0.0000	90.00	No Ice	12.60	12.60	0.36
Mount (1)			0.00			1/2" Ice	17.60	17.60	0.49
(Verizon - Existing)			0.00						
Pirod 12' T-Frame Sector	C	From Leg	1.00	0.0000	90.00	No Ice	12.60	12.60	0.36
Mount (1)			0.00			1/2" Ice	17.60	17.60	0.49
(Verizon - Existing)			0.00						

Tower Pressures - No Ice

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1	90.00	1.332	22	134.758	A	8.208	32.825	7.917	19.29	0.000	0.000
100.00-80.00					B	9.236	20.064		27.02	0.000	0.000
					C	10.215	7.917		43.66	0.000	0.000
T2 80.00-60.00	70.00	1.24	20	155.998	A	6.834	58.383	9.599	14.72	0.000	0.000
					B	9.402	21.747		30.82	0.000	0.000
					C	10.254	9.599		48.35	0.000	0.000
T3 60.00-40.00	50.00	1.126	18	196.398	A	11.854	58.383	9.600	13.67	0.000	0.000
					B	15.005	21.747		26.12	0.000	0.000
					C	16.049	9.600		37.43	0.000	0.000
T4 40.00-20.00	30.00	1	16	237.841	A	14.671	60.469	11.686	15.55	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					B	17.702	23.834		28.14	0.000	0.000
					C	18.706	11.686		38.45	0.000	0.000
T5 20.00-0.00	10.00	1	16	278.841	A	22.032	45.836	11.688	17.22	0.000	0.000
					B	24.457	20.191		26.18	0.000	0.000
					C	25.262	11.688		31.63	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 100.00-80.00	90.00	1.332	16	0.5000	136.425	A	30.277	26.639	11.250	19.77	0.000	0.000
						B	21.915	24.740		24.11	0.000	0.000
						C	10.215	17.972		39.91	0.000	0.000
T2 80.00-60.00	70.00	1.24	15	0.5000	157.666	A	51.191	35.359	12.938	14.95	0.000	0.000
						B	22.176	25.841		26.94	0.000	0.000
						C	10.254	18.797		44.54	0.000	0.000
T3 60.00-40.00	50.00	1.126	14	0.5000	198.067	A	55.959	37.335	12.939	13.87	0.000	0.000
						B	27.633	27.945		23.28	0.000	0.000
						C	16.049	20.964		34.96	0.000	0.000
T4 40.00-20.00	30.00	1	12	0.5000	239.509	A	58.828	40.856	15.025	15.07	0.000	0.000
						B	30.360	31.394		24.33	0.000	0.000
						C	18.706	24.378		34.87	0.000	0.000
T5 20.00-0.00	10.00	1	12	0.5000	280.510	A	52.810	37.380	15.028	16.66	0.000	0.000
						B	33.242	30.726		23.49	0.000	0.000
						C	25.262	25.800		29.43	0.000	0.000

Tower Pressure - Service

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	90.00	1.332	9	134.758	A	8.208	32.825	7.917	19.29	0.000	0.000
100.00-80.00					B	9.236	20.064		27.02	0.000	0.000
					C	10.215	7.917		43.66	0.000	0.000
T2 80.00-60.00	70.00	1.24	8	155.998	A	6.834	58.383	9.599	14.72	0.000	0.000
					B	9.402	21.747		30.82	0.000	0.000
					C	10.254	9.599		48.35	0.000	0.000
T3 60.00-40.00	50.00	1.126	7	196.398	A	11.854	58.383	9.600	13.67	0.000	0.000
					B	15.005	21.747		26.12	0.000	0.000
					C	16.049	9.600		37.43	0.000	0.000
T4 40.00-20.00	30.00	1	6	237.841	A	14.671	60.469	11.686	15.55	0.000	0.000
					B	17.702	23.834		28.14	0.000	0.000
					C	18.706	11.686		38.45	0.000	0.000
T5 20.00-0.00	10.00	1	6	278.841	A	22.032	45.836	11.688	17.22	0.000	0.000
					B	24.457	20.191		26.18	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	25.262	11.688		31.63	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	0.67	A	0.304	2.284	0.617	1	1	28.471	1.65	82.46	A
100.00-80.00			B	0.217	2.539	0.594	1	1	21.157			
			C	0.135	2.829	0.579	1	1	14.800			
T2	0.43	0.81	A	0.418	2.029	0.659	1	1	45.316	2.17	108.53	A
80.00-60.00			B	0.2	2.597	0.59	1	1	22.240			
			C	0.127	2.857	0.578	1	1	15.805			
T3	0.43	1.34	A	0.358	2.154	0.635	1	1	48.940	2.26	113.01	A
60.00-40.00			B	0.187	2.64	0.588	1	1	27.789			
			C	0.131	2.844	0.579	1	1	21.605			
T4	0.43	1.48	A	0.316	2.254	0.621	1	1	52.217	2.24	112.07	A
40.00-20.00			B	0.175	2.683	0.586	1	1	31.657			
			C	0.128	2.855	0.578	1	1	25.465			
T5 20.00-0.00	0.30	1.76	A	0.243	2.457	0.6	1	1	49.543	2.32	115.91	A
			B	0.16	2.735	0.583	1	1	36.231			
			C	0.133	2.837	0.579	1	1	32.029			
Sum Weight:	1.83	6.06						OTM	503.81 kip-ft	10.64		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	0.67	A	0.304	2.284	0.617	0.825	1	27.034	1.57	78.30	A
100.00-80.00			B	0.217	2.539	0.594	0.825	1	19.540			
			C	0.135	2.829	0.579	0.825	1	13.013			
T2	0.43	0.81	A	0.418	2.029	0.659	0.825	1	44.120	2.11	105.67	A
80.00-60.00			B	0.2	2.597	0.59	0.825	1	20.595			
			C	0.127	2.857	0.578	0.825	1	14.010			
T3	0.43	1.34	A	0.358	2.154	0.635	0.825	1	46.866	2.16	108.22	A
60.00-40.00			B	0.187	2.64	0.588	0.825	1	25.163			
			C	0.131	2.844	0.579	0.825	1	18.796			
T4	0.43	1.48	A	0.316	2.254	0.621	0.825	1	49.650	2.13	106.56	A
40.00-20.00			B	0.175	2.683	0.586	0.825	1	28.560			
			C	0.128	2.855	0.578	0.825	1	22.191			
T5 20.00-0.00	0.30	1.76	A	0.243	2.457	0.6	0.825	1	45.688	2.14	106.89	A
			B	0.16	2.735	0.583	0.825	1	31.951			
			C	0.133	2.837	0.579	0.825	1	27.608			
Sum Weight:	1.83	6.06						OTM	482.41 kip-ft	10.11		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	0.67	A	0.304	2.284	0.617	0.8	1	26.829	1.55	77.71	A
100.00-80.00			B	0.217	2.539	0.594	0.8	1	19.309			
			C	0.135	2.829	0.579	0.8	1	12.757			
T2	0.43	0.81	A	0.418	2.029	0.659	0.8	1	43.950	2.11	105.26	A
80.00-60.00			B	0.2	2.597	0.59	0.8	1	20.360			
			C	0.127	2.857	0.578	0.8	1	13.754			
T3	0.43	1.34	A	0.358	2.154	0.635	0.8	1	46.570	2.15	107.53	A
60.00-40.00			B	0.187	2.64	0.588	0.8	1	24.788			
			C	0.131	2.844	0.579	0.8	1	18.395			
T4	0.43	1.48	A	0.316	2.254	0.621	0.8	1	49.283	2.12	105.77	A
40.00-20.00			B	0.175	2.683	0.586	0.8	1	28.117			
			C	0.128	2.855	0.578	0.8	1	21.723			
T5 20.00-0.00	0.30	1.76	A	0.243	2.457	0.6	0.8	1	45.137	2.11	105.60	A
			B	0.16	2.735	0.583	0.8	1	31.339			
			C	0.133	2.837	0.579	0.8	1	26.976			
Sum Weight:	1.83	6.06						OTM	479.35 kip-ft	10.04		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	0.67	A	0.304	2.284	0.617	0.85	1	27.239	1.58	78.89	A
100.00-80.00			B	0.217	2.539	0.594	0.85	1	19.771			
			C	0.135	2.829	0.579	0.85	1	13.268			
T2	0.43	0.81	A	0.418	2.029	0.659	0.85	1	44.291	2.12	106.08	A
80.00-60.00			B	0.2	2.597	0.59	0.85	1	20.830			
			C	0.127	2.857	0.578	0.85	1	14.267			
T3	0.43	1.34	A	0.358	2.154	0.635	0.85	1	47.162	2.18	108.90	A
60.00-40.00			B	0.187	2.64	0.588	0.85	1	25.538			
			C	0.131	2.844	0.579	0.85	1	19.197			
T4	0.43	1.48	A	0.316	2.254	0.621	0.85	1	50.016	2.15	107.35	A
40.00-20.00			B	0.175	2.683	0.586	0.85	1	29.002			
			C	0.128	2.855	0.578	0.85	1	22.659			
T5 20.00-0.00	0.30	1.76	A	0.243	2.457	0.6	0.85	1	46.239	2.16	108.18	A
			B	0.16	2.735	0.583	0.85	1	32.562			
			C	0.133	2.837	0.579	0.85	1	28.239			
Sum Weight:	1.83	6.06						OTM	485.47 kip-ft	10.19		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.65	1.17	A	0.417	2.031	0.659	1	1	47.826	1.85	92.38	A
100.00-80.00			B	0.342	2.19	0.63	1	1	37.492			
			C	0.207	2.574	0.592	1	1	20.850			
T2	1.05	1.31	A	0.549	1.845	0.724	1	1	76.780	2.51	125.35	A
80.00-60.00			B	0.305	2.284	0.617	1	1	38.128			
			C	0.184	2.649	0.587	1	1	21.294			
T3	1.05	2.04	A	0.471	1.941	0.683	1	1	81.464	2.54	127.10	A
60.00-40.00			B	0.281	2.349	0.61	1	1	44.683			
			C	0.187	2.64	0.588	1	1	28.372			
T4	1.05	2.29	A	0.416	2.033	0.658	1	1	85.726	2.49	124.43	A
40.00-20.00			B	0.258	2.414	0.604	1	1	49.319			
			C	0.18	2.665	0.587	1	1	33.004			
T5 20.00-0.00	0.74	2.78	A	0.322	2.24	0.623	1	1	76.088	2.43	121.71	A
			B	0.228	2.505	0.597	1	1	51.571			
			C	0.182	2.657	0.587	1	1	40.404			
Sum Weight:	4.54	9.59						OTM	567.87 kip-ft	11.82		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.65	1.17	A	0.417	2.031	0.659	0.825	1	42.528	1.64	82.14	A
100.00-80.00			B	0.342	2.19	0.63	0.825	1	33.657			
			C	0.207	2.574	0.592	0.825	1	19.063			
T2	1.05	1.31	A	0.549	1.845	0.724	0.825	1	67.822	2.21	110.73	A
80.00-60.00			B	0.305	2.284	0.617	0.825	1	34.247			
			C	0.184	2.649	0.587	0.825	1	19.499			
T3	1.05	2.04	A	0.471	1.941	0.683	0.825	1	71.671	2.24	111.82	A
60.00-40.00			B	0.281	2.349	0.61	0.825	1	39.848			
			C	0.187	2.64	0.588	0.825	1	25.563			
T4	1.05	2.29	A	0.416	2.033	0.658	0.825	1	75.431	2.19	109.48	A
40.00-20.00			B	0.258	2.414	0.604	0.825	1	44.006			
			C	0.18	2.665	0.587	0.825	1	29.731			
T5 20.00-0.00	0.74	2.78	A	0.322	2.24	0.623	0.825	1	66.846	2.14	106.93	A
			B	0.228	2.505	0.597	0.825	1	45.754			
			C	0.182	2.657	0.587	0.825	1	35.983			
Sum Weight:	4.54	9.59						OTM	501.77 kip-ft	10.42		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.65	1.17	A	0.417	2.031	0.659	0.8	1	41.771	1.61	80.68	A
100.00-80.00			B	0.342	2.19	0.63	0.8	1	33.109			
			C	0.207	2.574	0.592	0.8	1	18.807			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2	1.05	1.31	A	0.549	1.845	0.724	0.8	1	66.542	2.17	108.64	A
80.00-60.00			B	0.305	2.284	0.617	0.8	1	33.693			
			C	0.184	2.649	0.587	0.8	1	19.243			
T3	1.05	2.04	A	0.471	1.941	0.683	0.8	1	70.272	2.19	109.64	A
60.00-40.00			B	0.281	2.349	0.61	0.8	1	39.157			
			C	0.187	2.64	0.588	0.8	1	25.162			
T4	1.05	2.29	A	0.416	2.033	0.658	0.8	1	73.960	2.15	107.35	A
40.00-20.00			B	0.258	2.414	0.604	0.8	1	43.247			
			C	0.18	2.665	0.587	0.8	1	29.263			
T5 20.00-0.00	0.74	2.78	A	0.322	2.24	0.623	0.8	1	65.526	2.10	104.81	A
			B	0.228	2.505	0.597	0.8	1	44.923			
			C	0.182	2.657	0.587	0.8	1	35.351			
Sum Weight:	4.54	9.59						OTM	492.33 kip-ft	10.22		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.65	1.17	A	0.417	2.031	0.659	0.85	1	43.285	1.67	83.60	A
100.00-80.00			B	0.342	2.19	0.63	0.85	1	34.205			
			C	0.207	2.574	0.592	0.85	1	19.318			
T2	1.05	1.31	A	0.549	1.845	0.724	0.85	1	69.102	2.26	112.82	A
80.00-60.00			B	0.305	2.284	0.617	0.85	1	34.802			
			C	0.184	2.649	0.587	0.85	1	19.756			
T3	1.05	2.04	A	0.471	1.941	0.683	0.85	1	73.070	2.28	114.00	A
60.00-40.00			B	0.281	2.349	0.61	0.85	1	40.538			
			C	0.187	2.64	0.588	0.85	1	25.964			
T4	1.05	2.29	A	0.416	2.033	0.658	0.85	1	76.901	2.23	111.62	A
40.00-20.00			B	0.258	2.414	0.604	0.85	1	44.765			
			C	0.18	2.665	0.587	0.85	1	30.198			
T5 20.00-0.00	0.74	2.78	A	0.322	2.24	0.623	0.85	1	68.166	2.18	109.04	A
			B	0.228	2.505	0.597	0.85	1	46.585			
			C	0.182	2.657	0.587	0.85	1	36.614			
Sum Weight:	4.54	9.59						OTM	511.22 kip-ft	10.62		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	0.67	A	0.304	2.284	0.617	1	1	28.471	0.64	32.21	A
100.00-80.00			B	0.217	2.539	0.594	1	1	21.157			
			C	0.135	2.829	0.579	1	1	14.800			
T2	0.43	0.81	A	0.418	2.029	0.659	1	1	45.316	0.85	42.40	A
80.00-60.00			B	0.2	2.597	0.59	1	1	22.240			
			C	0.127	2.857	0.578	1	1	15.805			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T3	0.43	1.34	A	0.358	2.154	0.635	1	1	48.940	0.88	44.14	A
60.00-40.00			B	0.187	2.64	0.588	1	1	27.789			
			C	0.131	2.844	0.579	1	1	21.605			
T4	0.43	1.48	A	0.316	2.254	0.621	1	1	52.217	0.88	43.78	A
40.00-20.00			B	0.175	2.683	0.586	1	1	31.657			
			C	0.128	2.855	0.578	1	1	25.465			
T5 20.00-0.00	0.30	1.76	A	0.243	2.457	0.6	1	1	49.543	0.91	45.28	A
			B	0.16	2.735	0.583	1	1	36.231			
			C	0.133	2.837	0.579	1	1	32.029			
Sum Weight:	1.83	6.06						OTM	196.80 kip-ft	4.16		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	0.67	A	0.304	2.284	0.617	0.825	1	27.034	0.61	30.59	A
100.00-80.00			B	0.217	2.539	0.594	0.825	1	19.540			
			C	0.135	2.829	0.579	0.825	1	13.013			
T2	0.43	0.81	A	0.418	2.029	0.659	0.825	1	44.120	0.83	41.28	A
80.00-60.00			B	0.2	2.597	0.59	0.825	1	20.595			
			C	0.127	2.857	0.578	0.825	1	14.010			
T3	0.43	1.34	A	0.358	2.154	0.635	0.825	1	46.866	0.85	42.27	A
60.00-40.00			B	0.187	2.64	0.588	0.825	1	25.163			
			C	0.131	2.844	0.579	0.825	1	18.796			
T4	0.43	1.48	A	0.316	2.254	0.621	0.825	1	49.650	0.83	41.63	A
40.00-20.00			B	0.175	2.683	0.586	0.825	1	28.560			
			C	0.128	2.855	0.578	0.825	1	22.191			
T5 20.00-0.00	0.30	1.76	A	0.243	2.457	0.6	0.825	1	45.688	0.84	41.75	A
			B	0.16	2.735	0.583	0.825	1	31.951			
			C	0.133	2.837	0.579	0.825	1	27.608			
Sum Weight:	1.83	6.06						OTM	188.44 kip-ft	3.95		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	0.67	A	0.304	2.284	0.617	0.8	1	26.829	0.61	30.35	A
100.00-80.00			B	0.217	2.539	0.594	0.8	1	19.309			
			C	0.135	2.829	0.579	0.8	1	12.757			
T2	0.43	0.81	A	0.418	2.029	0.659	0.8	1	43.950	0.82	41.12	A
80.00-60.00			B	0.2	2.597	0.59	0.8	1	20.360			
			C	0.127	2.857	0.578	0.8	1	13.754			
T3	0.43	1.34	A	0.358	2.154	0.635	0.8	1	46.570	0.84	42.01	A
60.00-40.00			B	0.187	2.64	0.588	0.8	1	24.788			
			C	0.131	2.844	0.579	0.8	1	18.395			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T4	0.43	1.48	A	0.316	2.254	0.621	0.8	1	49.283	0.83	41.32	A
40.00-20.00			B	0.175	2.683	0.586	0.8	1	28.117			
			C	0.128	2.855	0.578	0.8	1	21.723			
T5 20.00-0.00	0.30	1.76	A	0.243	2.457	0.6	0.8	1	45.137	0.82	41.25	A
			B	0.16	2.735	0.583	0.8	1	31.339			
			C	0.133	2.837	0.579	0.8	1	26.976			
Sum Weight:	1.83	6.06						OTM	187.25 kip-ft	3.92		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.26	0.67	A	0.304	2.284	0.617	0.85	1	27.239	0.62	30.82	A
100.00-80.00			B	0.217	2.539	0.594	0.85	1	19.771			
			C	0.135	2.829	0.579	0.85	1	13.268			
T2	0.43	0.81	A	0.418	2.029	0.659	0.85	1	44.291	0.83	41.44	A
80.00-60.00			B	0.2	2.597	0.59	0.85	1	20.830			
			C	0.127	2.857	0.578	0.85	1	14.267			
T3	0.43	1.34	A	0.358	2.154	0.635	0.85	1	47.162	0.85	42.54	A
60.00-40.00			B	0.187	2.64	0.588	0.85	1	25.538			
			C	0.131	2.844	0.579	0.85	1	19.197			
T4	0.43	1.48	A	0.316	2.254	0.621	0.85	1	50.016	0.84	41.93	A
40.00-20.00			B	0.175	2.683	0.586	0.85	1	29.002			
			C	0.128	2.855	0.578	0.85	1	22.659			
T5 20.00-0.00	0.30	1.76	A	0.243	2.457	0.6	0.85	1	46.239	0.85	42.26	A
			B	0.16	2.735	0.583	0.85	1	32.562			
			C	0.133	2.837	0.579	0.85	1	28.239			
Sum Weight:	1.83	6.06						OTM	189.64 kip-ft	3.98		

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	2.10					
Bracing Weight	3.96					
Total Member Self-Weight	6.06			1.72	5.19	
Total Weight	11.09			1.72	5.19	
Wind 0 deg - No Ice		-0.00	-16.38	-1038.55	5.23	-11.44
Wind 30 deg - No Ice		7.95	-13.79	-883.28	-504.35	-7.98
Wind 45 deg - No Ice		11.19	-11.21	-718.71	-713.26	-5.57
Wind 60 deg - No Ice		13.64	-7.89	-506.16	-872.10	-2.82
Wind 90 deg - No Ice		15.90	0.00	1.75	-1013.95	3.04
Wind 120 deg - No Ice		14.16	8.19	521.88	-893.32	8.49
Wind 135 deg - No Ice		11.19	11.21	722.19	-713.32	9.83
Wind 150 deg - No Ice		7.95	13.80	886.75	-504.41	11.02

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 180 deg - No Ice		0.00	15.78	1017.53	5.15	10.81
Wind 210 deg - No Ice		-7.95	13.79	886.71	514.73	7.98
Wind 225 deg - No Ice		-11.19	11.21	722.14	723.64	5.57
Wind 240 deg - No Ice		-14.16	8.19	521.82	903.66	2.96
Wind 270 deg - No Ice		-15.90	-0.00	1.68	1024.33	-3.04
Wind 300 deg - No Ice		-13.64	-7.89	-506.22	882.52	-7.99
Wind 315 deg - No Ice		-11.19	-11.21	-718.76	723.70	-9.83
Wind 330 deg - No Ice		-7.95	-13.80	-883.32	514.80	-11.02
Member Ice	3.53					
Total Weight Ice	19.19			3.91	12.36	
Wind 0 deg - Ice		-0.00	-16.74	-1023.76	12.48	-9.85
Wind 30 deg - Ice		7.76	-13.46	-836.96	-472.02	-6.59
Wind 45 deg - Ice		10.83	-10.85	-675.94	-666.04	-4.65
Wind 60 deg - Ice		13.10	-7.57	-472.06	-810.37	-2.47
Wind 90 deg - Ice		15.52	0.00	4.02	-956.60	2.17
Wind 120 deg - Ice		14.48	8.37	517.84	-875.90	7.06
Wind 135 deg - Ice		10.84	10.85	683.92	-666.20	7.65
Wind 150 deg - Ice		7.76	13.46	844.88	-472.22	8.76
Wind 180 deg - Ice		0.00	15.15	956.03	12.25	8.53
Wind 210 deg - Ice		-7.76	13.46	844.77	496.74	6.59
Wind 225 deg - Ice		-10.83	10.85	683.76	690.76	4.65
Wind 240 deg - Ice		-14.48	8.37	517.64	900.51	2.79
Wind 270 deg - Ice		-15.52	-0.00	3.79	981.32	-2.17
Wind 300 deg - Ice		-13.10	-7.57	-472.25	835.20	-6.06
Wind 315 deg - Ice		-10.84	-10.85	-676.10	690.92	-7.65
Wind 330 deg - Ice		-7.76	-13.46	-837.07	496.94	-8.76
Total Weight	11.09			1.72	5.19	
Wind 0 deg - Service		-0.00	-6.40	-406.50	-0.03	-4.47
Wind 30 deg - Service		3.10	-5.39	-345.85	-199.08	-3.12
Wind 45 deg - Service		4.37	-4.38	-281.56	-280.69	-2.18
Wind 60 deg - Service		5.33	-3.08	-198.54	-342.73	-1.10
Wind 90 deg - Service		6.21	0.00	-0.13	-398.14	1.19
Wind 120 deg - Service		5.53	3.20	203.04	-351.02	3.31
Wind 135 deg - Service		4.37	4.38	281.29	-280.71	3.84
Wind 150 deg - Service		3.11	5.39	345.57	-199.11	4.30
Wind 180 deg - Service		0.00	6.16	396.65	-0.06	4.22
Wind 210 deg - Service		-3.10	5.39	345.55	199.00	3.12
Wind 225 deg - Service		-4.37	4.38	281.27	280.60	2.18
Wind 240 deg - Service		-5.53	3.20	203.01	350.92	1.15
Wind 270 deg - Service		-6.21	-0.00	-0.16	398.06	-1.19
Wind 300 deg - Service		-5.33	-3.08	-198.56	342.66	-3.12
Wind 315 deg - Service		-4.37	-4.38	-281.59	280.62	-3.84
Wind 330 deg - Service		-3.11	-5.39	-345.87	199.02	-4.30

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice

Comb. No.	Description
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	100 - 80	Leg	Max Tension	10	12.51	0.07	-0.00
			Max. Compression	2	-15.26	0.09	0.01
			Max. Mx	10	3.69	0.66	0.01
			Max. My	6	-0.55	-0.00	-0.68
			Max. Vy	10	-0.91	-0.44	0.01
			Max. Vx	14	-0.91	0.00	-0.41
		Diagonal	Max Tension	3	2.91	0.00	0.00
			Max. Compression	3	-2.90	0.00	0.00
			Max. Mx	30	2.13	0.01	0.00
			Max. My	11	-2.85	0.00	-0.00
			Max. Vy	30	-0.01	0.01	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	11	0.00	0.00	0.00
		Top Girt	Max Tension	2	0.53	0.00	0.00
			Max. Compression	10	-0.51	0.00	0.00
			Max. Mx	18	0.03	-0.02	0.00
			Max. My	19	-0.19	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T2	80 - 60	Leg	Max Tension	10	31.40	-0.06	-0.02
			Max. Compression	13	-35.31	-0.00	-0.00
			Max. Mx	22	26.63	-0.10	0.00
			Max. My	17	-1.88	-0.00	0.11
			Max. Vy	22	-0.04	-0.10	0.00
			Max. Vx	17	0.05	-0.01	0.09
		Diagonal	Max Tension	3	2.68	0.00	0.00
			Max. Compression	3	-2.69	0.00	0.00
			Max. Mx	30	1.98	0.02	-0.00
			Max. My	28	-2.35	0.00	-0.00
			Max. Vy	30	-0.01	0.02	-0.00
			Max. Vx	28	0.00	0.00	0.00
T3	60 - 40	Leg	Max Tension	10	46.52	0.15	-0.01
			Max. Compression	30	-51.85	-0.35	-0.00
			Max. Mx	30	-51.85	-0.35	-0.00
			Max. My	17	-2.50	-0.02	0.23
			Max. Vy	30	0.20	0.32	-0.00
			Max. Vx	17	-0.11	-0.02	0.23
		Diagonal	Max Tension	3	3.06	0.03	0.00
			Max. Compression	3	-3.18	0.00	0.00
			Max. Mx	30	2.34	0.04	0.00
			Max. My	19	-2.80	-0.00	0.01
			Max. Vy	30	-0.02	0.04	0.00
			Max. Vx	19	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	30	0.90	0.00	0.00
			Max. Compression	30	-0.90	0.01	-0.00
			Max. Mx	19	0.01	0.02	0.00
			Max. My	27	-0.17	0.01	0.01
			Max. Vy	19	-0.01	0.02	0.00
			Max. Vx	33	-0.00	0.00	0.00
T4	40 - 20	Leg	Max Tension	10	61.11	0.25	-0.01
			Max. Compression	30	-69.02	-0.10	-0.00
			Max. Mx	30	-63.52	0.52	-0.00
			Max. My	17	-3.25	-0.03	0.30
			Max. Vy	30	-0.31	0.48	-0.00
			Max. Vx	17	0.14	-0.03	0.29
		Diagonal	Max Tension	3	3.34	0.03	-0.00
			Max. Compression	19	-3.75	0.00	0.00
			Max. Mx	30	2.49	0.05	0.00
			Max. My	19	-3.18	0.00	0.01
			Max. Vy	32	0.02	0.05	0.00
			Max. Vx	19	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	30	1.20	0.00	0.00
			Max. Compression	30	-1.20	0.03	0.00
			Max. Mx	19	0.03	0.03	0.00
			Max. My	27	-0.28	0.03	0.01
			Max. Vy	19	-0.02	0.03	0.00
			Max. Vx	33	-0.00	0.00	0.00
T5	20 - 0	Leg	Max Tension	10	74.30	0.27	-0.01
			Max. Compression	30	-86.16	0.00	0.00
			Max. Mx	32	63.71	0.69	0.01
			Max. My	17	-3.73	-0.04	0.41

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	30	0.34	0.53	0.00
			Max. Vx	17	-0.17	-0.04	0.41
		Diagonal	Max Tension	20	3.98	0.00	0.00
			Max. Compression	20	-3.96	0.00	0.00
			Max. Mx	33	1.95	0.07	-0.00
			Max. My	19	-3.91	0.04	0.01
			Max. Vy	33	0.03	0.07	-0.00
			Max. Vx	19	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	30	1.49	0.00	0.00
			Max. Compression	30	-1.49	0.01	0.00
			Max. Mx	34	-0.35	0.04	0.01
			Max. My	27	-0.29	0.04	0.01
			Max. Vy	34	-0.02	0.04	0.01
			Max. Vx	27	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	88.35	8.19	-4.86
	Max. H_x	13	85.90	8.63	-5.12
	Max. H_z	21	-65.79	-7.73	5.00
	Min. Vert	5	-75.74	-7.76	4.61
	Min. H_x	22	-67.61	-8.09	4.78
	Min. H_z	12	81.51	7.90	-5.16
Leg B	Max. Vert	24	86.68	-8.37	-4.50
	Max. H_x	32	-69.31	8.28	4.52
	Max. H_z	33	-67.49	8.00	4.61
	Min. Vert	15	-76.45	7.98	4.25
	Min. H_x	7	85.20	-8.85	-4.72
	Min. H_z	7	85.20	-8.85	-4.72
Leg A	Max. Vert	19	87.17	-0.40	9.51
	Max. H_x	30	-34.45	1.16	-5.39
	Max. H_z	2	85.51	-0.45	10.04
	Min. Vert	10	-76.46	0.42	-9.05
	Min. H_x	5	43.57	-1.11	5.00
	Min. H_z	27	-69.04	0.32	-9.43

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	11.09	0.00	0.00	1.72	5.19	0.00
Dead+Wind 0 deg - No Ice	11.09	-0.00	-16.38	-1041.55	5.27	-11.47
Dead+Wind 30 deg - No Ice	11.09	7.95	-13.79	-885.85	-505.79	-8.00
Dead+Wind 45 deg - No Ice	11.09	11.19	-11.21	-720.80	-715.31	-5.59
Dead+Wind 60 deg - No Ice	11.09	13.64	-7.89	-507.63	-874.62	-2.83
Dead+Wind 90 deg - No Ice	11.09	15.90	0.00	1.76	-1016.88	3.05
Dead+Wind 120 deg - No Ice	11.09	14.16	8.19	523.41	-895.88	8.50
Dead+Wind 135 deg - No Ice	11.09	11.19	11.21	724.30	-715.36	9.85

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - No Ice	11.09	7.95	13.80	889.33	-505.85	11.04
Dead+Wind 180 deg - No Ice	11.09	0.00	15.78	1020.48	5.20	10.84
Dead+Wind 210 deg - No Ice	11.09	-7.95	13.79	889.27	516.24	8.00
Dead+Wind 225 deg - No Ice	11.09	-11.19	11.21	724.22	725.75	5.59
Dead+Wind 240 deg - No Ice	11.09	-14.16	8.19	523.31	906.27	2.96
Dead+Wind 270 deg - No Ice	11.09	-15.90	-0.00	1.69	1027.30	-3.05
Dead+Wind 300 deg - No Ice	11.09	-13.64	-7.89	-507.67	885.08	-8.01
Dead+Wind 315 deg - No Ice	11.09	-11.19	-11.21	-720.83	725.81	-9.85
Dead+Wind 330 deg - No Ice	11.09	-7.95	-13.80	-885.86	516.31	-11.04
Dead+Ice+Temp	19.19	0.00	0.00	3.92	12.42	-0.00
Dead+Wind 0 deg+Ice+Temp	19.19	-0.00	-16.74	-1028.35	12.56	-9.91
Dead+Wind 30 deg+Ice+Temp	19.19	7.76	-13.46	-840.76	-474.14	-6.63
Dead+Wind 45 deg+Ice+Temp	19.19	10.83	-10.85	-679.03	-669.05	-4.67
Dead+Wind 60 deg+Ice+Temp	19.19	13.10	-7.57	-474.22	-814.05	-2.48
Dead+Wind 90 deg+Ice+Temp	19.19	15.52	0.00	4.04	-960.93	2.18
Dead+Wind 120 deg+Ice+Temp	19.19	14.48	8.37	520.17	-879.82	7.10
Dead+Wind 135 deg+Ice+Temp	19.19	10.84	10.85	687.03	-669.21	7.70
Dead+Wind 150 deg+Ice+Temp	19.19	7.76	13.46	848.72	-474.34	8.81
Dead+Wind 180 deg+Ice+Temp	19.19	0.00	15.15	960.38	12.32	8.58
Dead+Wind 210 deg+Ice+Temp	19.19	-7.76	13.46	848.59	499.01	6.63
Dead+Wind 225 deg+Ice+Temp	19.19	-10.83	10.85	686.85	693.90	4.68
Dead+Wind 240 deg+Ice+Temp	19.19	-14.48	8.37	519.95	904.55	2.81
Dead+Wind 270 deg+Ice+Temp	19.19	-15.52	-0.00	3.81	985.76	-2.18
Dead+Wind 300 deg+Ice+Temp	19.19	-13.10	-7.57	-474.40	839.01	-6.10
Dead+Wind 315 deg+Ice+Temp	19.19	-10.84	-10.85	-679.17	694.07	-7.70
Dead+Wind 330 deg+Ice+Temp	19.19	-7.76	-13.46	-840.86	499.21	-8.81
Dead+Wind 0 deg - Service	11.09	-0.00	-6.40	-405.82	5.23	-4.48
Dead+Wind 30 deg - Service	11.09	3.10	-5.39	-344.99	-194.41	-3.13
Dead+Wind 45 deg - Service	11.09	4.37	-4.38	-280.51	-276.25	-2.18
Dead+Wind 60 deg - Service	11.09	5.33	-3.08	-197.25	-338.48	-1.10
Dead+Wind 90 deg - Service	11.09	6.21	0.00	1.74	-394.05	1.19
Dead+Wind 120 deg - Service	11.09	5.53	3.20	205.50	-346.79	3.32
Dead+Wind 135 deg - Service	11.09	4.37	4.38	283.98	-276.28	3.85
Dead+Wind 150 deg - Service	11.09	3.11	5.39	348.44	-194.42	4.31
Dead+Wind 180 deg - Service	11.09	0.00	6.16	399.67	5.20	4.23
Dead+Wind 210 deg - Service	11.09	-3.10	5.39	348.42	204.83	3.13
Dead+Wind 225 deg - Service	11.09	-4.37	4.38	283.95	286.67	2.18
Dead+Wind 240 deg - Service	11.09	-5.53	3.20	205.47	357.19	1.16
Dead+Wind 270 deg - Service	11.09	-6.21	-0.00	1.71	404.47	-1.19
Dead+Wind 300 deg - Service	11.09	-5.33	-3.08	-197.27	348.91	-3.13
Dead+Wind 315 deg - Service	11.09	-4.37	-4.38	-280.53	286.69	-3.85
Dead+Wind 330 deg - Service	11.09	-3.11	-5.39	-345.00	204.86	-4.31

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-11.09	0.00	0.00	11.09	0.00	0.000%
2	-0.00	-11.09	-16.38	0.00	11.09	16.38	0.000%
3	7.95	-11.09	-13.79	-7.95	11.09	13.79	0.000%
4	11.19	-11.09	-11.21	-11.19	11.09	11.21	0.000%
5	13.64	-11.09	-7.89	-13.64	11.09	7.89	0.000%
6	15.90	-11.09	0.00	-15.90	11.09	-0.00	0.000%
7	14.16	-11.09	8.19	-14.16	11.09	-8.19	0.000%
8	11.19	-11.09	11.21	-11.19	11.09	-11.21	0.000%
9	7.95	-11.09	13.80	-7.95	11.09	-13.80	0.000%
10	0.00	-11.09	15.78	-0.00	11.09	-15.78	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
11	-7.95	-11.09	13.79	7.95	11.09	-13.79	0.000%
12	-11.19	-11.09	11.21	11.19	11.09	-11.21	0.000%
13	-14.16	-11.09	8.19	14.16	11.09	-8.19	0.000%
14	-15.90	-11.09	-0.00	15.90	11.09	0.00	0.000%
15	-13.64	-11.09	-7.89	13.64	11.09	7.89	0.000%
16	-11.19	-11.09	-11.21	11.19	11.09	11.21	0.000%
17	-7.95	-11.09	-13.80	7.95	11.09	13.80	0.000%
18	0.00	-19.19	0.00	0.00	19.19	0.00	0.000%
19	-0.00	-19.19	-16.74	0.00	19.19	16.74	0.000%
20	7.76	-19.19	-13.46	-7.76	19.19	13.46	0.000%
21	10.83	-19.19	-10.85	-10.83	19.19	10.85	0.000%
22	13.10	-19.19	-7.57	-13.10	19.19	7.57	0.000%
23	15.52	-19.19	0.00	-15.52	19.19	-0.00	0.000%
24	14.48	-19.19	8.37	-14.48	19.19	-8.37	0.000%
25	10.84	-19.19	10.85	-10.84	19.19	-10.85	0.000%
26	7.76	-19.19	13.46	-7.76	19.19	-13.46	0.000%
27	0.00	-19.19	15.15	-0.00	19.19	-15.15	0.000%
28	-7.76	-19.19	13.46	7.76	19.19	-13.46	0.000%
29	-10.83	-19.19	10.85	10.83	19.19	-10.85	0.000%
30	-14.48	-19.19	8.37	14.48	19.19	-8.37	0.000%
31	-15.52	-19.19	-0.00	15.52	19.19	0.00	0.000%
32	-13.10	-19.19	-7.57	13.10	19.19	7.57	0.000%
33	-10.84	-19.19	-10.85	10.84	19.19	10.85	0.000%
34	-7.76	-19.19	-13.46	7.76	19.19	13.46	0.000%
35	-0.00	-11.09	-6.40	0.00	11.09	6.40	0.000%
36	3.10	-11.09	-5.39	-3.10	11.09	5.39	0.000%
37	4.37	-11.09	-4.38	-4.37	11.09	4.38	0.000%
38	5.33	-11.09	-3.08	-5.33	11.09	3.08	0.000%
39	6.21	-11.09	0.00	-6.21	11.09	-0.00	0.000%
40	5.53	-11.09	3.20	-5.53	11.09	-3.20	0.000%
41	4.37	-11.09	4.38	-4.37	11.09	-4.38	0.000%
42	3.11	-11.09	5.39	-3.11	11.09	-5.39	0.000%
43	0.00	-11.09	6.16	-0.00	11.09	-6.16	0.000%
44	-3.10	-11.09	5.39	3.10	11.09	-5.39	0.000%
45	-4.37	-11.09	4.38	4.37	11.09	-4.38	0.000%
46	-5.53	-11.09	3.20	5.53	11.09	-3.20	0.000%
47	-6.21	-11.09	-0.00	6.21	11.09	0.00	0.000%
48	-5.33	-11.09	-3.08	5.33	11.09	3.08	0.000%
49	-4.37	-11.09	-4.38	4.37	11.09	4.38	0.000%
50	-3.11	-11.09	-5.39	3.11	11.09	5.39	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	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001

12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000240
20	Yes	4	0.00000001	0.00000344
21	Yes	4	0.00000001	0.00000403
22	Yes	4	0.00000001	0.00000421
23	Yes	4	0.00000001	0.00000344
24	Yes	4	0.00000001	0.00000236
25	Yes	4	0.00000001	0.00000261
26	Yes	4	0.00000001	0.00000357
27	Yes	4	0.00000001	0.00000432
28	Yes	4	0.00000001	0.00000355
29	Yes	4	0.00000001	0.00000262
30	Yes	4	0.00000001	0.00000247
31	Yes	4	0.00000001	0.00000359
32	Yes	4	0.00000001	0.00000435
33	Yes	4	0.00000001	0.00000418
34	Yes	4	0.00000001	0.00000360
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	2.922	46	0.2404	0.0221
T2	80 - 60	1.917	46	0.2174	0.0194
T3	60 - 40	1.080	46	0.1642	0.0147
T4	40 - 20	0.483	46	0.1101	0.0103
T5	20 - 0	0.127	46	0.0482	0.0053

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	800-10121	46	2.922	0.2404	0.0221	101091
90.80	LPA-70063-6CF	46	2.448	0.2328	0.0211	54941
90.00	Pirod 12' T-Frame Sector Mount (1)	46	2.408	0.2320	0.0210	50545

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	7.422	13	0.6104	0.0565
T2	80 - 60	4.868	13	0.5520	0.0498
T3	60 - 40	2.744	13	0.4168	0.0376
T4	40 - 20	1.227	13	0.2794	0.0263
T5	20 - 0	0.324	30	0.1223	0.0136

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	800-10121	13	7.422	0.6104	0.0565	39738
90.80	LPA-70063-6CF	13	6.218	0.5911	0.0540	21597
90.00	Pirod 12' T-Frame Sector Mount (1)	13	6.115	0.5890	0.0537	19869

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	100	Leg	A325N	0.6250	4	3.13	13.50	0.232 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	2.91	4.08	0.713 ✔	1.333	Member Bearing
		Top Girt	A325N	0.5000	1	0.53	4.08	0.129 ✔	1.333	Member Bearing
T2	80	Leg	A325N	0.6250	4	7.85	13.50	0.581 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	2.68	4.08	0.658 ✔	1.333	Member Bearing
T3	60	Leg	A325N	0.7500	4	11.62	19.44	0.598 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3.18	4.12	0.770 ✔	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.5000	1	0.90	4.08	0.221 ✔	1.333	Member Bearing
T4	40	Leg	A325N	0.8750	4	15.26	26.46	0.577 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3.75	4.12	0.908 ✔	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.5000	1	1.20	4.08	0.293 ✔	1.333	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
T5	20	Leg	A354-BC	0.8750	4	18.56	24.80	0.748 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3.98	4.08	0.977 ✔	1.333	Member Bearing
		Secondary Horizontal	A325N	0.5000	1	1.49	4.08	0.366 ✔	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	100 - 80	ROHN 2 STD	20.00	4.00	61.0 K=1.00	22.549	1.0745	-15.26	24.23	0.630 ✔
T2	80 - 60	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	22.122	1.7040	-35.31	37.70	0.937 ✔
T3	60 - 40	ROHN 2.5 X-STR	20.03	3.47	45.0 K=1.00	25.108	2.2535	-51.85	56.58	0.916 ✔
T4	40 - 20	ROHN 3 STD	20.03	3.44	35.5 K=1.00	26.449	2.2285	-69.02	58.94	1.171 ✔
T5	20 - 0	ROHN 3 X-STR	20.04	3.43	36.2 K=1.00	26.351	3.0159	-86.16	79.47	1.084 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	100 - 80	L1 1/2x1 1/2x3/16	7.68	3.62	148.2 K=1.00	6.802	0.5273	-2.90	3.59	0.809 ✔
T2	80 - 60	L1 3/4x1 3/4x3/16	9.70	4.75	166.0 K=1.00	5.418	0.6211	-2.69	3.37	0.800 ✔
T3	60 - 40	L2x2x1/4	12.24	6.18	189.6 K=1.00	4.153	0.9380	-3.18	3.90	0.815 ✔
T4	40 - 20	L2x2x1/4	13.96	7.01	215.0 K=1.00	3.231	0.9380	-3.75	3.03	1.236 ✔
T5	20 - 0	KL/R > 200 (C) - 101 L2 1/2x2 1/2x3/16	15.82	7.94	192.6 K=1.00	4.026	0.9020	-3.70	3.63	1.019 ✔

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T3	60 - 40	L2x2x3/16	10.25	10.01	194.7 K=1.00	3.941	0.7150	-0.90	2.82	0.319 ✔
T4	40 - 20	L2x2x3/16	12.26	11.97	232.7 K=1.00	2.757	0.7150	-1.20	1.97	0.607 ✔
T5	20 - 0	L2x2x3/16	14.34	14.05	273.3 K=1.00	2.000	0.7150	-1.49	1.43	1.045 ✔
		KL/R > 250 (C) - 133								

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	L1 3/4x1 3/4x3/16	6.52	6.11	213.6 K=1.00	3.273	0.6211	-0.51	2.03	0.249 ✔
		KL/R > 200 (C) - 4								

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	ROHN 2 STD	20.00	4.00	61.0	30.000	1.0745	12.51	32.24	0.388 ✔
T2	80 - 60	ROHN 2.5 STD	20.03	5.01	63.4	30.000	1.7040	31.40	51.12	0.614 ✔
T3	60 - 40	ROHN 2.5 X-STR	20.03	3.47	45.0	30.000	2.2535	46.52	67.61	0.688 ✔
T4	40 - 20	ROHN 3 STD	20.03	3.44	35.5	30.000	2.2285	61.11	66.85	0.914 ✔
T5	20 - 0	ROHN 3 X-STR	20.04	3.43	36.2	30.000	3.0159	74.30	90.48	0.821 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	L1 1/2x1 1/2x3/16	7.67	3.62	97.8	21.600	0.5273	2.91	11.39	0.255 ✔
T2	80 - 60	L1 3/4x1 3/4x3/16	9.70	4.75	108.5	21.600	0.6211	2.68	13.42	0.200 ✔
T3	60 - 40	L2x2x1/4	12.24	6.18	121.7	21.600	0.9380	3.06	20.26	0.151 ✔
T4	40 - 20	L2x2x1/4	13.96	7.01	138.0	21.600	0.9380	3.34	20.26	0.165 ✔
T5	20 - 0	L2 1/2x2 1/2x3/16	15.82	7.94	122.5	21.600	0.9020	3.98	19.48	0.204 ✔

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T3	60 - 40	L2x2x3/16	10.25	10.01	194.7	21.600	0.7150	0.90	15.44	0.058 ✔
T4	40 - 20	L2x2x3/16	12.26	11.97	232.7	21.600	0.7150	1.20	15.44	0.077 ✔
T5	20 - 0	L2x2x3/16	14.34	14.05	273.3	21.600	0.7150	1.49	15.44	0.097 ✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	100 - 80	L1 3/4x1 3/4x3/16	6.52	6.11	141.3	21.600	0.6211	0.53	13.42	0.039 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	100 - 80	Leg	ROHN 2 STD	3	-15.26	32.30	47.2	Pass
T2	80 - 60	Leg	ROHN 2.5 STD	37	-35.31	50.25	70.3	Pass
T3	60 - 40	Leg	ROHN 2.5 X-STR	64	-51.85	75.42	68.7	Pass
T4	40 - 20	Leg	ROHN 3 STD	94	-69.02	78.57	87.8	Pass
T5	20 - 0	Leg	ROHN 3 X-STR	124	-86.16	105.94	81.3	Pass
T1	100 - 80	Diagonal	L1 1/2x1 1/2x3/16	11	-2.90	4.78	60.7	Pass
T2	80 - 60	Diagonal	L1 3/4x1 3/4x3/16	44	-2.69	4.49	60.0	Pass
T3	60 - 40	Diagonal	L2x2x1/4	71	-3.18	5.19	61.2	Pass
T4	40 - 20	Diagonal	L2x2x1/4	101	-3.75	4.04	92.7	Pass
T5	20 - 0	Diagonal	L2 1/2x2 1/2x3/16	131	-3.70	4.84	76.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T3	60 - 40	Secondary Horizontal	L2x2x3/16	73	-0.90	3.76	23.9	Pass
T4	40 - 20	Secondary Horizontal	L2x2x3/16	103	-1.20	2.63	45.5	Pass
T5	20 - 0	Secondary Horizontal	L2x2x3/16	135	-1.49	1.91	78.4	Pass
T1	100 - 80	Top Girt	L1 3/4x1 3/4x3/16	4	-0.51	2.71	18.7	Pass
							Summary	
						Leg (T4)	87.8	Pass
						Diagonal (T4)	92.7	Pass
						Secondary Horizontal (T5)	78.4	Pass
						Top Girt (T1)	18.7	Pass
						Bolt Checks	73.3	Pass
						RATING =	**92.7**	**Pass**

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Subject:	Foundation Analysis
Location:	Windsor Locks, CT
Rev. 0: 9/9/16	Prepared by: TJL. Checked by: C.F.C. Job No. 16001.33

Foundation Analysis:

Input Data:

Tower Data

Max Uplift Force =	$Uplift := 76 \cdot kips$	(User Input from tnxTower)	(Leg)
Max Shear Force =	$Shear := 10 \cdot kips$	(User Input from tnxTower)	(Leg)
Max Compressive Force =	$Compression := 88 \cdot kips$	(User Input from tnxTower)	(Leg)
Base Shear =	$Shear_{tot} := 16 \cdot kips$	(User Input from tnxTower)	(Tower)
Base Compression =	$Comp_{tot} := 11 \cdot kips$	(User Input from tnxTower)	(Tower)
Base Moment =	$Moment := 1047 \cdot ft \cdot kips$	(User Input from tnxTower)	(Tower)
Tower Height =	$H_t := 100 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 6.5ft$	(User Input)	
Length of Pier =	$L_p := 5.0ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1.0ft$	(User Input)	
Diameter of Pier =	$W_p := 1.5ft$	(User Input)	
Thickness of Footing =	$T_f := 2.5ft$	(User Input)	
Width of Footing =	$W_f := 8.5 \cdot ft$	(User Input)	

Material Properties:

Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

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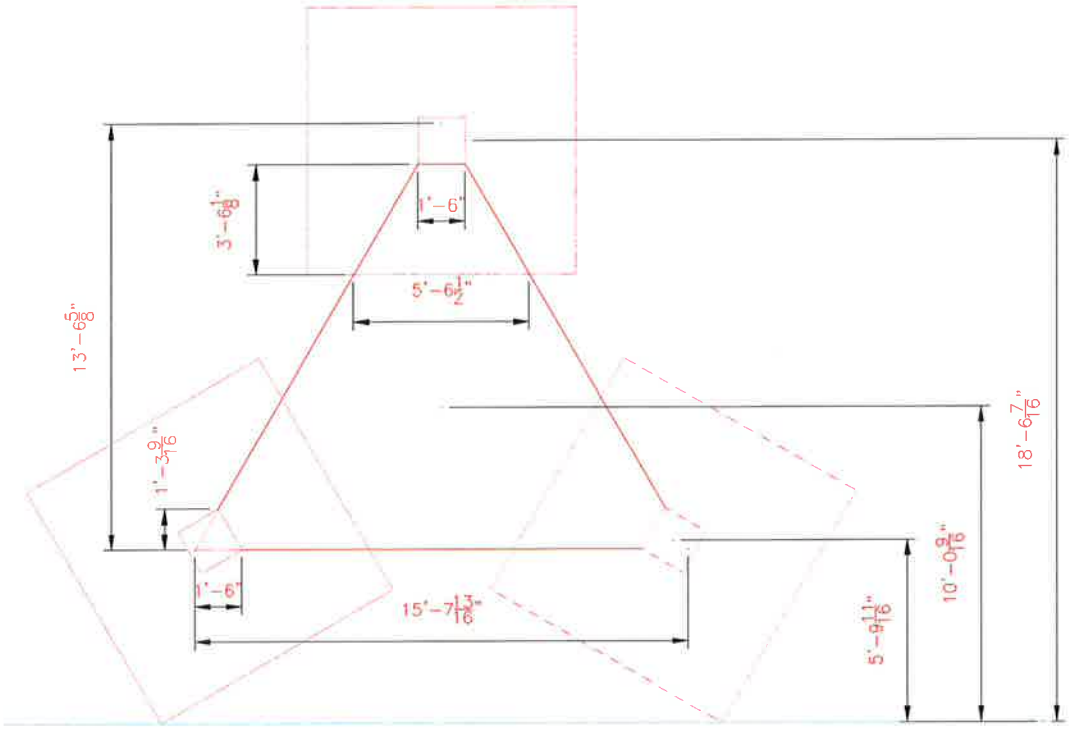
Subject:		Foundation Analysis
Location:		Windsor Locks, CT
Rev. 0: 9/9/16		Prepared by: TJL. Checked by: C.F.C. Job No. 16001.33

Concrete Mat Propperties:

Triangle One Width =	$T1_w := 15.65ft$	(User Input)
Triangle One Height =	$T1_h := 13.55ft$	(User Input)
Triangle Two Width =	$T2_w := 1.5ft$	(User Input)
Triangle Two Height =	$T2_h := 1.3ft$	(User Input)
Triangle Three Width =	$T3_w := 5.54ft$	(User Input)
Triangle Three Height =	$T3_h := 3.51ft$	(User Input)
Thickness of Mat =	$Mat_t := 4ft$	(User Input)

Distance To Centroids:

	$d_1 := 18.54ft$	(User Input)
	$d_2 := 10.05ft$	(User Input)
	$d_3 := 5.81ft$	(User Input)



Overturning Moment Check:

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

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 100 \cdot pcf$

Volume of Concrete Pad and Pier = $V_{pp} := \left[\left(W_f^2 \cdot T_f\right) + W_p^2 \cdot L_p\right] = 191.9 \cdot ft^3$

Total Volume of the Concrete Mat = $V_{mat.tot} := \frac{1}{2} \cdot \left[T1_w \cdot T1_h - \left(T2_w \cdot T2_h\right) \cdot 3\right] \cdot Mat_t = 412 \cdot ft^3$

Volume of Soil Above Footing = $V_{soilAF} := \left[W_f^2 - W_p^2 - \frac{\left(T3_w + W_p\right)}{2} \cdot T3_h\right] \cdot Mat_t = 231 \cdot ft^3$

Volume of Soil (Three Sides) = $V_{soilBF} := \frac{1}{2} \tan\left(\Phi_s\right) \cdot \left(L_p - L_{pag}\right)^2 \cdot W_f \cdot 3 = 117.779 \cdot ft^3$

Volume of Soil = $V_{soil} := V_{soilAF} + V_{soilBF}$

Weight of Soil = $WT_s := V_{soil} \cdot \gamma_s = 34.8 \cdot kip$

Weight of Concrete Mat = $WT_{mat.tot} := V_{mat.tot} \cdot \gamma_c = 61.9 \cdot kips$

Weight of Concrete Pad and Pier = $WT_{pp} := V_{pp} \cdot \gamma_c = 28.8 \cdot kips$

Resisting Moment = $M_r := \left(WT_{pp} + WT_s\right) \cdot d_1 + \left(WT_{pp} + WT_s\right) \cdot d_3 \cdot 2 + WT_{mat.tot} \cdot d_2 = 2540 ft \cdot kips$

Overturning Moment = $M_{ot} := Moment + Shear_{tot} \cdot \left(L_p + T_f\right) = 1167 \cdot kip \cdot ft$

Factor of Safety = $\frac{M_r}{M_{ot}} = 2.18$

$Overturning\_Moment := if\left(\frac{M_r}{M_{ot}} > 2, "OK", "NG"\right)$

Overturning_Moment = "OK"

Bearing Pressure Check:

Area of the Pad = $A_{pad} := W_f^2 = 72.25\,ft^2$

Weight of Soil Above Footing = $WT_{soil} := \left[\left[W_f^2 - W_p^2 - \frac{(T3_w + W_p)}{2}\cdot T3_h\right]\cdot(L_p - L_{pag} - n)\right]\cdot\gamma_s = 23.1\cdot kips$

Cross Sectional Area of Mat = $A_{mat} := \frac{1}{2}\cdot\left[T1_w\cdot T1_h - (T2_w\cdot T2_h)\cdot 3 - (T3_w + W_p)\cdot T3_h\cdot 3\right] = 66\,ft^2$

Cross Sectional Area of Base = $A := A_{pad}\cdot 3 + A_{mat} = 282.788\,ft^2$

Section Modulus of Foundation = $S := \frac{A_{pad}\cdot d_1^2 + A_{pad}\cdot d_3^2\cdot 2 + A_{mat}\cdot d_2^2}{d_2} = 3620.1\cdot ft^3$

Total Weight = $P := (WT_{pp})\cdot 3 + Comp_{tot} + WT_{mat.tot} = 159.2\cdot kips$

Max Pressure = $q_{max} := \frac{P}{A} + \frac{M_{ot}}{S} = 0.89\cdot ksf$

$Max\_Pressure\_Check := if(q_{max} < q_s, "OK", "NG")$

Max_Pressure_Check = "OK"

Minimum Pressure in Mat = $P_{min} := \frac{P}{A} - \frac{M_{ot}}{S} = 0.241\cdot ksf$

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

Min_Pressure_Check = "Okay"

SITE NAME	SUFFIELD S CT	Additional Comments: 2017 AWS carrier add. 700 TRDU to 60W RRH upgrade.	
SITE NO.	8-0252		
LATITUDE	41-56-48.01 N		
LONGITUDE	72-39-54.32 W		
700 MHz (LTE-700U) - BEFORE	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 MHz TRDU	700 MHz TRDU	700 MHz TRDU
ANTENNA TYPE	BXA-70063-6CF-6-750MHZ	BXA-70063-6CF-6-750MHZ	BXA-70063-6CF-6-750MHZ
ANTENNA QUANTITY	1	1	1
ORIENTATION (°)	30	150	290
TILT (MDT°|EDT°)	0 | 6	0 | 6	0 | 6
RAD CENTER (ft)	90.8	90.8	90.8
TMA (QTY)			
DIPLEXER (QTY/MODEL)			
RRH MODEL			
700 MHz (LTE-700U) - AFTER	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	700 MHz BBU + RRH	700 MHz BBU + RRH	700 MHz BBU + RRH
ANTENNA TYPE	SBNHH-1D65B	SBNHH-1D65B	SBNHH-1D65B
ANTENNA QUANTITY	Same as AWS	Same as AWS	Same as AWS
ORIENTATION (°)	30	150	290
TILT (MDT°|EDT°)	0 | 7	0 | 7	0 | 7
RAD CENTER (ft)	90.8	90.8	90.8
TMA (QTY)			
DIPLEXER (QTY/MODEL)			
RRH MODEL	Nokia RH_4X30-B13	Nokia RH_4X30-B13	Nokia RH_4X30-B13
850 MHz (Cellular) - BEFORE	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Mod 4.0B	Cellular Mod 4.0B	Cellular Mod 4.0B
ANTENNA TYPE	LPA-70063-6CF-EDIN-2	LPA-70063-6CF-EDIN-2	LPA-70063-6CF-EDIN-2
ANTENNA QUANTITY	1	1	1
ORIENTATION (°)	30	150	290
TILT (MDT°|EDT°)	0 | 2	0 | 2	0 | 2
RAD CENTER (ft)	90.8	90.8	90.8
TMA (QTY)			
DIPLEXER (QTY/MODEL)			
RRH (QTY/MODEL)			
850 MHz (Cellular) - AFTER	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Mod 4.0B	Cellular Mod 4.0B	Cellular Mod 4.0B
ANTENNA TYPE	LPA-70063-6CF-EDIN-2	LPA-70063-6CF-EDIN-2	LPA-70063-6CF-EDIN-2
ANTENNA QUANTITY	1	1	1
ORIENTATION (°)	30	150	290
TILT (MDT°|EDT°)	0 | 2	0 | 2	0 | 2
RAD CENTER (ft)	90.8	90.8	90.8
TMA (QTY)			
DIPLEXER (QTY/MODEL)			
RRH (QTY/MODEL)			
1900 MHz (PCS) - BEFORE	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Mod 4.0B	PCS Mod 4.0B	PCS Mod 4.0B
ANTENNA TYPE	BXA-171063-12BF	BXA-171063-12BF	BXA-171063-12BF
ANTENNA QUANTITY	1	1	1
ORIENTATION (°)	30	150	290
TILT (MDT°|EDT°)	0 | 2	0 | 2	0 | 2
RAD CENTER (ft)	90.8	90.8	90.8
TMA (QTY)			
DIPLEXER (QTY/MODEL)			
RRH (QTY/MODEL)			
1900 MHz (PCS) - AFTER	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	1900 MHz BBU + RRH	1900 MHz BBU + RRH	1900 MHz BBU + RRH
ANTENNA TYPE	SBNHH-1D65B	SBNHH-1D65B	SBNHH-1D65B
ANTENNA QUANTITY	1	1	1
ORIENTATION (°)	30	150	290
TILT (MDT°|EDT°)	0 | 2	0 | 2	0 | 2
RAD CENTER (ft)	90.8	90.8	90.8
TMA (QTY)			
DIPLEXER (QTY/MODEL)			
RRH (QTY/MODEL)			

2100 MHz (AWS) - BEFORE	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE						
ANTENNA TYPE						
ANTENNA QUANTITY						
ORIENTATION (°)						
TILT (MDT°|EDT°)						
RAD CENTER (ft)						
TMA (QTY)						
DIPLEXER (QTY/MODEL)						
RRH (QTY/MODEL)						
2100 MHz (AWS) - AFTER	**ALPHA**		**BETA**		**GAMMA**	
EQUIPMENT TYPE	2100 MHz BBU + RRH		2100 MHz BBU + RRH		2100 MHz BBU + RRH	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
ANTENNA QUANTITY	1		1		1	
ORIENTATION (°)	30		150		290	
TILT (MDT°|EDT°)	0	4	0	4	0	4
RAD CENTER (ft)	90.8		90.8		90.8	
TMA (QTY)						
DIPLEXER (QTY/MODEL)						
RRH (QTY/MODEL)	Nokia RH_4X45-AWS		Nokia RH_4X45-AWS		Nokia RH_4X45-AWS	

COAX CABLE	QUANTITY	SIZE	FIBER CABLE	QUANTITY	SIZE
MAIN LINE	12	1 5/8 "	FIBER LINE	2	1 1/4"
TOP COAX JUMPER	30	1/2"	FIBER JUMPER	6	1/2"
RET CONNECTIVITY REQUIRED	☑ LTE-700U	☑ PCS	OTHER RET RELATED INFO	☐ HOMERUN	☐ DAISY CHAIN
	☐ 850	☑ AWS	RET KIT	☐ BIAS-T	Other:

Special Instructions:

RF ENGINEER	RF MANAGER	RF INITIALS	DATE
Kelly Lemay	ALEX RESTREPO	KML	8/17/2016

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

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

Product Specifications

SBNHH-1D65B

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.

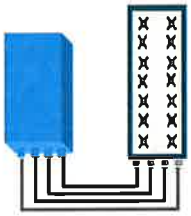
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

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

VZW Network Equipment Reporting Form (NERF)

Vendor	Alcatel-Lucent		Model	B66a RRH 4Tx/4Rx 4x45W or 2x 90W (SW selectable)		Function	RRH for distributed architecture with a CPRI interface between digital and RF processing components. The RRH has 4 Tx ports and 4 Rx ports. Can be SW configured for 2 Tx with 90W rf per port or 4 Tx with 45W rf per port. The RRH has passive cooling only.		
*1)Equipment Configuration	*2)Heat Release @50°F Intake Temp [W]		*3)Airflow Rate @ 100% Activity Rate [cfm]		*4)Dimensions [in]		Non-Thermal Data		
	100% Activity	50% Activity	Nominal (70°F)	Max (95°F)	External (WxDxH)	Clear (F/R/S)	Installed Weight [lb]	*5)Sound @ Nominal [L_WAd]	*6)Name Plate [W]
Minimum			N/A Convection cooled	N/A Convection cooled	w/o Solar Shield W = 11.4in D = 6.7in H = 25.2in (W=290mm) (D=170mm) (H=640mm)	Front: 12" Rear: 7.5" Right: 12" Left: 12" Top: 12" Bottom: 24"			
Typical			N/A Convection cooled	N/A Convection cooled	with Solar Shield W = 12in D = 7.6in H = 25.8in (W=304mm) (D=193mm) (H=655mm)		62lb 72 lb(w mounting brackets)	N/A Convection cooled	
Full	825W (add 60W for AISG)	TBD	N/A Convection cooled	N/A Convection cooled	N/A			N/A Convection cooled	

*7)Equipment EC-Class	N/A Convection cooled	*10)Fan Speed	N/A Convection cooled	*13)Fan Hot-Swap	N/A Convection cooled	*16)Environ. Tests	N/A Convection cooled	*18)Temp. Rise [°F]	N/A Convection cooled
*8)Non-Optimal EC-Class	N/A Convection cooled	*11)Fan Logic	N/A Convection cooled	*14)Shut-Down	N/A Convection cooled	*17)Allow. Max [°F]	N/A Convection cooled	*19)Rec. Max [°F]	N/A Convection cooled
*9)Exhaust Openings	N/A Convection cooled	*12)Fan Alarm	N/A Convection cooled	*15)Temp. Access	N/A Convection cooled	*17)Allow. Min [°F]	N/A Convection cooled	*19)Rec. Min [°F]	N/A Convection cooled

Power Reporting					
Power Input	-48V	No. Power Supplies	N/A (Customer provided power plant)	Number of Inputs per Power Supply	1
*24)Maximum Demand (total system in Watts)	825W (add 60W for AISG)	Maximum Input (each power supply in Watts)	N/A (Customer provided power plant)	Maximum Output (each power supply in Watts)	58W (to AISG port, 29V/2A)
Power Supply Connection Type	DC entry via Conduit Box	Power Supply Make & Model	N/A (Customer provided power plant)		
Input Protection	no input fuse	Input Protection Make & Model	N/A (Customer provided power plant)		
Redundancy Scheme	N/A				
Nominal Voltage	-48VDC	Maximum Voltage	-57V	Minimum Voltage	-38V
*25)Max Current at Nominal Voltage	17.2A (add 1.2A if AISG port loaded 2A*29V)	*25)Max Current at Maximum Voltage	14.5A (add 1A if AISG port loaded 2A*29V)	*25)Max Current at Minimum Voltage	21.7A (add 1.5A if AISG port loaded 2A*29V)

Return completed forms to Engineering and Operations Support (EOS)
Richard.damiano@verizonwireless.com

DATA SHEET

DC Surge Protection for RRH/Integrated Antenna Radio Head

RxxDC-4750-PF-48 • RxxDC-3103-PF-48 • RxxDC-3315-PF-48

Tower / Base / Rooftop / Rooftop Distribution Models

Raycap's flexible Tower, Base Stations and Rooftop protection and Distribution products provide protection for up to 6 Remote Radio Heads/Integrated Antennas. The solutions mitigate the risk of damage due to lightning and provide high levels of availability and reliability to radio equipment.

Shown with optional 90° elbow for side entry. Can be installed on left or right side of unit.

Mounting Bracket Included

Features

- Employs the Strikesorb® 30-V1-HV Surge Protective Device (SPD) specifically designed for the Remote Radio Head (RRH) installation environment and certified for use in DC applications and at low DC operating voltages (48V).
- The Strikesorb 30-V1-HV is a Class I SPD, certified by VDE per the IEC 61643-1 standard as suitable for installation in areas where direct lightning exposure is expected. Strikesorb 30-V1-HV is able to withstand direct lightning currents of up to 5kA (10/350) and induced surge currents of up to 60kA (8/20).
- Provides very low let through / clamping voltage - unique for a Class I product - as it does not employ spark gaps or other switching elements. Strikesorb offers unique protection levels to the RRH equipment as well as the Base Band Units.
- Alarms for SPD sacrifice, Moisture detection and Intrusion.
- Fully recognized to the UL 1449 3rd Edition Safety Standard.
- Patent pending design

Benefits

- Offers unique maintenance-free protection against direct lightning currents.
- Protects up to 6 Remote Radio Heads and connects up to 12 fiber pairs.
- Utilizes an IP 67 rated enclosure, allowing for indoor or outdoor installation on a roof or tower top.
- Configurable cable ports are designed to accommodate varying diameters of hybrid (combined power and fiber optic) or standard cables with diameters up to 2" (will fit most standard 1⅝" coax class cables) depending upon port configuration.
- Lightweight aerodynamic design provides maximum flexibility for tower top installation.
- Companion to the RxxDC-4291-PF-48 / RxxDC-1064-PF-48 (Sector) models.

Tower / Base / Rooftop / Rooftop Distribution Models
RxxDC-4750-PF-48
RxxDC-3103-PF-48
RxxDC-3315-PF-48

Companion Sector Models:
RxxDC-4291-PF-48
RxxDC-1064-PF-48

G02-00-236 121003

Raycap

www.raycapsurgeprotection.com

SPECIFICATIONS

DC Surge Protection for RRH/Integrated Antenna Radio Head

RxxDC-4750-PF-48 • RxxDC-3103-PF-48 • RxxDC-3315-PF-48

Tower / Base / Rooftop / Rooftop Distribution Models

Electrical

Model Numbers	RxxDC-4750-PF-48	RxxDC-3103-PF-48	RxxDC-3315-PF-48
Nominal Operating Voltage	48 VDC	48 VDC	48 VDC
Nominal Discharge Current [I_n]	20 kA 8/20 µs	20 kA 8/20 µs	20 kA 8/20 µs
Maximum Surge Current [I_{max}]	60 kA 8/20 µs	60 kA 8/20 µs	60 kA 8/20 µs
Maximum Impulse (Lightning) Current per IEC 61643-1	5 kA 10/350 µs	5 kA 10/350 µs	5 kA 10/350 µs
Maximum Continuous Operating Voltage [U_c]	75 VDC	75 VDC	75 VDC
Voltage Protection Rating (VPR) per UL 1449 3rd Edition	400V	400V	400V
Protection Class as per IEC 61643-1	Class I	Class I	Class I
SPD Alarm	upon sacrifice	upon sacrifice	upon sacrifice
Intrusion Sensor	microswitch	microswitch	microswitch
Moisture Sensor	infrared moisture detector	infrared moisture detector	infrared moisture detector
Strikesorb Module Type	**No Strikesorb modules installed**	30-V1-HV **Strikesorb modules installed to protect 3 Remote Radio Heads**	30-V1-HV **Strikesorb modules installed to protect 6 Remote Radio Heads**

Mechanical

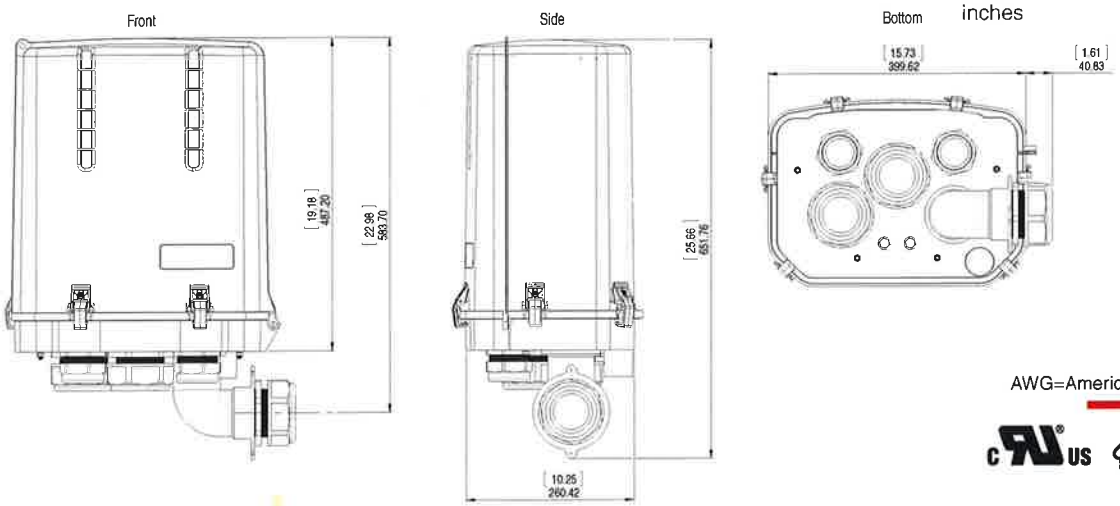
Suppression Connection Method	Compression lug, #14 - #2/0 AWG (2.5 mm² - 70 mm²) Copper; #12 - #2/0 AWG (4 mm² - 70 mm²) Aluminum		
Fiber Connection Method	LC-LC Single mode		
Pressure Equalizing Vent	Gore™ Vent		
Environmental Rating	IP 67		
Operating Temperature	-40° C to +80° C		
UV Resistant	Yes		
Weight	System: 16.0 lbs (7.25 kg) Mount: 5.5 lbs (2.49 kg) Total: 21.5 lbs (9.75 kg)	System: 18.7 lbs (8.48 kg) Mount: 5.5 lbs (2.49 kg) Total: 24.2 lbs (10.98 kg)	System: 21.4 lbs (9.70 kg) Mount: 5.5 lbs (2.49 kg) Total: 26.9 lbs (12.20 kg)
Combined Wind Loading	150mph (sustained): 200 lbs (889.6 N)		

Standards Compliance

Strikesorb modules are compliant to the following Surge Protective Device (SPD) Standards	
Standards	ANSI/UL 1449 3rd Edition
	IEEE C62.41
	NEMA LS-1, IEC 61643-1:2005 2nd Edition (Class I Protection)
	IEC 61643-12
	EN 61643-11:2002 (including A11:2007)

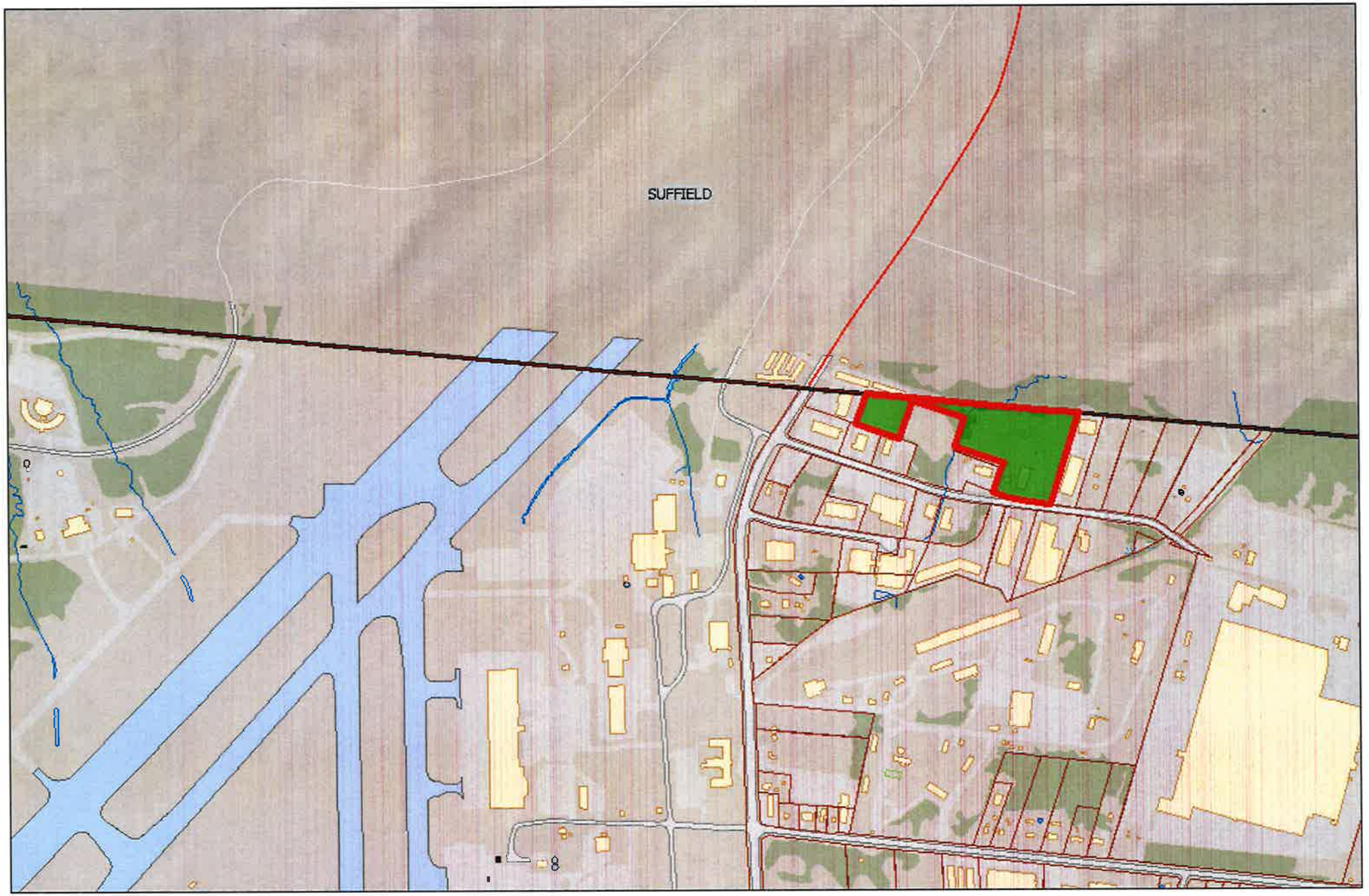
Product Diagram

[mm]
inches



AWG=American Wire Gauge

ATTACHMENT 4



N
W E
S

Windsor Locks, CT

Feet
0 700 1,400 2,800

1 inch = 1,036 feet

TOWN OF WINDSOR LOCKS, CONNECTICUT SEAL

55 KING SPRING ROAD

Location	55 KING SPRING ROAD	**Mblu**	3/ 2/ 282/ /
Acct#	32282000	**Owner**	SALES SAMUEL P REV TR & SAMUAL P TRS
Assessment	$396,800	**PID**	62
Building Count	2		

Current Value

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$182,500	$214,300	$396,800

Owner of Record

Owner	SALES SAMUEL P REV TR & SAMUAL P TRS	**Sale Price**	$0
Co-Owner		**Certificate**	
Address	55 KING SPRING RD WINDSOR LOCKS, CT 06096	**Book & Page**	450/27
		Sale Date	08/18/2015
		Instrument	10

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
SALES SAMUEL P REV TR & SAMUAL P TRS			450/27	10	08/18/2015
SALES FRANK D JR REVOC TR AG DTD 4/13/04	$0		380/954	02	06/24/2008
SALES FRANK D JR REVOC TR AG DTD 4/13/04	$0		380/952	02	06/24/2008
SALES SAMUEL P & FRANK D JR 1/2 INT EACH	$0		286/1034		05/29/2002
SALES FRANK D EST OF W/SAMUEL P	$0		272/338	00	04/02/2001

Building Information

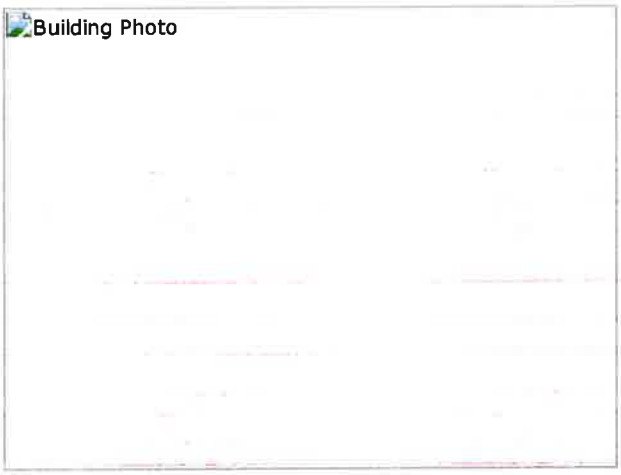
Building 1 : Section 1

Year Built:	1970
Living Area:	7248
Replacement Cost:	$306,445
Building Percent Good:	50
Replacement Cost Less Depreciation:	$153,200

Building Attributes

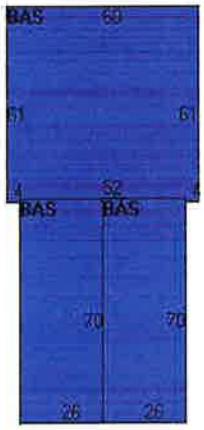
Field	Description
STYLE	Comm Garage
MODEL	Ind/Comm
Stories:	1
Occupancy	
Exterior Wall A	Concr/Cinder
Exterior Wall B	
Roof Structure	Gable/Hip
Roof Cover	Rolled Compos
Interior Wall A	Minim/Masonry
Interior Wall B	
Interior Floor A	Concr-Finished
Interior Floor B	
Heating Fuel	Coal or Wood
Heating Type	None
AC Type	None
Bldg Use	Industrial
Total Rooms	
Total Bedrooms	
Total Baths	
Heat/AC	None
Frame Type	Masonry
Baths/Plumbing	Average
Ceiling/Wall	Ceil Min Wall
Rooms/Prtns	Average
Wall Height	12.00
% Comn Wall	0.00

Building Photo



(http://images.vgsi.com/photos/WindsorlocksCTPhotos//C:\Use

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	7248	7248
		7248	7248

Building 2 : Section 1

Year Built: 1953
Living Area: 1251
Replacement Cost: $118,446
Building Percent Good: 55
Replacement Cost Less Depreciation: $65,100

Building Attributes : Bldg 2 of 2	
Field	Description
Style	Ranch
Model	Residential
Stories:	1 Story
Occupancy	1

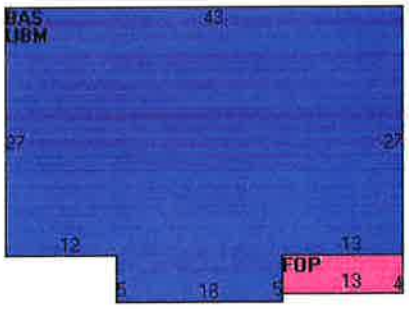
Exterior Wall A	Wood Shingle
Exterior Wall B	
Roof Structure:	Gable/Hip
Roof Cover	Asphalt Shingl
Interior Wall A	Plstr/shtrck
Interior Wall B	
Interior Flr A	Hardwood
Interior Flr B	Carpet
Heat Fuel	Oil
Heat Type:	Hot Water
AC Type:	None
Total Bedrooms:	3 Bedrooms
Total Bathrooms:	1
Total Half Baths:	0
Total Xtra Fixtrs:	
Total Rooms:	6 Rooms
Fireplaces	
Cath. Ceiling	
Fin. Basement	
Basement Gar.	
Whirlpool	
Fireplace Gas	

Building Photo

Building Photo

(http://images.vgsi.com/photos/WindsorlocksCTPhotos//C:\Use

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	1251	1251
FOP	Open Porch	52	0
UBM	Basement	1251	0
		2554	1251

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 300

Land Line Valuation

Size (Acres) 0.50

Description	Industrial	**Frontage**	0
Zone	IND1	**Depth**	0
Neighborhood	3000	**Assessed Value**	$214,300
Alt Land Appr	No		
Category			

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
CNPY	Canopy	A	Average	1664.00 S.F.	$41,600	2
SHD1	Shed	A	Average	96.00 S.F.	$900	2

Valuation History

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2012	$203,600	$74,700	$278,300
2007	$167,800	$80,900	$248,700
2002	$115,100	$100,500	$215,600