Robinson+Cole

KENNETH C. BALDWIN

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

Also admitted in Massachusetts

September 9, 2016

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

Re: **Notice of Exempt Modification – Facility Modification**
59 Westwood Drive, New London, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas on an 80-foot lattice tower at 59 Westwood Drive in New London (the "Property"). Four (4) antennas are located at the 67-foot level; four (4) antennas are located at the 72-foot level; and four (4) antennas are located at the 77-foot level. The tower and Property are owned by Atlantic Broadband CT LLC. The Council approved Cellco's shared use of this tower in 1990. Cellco now intends to modify its facility by replacing nine (9) of its existing antennas with three (3) model SBNHH-1D65B, 700 MHz antennas; three (3) model SBNHH-1D65B, 1900 MHz antennas; and three (3) model SBNHH-1D65B, 2100 MHz antennas, at the 67-foot, 72-foot and 77-foot levels on the tower. Cellco also intends to install nine (9) remote radio heads ("RRHs") behind its 700 MHz antennas, 1900 MHz antennas, and 2100 MHz antennas and two (2) new HYBRIFLEX™ 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 Michael Passero, Mayor for the City of New London. A copy of this letter is also being sent to Atlantic Broadband CT LLC, the Property and tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be installed on its existing antenna mounting frames at the 67-foot, 72-foot and 77-foot levels on the 80-foot tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for RF emissions at each of Cellco's operating frequencies, as modified, are included behind Attachment 2. These tables demonstrate how the modified facility will comply with the RF emissions standards established by the FCC.

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

6. The tower and its foundation, with certain modifications, can support Cellco's proposed modifications. (*See* Structural Analysis Report and Reinforcement Design 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:
Michael Passero, New London Mayor
Atlantic Broadband CT LLC
Timothy 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
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, 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.

General Specifications

Antenna Type	Sector with internal RET
Band	Multiband
Brand	DualPol®
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground

Product Specifications

SBNHH-1D65B

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, 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

Depth	180.0 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 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

Depth	296.0 mm | 11.7 in
Length	2025.0 mm | 79.7 in
Width	390.0 mm | 15.4 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

Product Specifications

SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

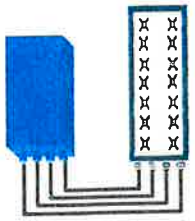
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

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
WIRELESS PRODUCT DATASHEET
RRH2X60-1900A-4R FOR BAND 2/25 APPLICATIONS

The Alcatel-Lucent RRH2x60-1900A-4R is a high power, small form factor Remote Radio Head operating in the PCS 1900MHz frequency band for WCDMA and LTE technologies. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.

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

The Alcatel-Lucent RRH2x60-1900A-4R is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCE

The Alcatel-Lucent RRH2x60-1900A-4R integrates all the latest technologies. This allows operators to offer best-in-class characteristics.

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

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

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

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

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-1900A-4R is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

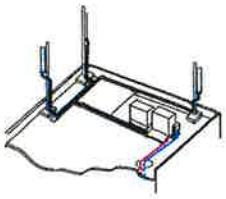
The Alcatel-Lucent RRH2x60-1900A-4R is a very cost-effective solution to deploy LTE MIMO.

EASY INSTALLATION

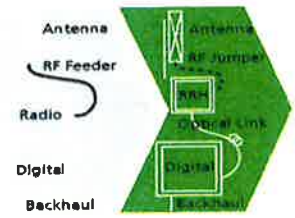
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-1900A-4R installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-1900A-4R is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

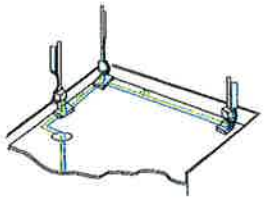
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-190A-4R is compact and weighs about 21 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-1900A-4R integrates two power amplifiers of 60W rating (at each antenna connector)
- RRH2x60-1900A-4R can operate WCDMA only, LTE only or a mix of WCDMA and LTE
- RRH2x60-1900A-4R offers the possibility for WCDMA (non MIMO) to operate the two radio chains independently (2 blocks of 20 MHz anywhere in the band)
- RRH2x60-1900A-4R is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control

BENEFITS

- MIMO deployment and/or WCDMA and LTE simultaneous operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

- HxWxD : 500x285x208 mm (30l with solar shield)
- Weight : 21 kg (46 lbs) (with solar shield)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption: 460W typ. @2x60W (100%RF)

RF Characteristics

- Supported spectrum: DL 1930-1990 / UL 1850-1910
- Frequency band: 3GPP band 2/25
- Output power: 2x60W at antenna connectors
- Technology supported: W-CDMA and LTE
- Instantaneous bandwidth: 20 MHz (MIMO) or 2x20 MHz (non MIMO)
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -124.8dBm for WCDMA and -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 15km using SM fiber
- TMA/RETA: AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions: ETS300-019-1-4 class4.1E
- Ingress Protection: IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089
- Safety : IEC60950-1, EN 60825-1
- Regulatory: CE Mark-European Directive 2002/95/EC (RoHS), 2002/96/EC (WEEE), 1999/5/EC (R&TTE)
- Health : EN 50385

Alcatel·Lucent

B66A RRH 4X45 - PHYSICAL CHARACTERISTICS- TARGET 15.1

B4 RRH4x45-4R (AWS-Extension Band)	
Frequency Band	LR15.1 – B4 / LR16.1 B66 (AWS 1 and 3 only)
RF Output Power	2x90W/4x45W (SW configurable)
Operational range	2110-2180 MHz, DL/ 1710-1780 MHz UL
Instantaneous Bandwidth	70MHz
Configuration (HW readiness)	LTE: 2T2R, 2T4R, 4T4R
Carrier Bandwidths	5, 10, 15 and 20 MHz
Interfaces	2x CPRI Rate 7 Ports Antenna Connectors 4.3-10
AISG Support	AISG 2.0 for RET Internal Smart Bias T
Monitor Ports	NA (Spec An to replace ports)
Environmental	GR487 Compliance / GR3178 Compliance (with exceptions)
Mounting options	Pole/Wall
Connectors location	All bottom
External Alarms	4
Annual Return Rate (Target)	<2%
Operating Temperature	-40 C to +55 C (without solar load)

- Commercial Product Will include B66 support of AWS 1 and 3.
- Lower AWS 3 UL Not in 3GPP Band 66 Definition

Physical Dimensions – Not to Exceed		
	W/O Solar Shield	With Solar Shield
Dimensions HxWxD	H = 26in (H=660mm) W = 11.4in (W=290mm) D = 5.9in (D=150mm)	H = 26.6in (H=675mm) W = 12in (W=304mm) D = 6.8n (D=173mm)
Volume	29l	35.5l
Weight		64lbs / 29kg

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

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

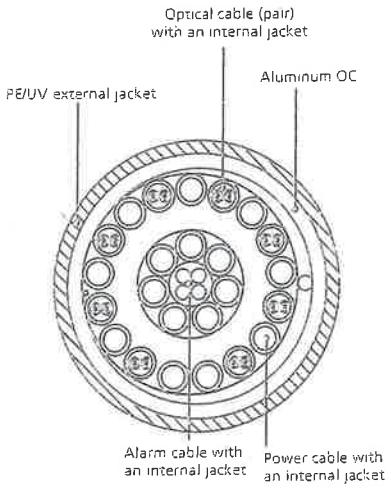


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

Far Field Approximation
with downtilt variation

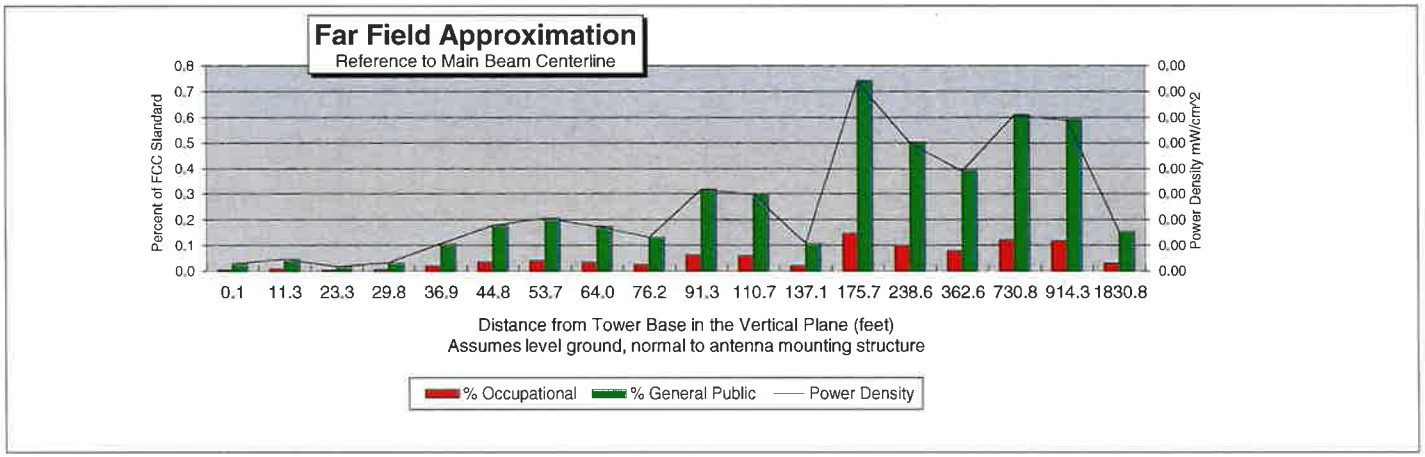
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	New London, CT
Site #:	
Date:	09/08/16
Name:	Ray Paradis
File Name:	New London, CT - FF Power

Operating Freq. (MHz)	**745.0**
Antenna Height (ft):	**66.9**
Antenna Gain (dBi):	**12.5**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	1050
Number of channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	63.9	64.9	68.0	70.5	73.8	78.0	83.4	90.4	99.5	111.5	127.9	151.3	186.9	247.0	368.2	733.5	916.5	1831.9	
Distance from Antenna Structure Base in Horizontal plane	0.1	11.3	23.3	29.8	36.9	44.8	53.7	64.0	76.2	91.3	110.7	137.1	175.7	238.6	362.6	730.8	914.3	1830.8	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.3	0.3	0.1	0.7	0.5	0.4	0.6	0.6	0.2	

Antenna Type SBNHH-1D65B
Max% 0.74%

Instructions:

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

Far Field Approximation
with downtilt variation

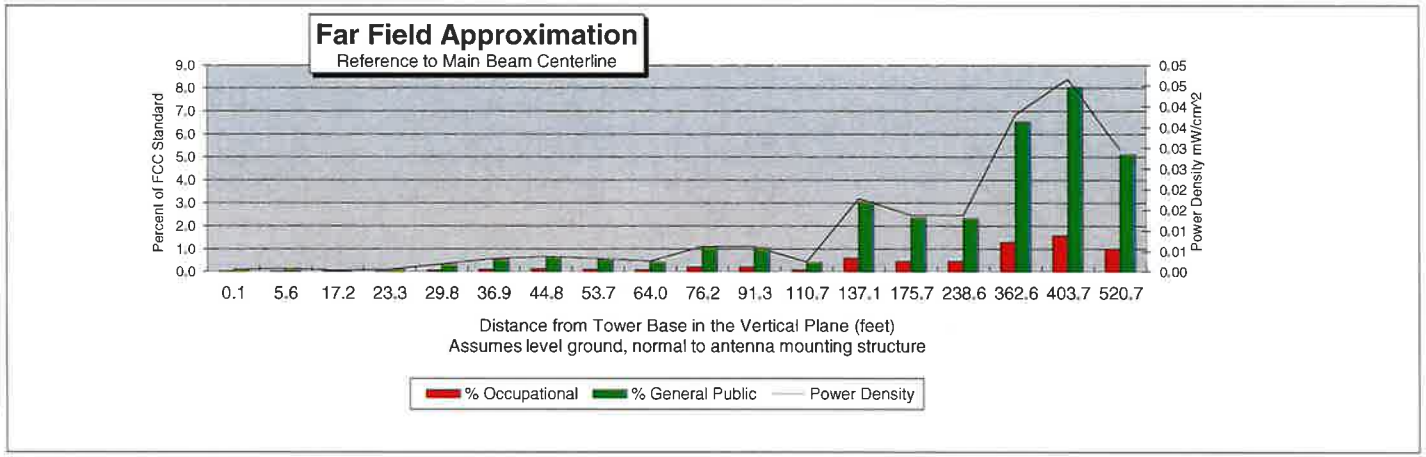
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	New London, CT
Site #:	
Date:	09/08/16
Name:	Ray Paradis
File Name:	New London, CT - FF Power

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**66.9**
Antenna Gain (dBi):	**13.0**
Antenna Size (in.):	**47.4**
Downtilt (degrees):	**5.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	**2952.0**



Calc Angle	90.0	85.0	75.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	9.0	7.0	
Solve for r, dx to antenna	63.9	64.1	66.2	68.0	70.5	73.8	78.0	83.4	90.4	99.5	111.5	127.9	151.3	186.9	247.0	368.2	408.7	524.6	
Distance from Antenna Structure Base in Horizontal plane	0.1	5.6	17.2	23.3	29.8	36.9	44.8	53.7	64.0	76.2	91.3	110.7	137.1	175.7	238.6	362.6	403.7	520.7	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.04	0.05	0.03	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.6	0.5	0.5	1.3	1.6	1.0	
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.3	0.5	0.6	0.6	0.4	1.1	1.1	0.4	3.1	2.4	2.3	6.6	8.0	5.1	

Antenna Type BXA-80063/4CF
Max% 8.05%

Instructions:

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

Far Field Approximation
with downtilt variation

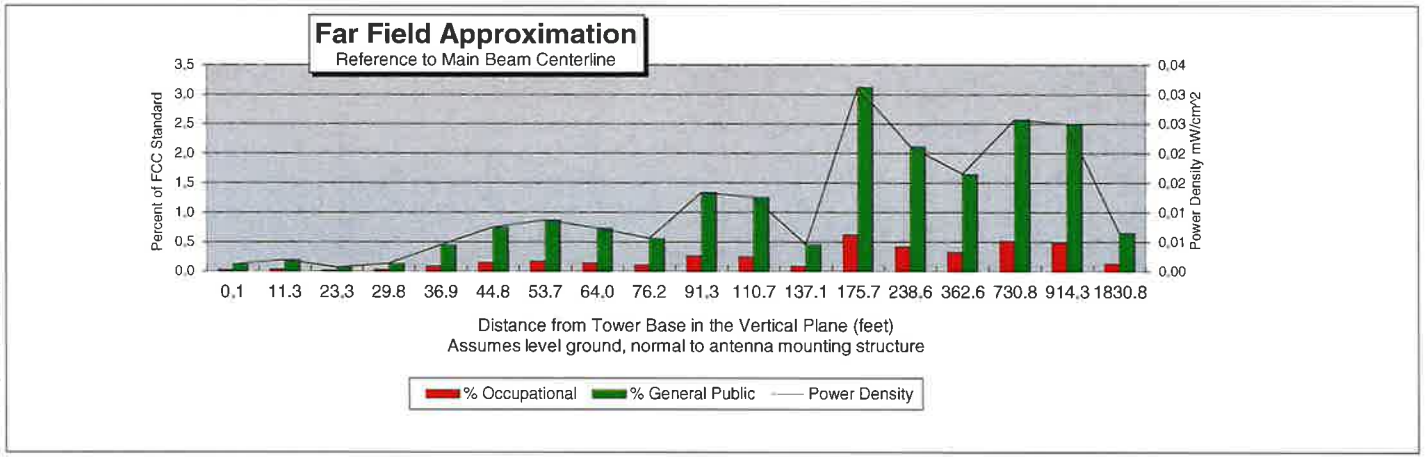
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	New London, CT
Site #:	
Date:	09/08/16
Name:	Ray Paradis
File Name:	New London, CT - FF Power

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**66.9**
Antenna Gain (dBi):	**16.2**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**2.0**
Power @ J4 (w):	3807.51
Number of channels:	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	63.9	64.9	68.0	70.5	73.8	78.0	83.4	90.4	99.5	111.5	127.9	151.3	186.9	247.0	368.2	733.5	916.5	1831.9	
Distance from Antenna Structure Base in Horizontal plane	0.1	11.3	23.3	29.8	36.9	44.8	53.7	64.0	76.2	91.3	110.7	137.1	175.7	238.6	362.6	730.8	914.3	1830.8	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.03	0.02	0.02	0.03	0.02	0.01	
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.1	0.3	0.3	0.1	0.6	0.4	0.3	0.5	0.5	0.1	
Percent of General Population Standard	0.1	0.2	0.1	0.1	0.4	0.8	0.9	0.7	0.6	1.3	1.3	0.5	3.1	2.1	1.6	2.6	2.5	0.7	

Antenna Type SBNHH-1D65B
Max% 3.12%

Instructions:

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

Far Field Approximation
with downtilt variation

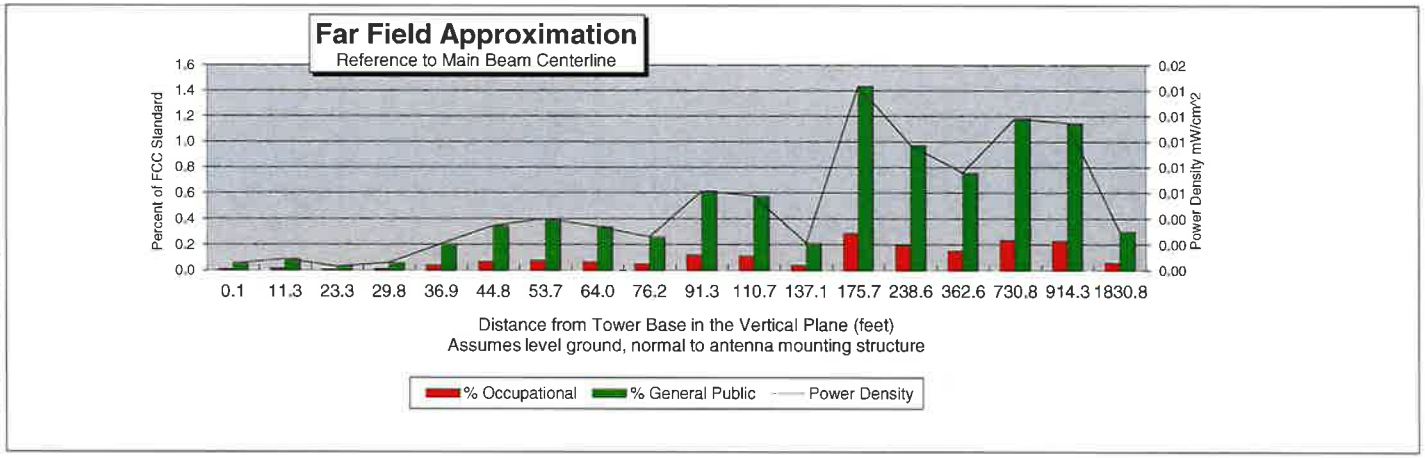
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	New London, CT
Site #:	
Date:	09/08/16
Name:	Ray Paradis
File Name:	New LOndon, CT - FF Power

Operating Freq. (MHz)	2145.0
Antenna Height (ft):	66.9
Antenna Gain (dBi):	16.2
Antenna Size (in.):	72.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	2.0
Power @ J4 (w):	1750
Number of channels:	1



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	63.9	64.9	68.0	70.5	73.8	78.0	83.4	90.4	99.5	111.5	127.9	151.3	186.9	247.0	368.2	733.5	916.5	1831.9
Distance from Antenna Structure Base in Horizontal plane	0.1	11.3	23.3	29.8	36.9	44.8	53.7	64.0	76.2	91.3	110.7	137.1	175.7	238.6	362.6	730.8	914.3	1830.8
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dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.2	0.2	0.2	0.2	0.1
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.2	0.3	0.4	0.3	0.3	0.6	0.6	0.2	1.4	1.0	0.8	1.2	1.1	0.3

Antenna Type SBNHH-1D65B
Max% 1.44%

Instructions:

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

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report and Reinforcement Design

80-ft Existing SSV Lattice Tower

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: New London

59 Westwood Avenue
New London, CT

Centek Project No. 16001.30

Date: September 6, 2016

Prepared for:

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

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

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

The host tower is an 80-ft three-legged, tapered steel self-support lattice tower originally designed and manufactured by Utility Tower Company, circa 1987. The manufacturer's original design documents were not available for reference. The tower geometry, structure member sizes and foundation information were obtained from a previous structural analysis and reinforcement design report prepared by Centek Engineering, Inc., Project No. 13001.CO9, dated March 19, 2013.

Antenna and appurtenance inventory were taken from the aforementioned Centek structural report and a Verizon RF data sheet.

The tower consists of three (3) tapered and one (1) straight vertical steel sections consisting of ASTM A53-Gr B (35ksi) pipe legs. Horizontal and diagonal lateral support bracing consists of ASTM A53-Gr B (35ksi) pipe and ASTM A36 steel angle construction. The vertical tower sections are connected by bolted flange plates while the bracing is connected by bolted and welded connections. The tower face width is 2.50-ft at the top and 7.00-ft at the bottom.

Verizon proposes the removal of nine (9) panel antennas and the installation of nine (9) panel antennas, nine (9) remote radio heads and two (2) main distribution boxes to be mounted to three (3) existing universal sector 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:

- VERIZON (EXISTING TO REMAIN)
  Antennas: Three (3) Antel BXA-80063-4CF panel antennas mounted to three (3) existing 10-ft-6in. universal sector frames with respective RAD center elevations of 67-ft, 72-ft and 77-ft above the tower base.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables.
- VERIZON (EXISTING TO REMOVE)
  Antennas: Three (3) Antel BXA-70063-6CF, three (3) Antel BXA-171063-8BF and three (3) Antel BXA-171063-12CF panel antennas mounted to three (3) existing 10-ft-6in. universal sector frames with respective RAD center elevations of 67-ft, 72-ft and 77-ft above the tower base.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables.

- **VERIZON (PROPOSED):**
  Antennas: Nine (9) Andrew SBNHH-1D65B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads and two (2) RFS DB-T1-6Z-8AB-0Z main distribution boxes mounted to three (3) existing 10-ft-6in universal sector frames with respective RAD center elevations of 67-ft, 72-ft and 77-ft above the tower base.
  Coax Cables: Two (2) 1-5/8" ∅ fiber cables mounted to a leg of the 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 coax cables routed as specified within Section 4 of this report.**
- **All reinforcements per the drawings located in section 4 of this report must be completed prior to the antenna upgrade**

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 of 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:	New London; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	New London; v = 120 mph (3 second gust) equivalent to v = 100 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	Appendix-K wind speed controls.	
Load Cases:	Load Case 1; 100 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 87 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 87 mph wind speed velocity represents 75% of the wind pressure generated by the 100 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 **with the proposed reinforcements outlined in the drawings within section 4 of this report were found** to be within allowable limits. In Load Case 1, per tnxtower "Section Capacity Table", this tower was found to be at **99.4%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T2)	40'-0"-60'-0"	99.4%	**PASS**
Diagonal (T1)	60'-0"-80'-0"	78.1%	**PASS**
Bottom Girt (T2)	40'-0"-60'-0"	28.1%	**PASS**

Foundation and Anchors

The existing foundation system consists of a 14-ft square by 5.0-ft thick concrete mat. The foundation information system was based on the aforementioned Centek structural report and reinforcement design. The existing anchor bolts are embedded within 2-ft square concrete foundation caps and were assumed to conform to ASTM A36.

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

Reactions	Vector	Proposed Base Reactions
Base	Shear	**9 kips**
	Compression	**6 kips**
	Moment	**490 kip-ft**
Leg	Shear	**7 kips**
	Uplift	**78 kips**
	Compression	**83 kips**

- The existing foundation system was found to be within allowable limits.

Foundation	Design Limit	Allowable Limit/FS	Proposed Loading	Result
Concrete Mat Foundation	Bearing Pressure	4.0ksf [3]	2.06ksf	**PASS**
	OM[4]	2.0 [2]	2.36[2]	**PASS**

Note 2: Min required Factor of Safety (FS) of 2.0 required per IBC 2003/2005 CSBC Section 3108.4.2.
Note 3: Allowable soil bearing pressure may be increased by 1/3rd for transient load effects.
Note 4: OM denotes Overturning Moment

Conclusion

This analysis shows that the subject tower **with the proposed reinforcements outlined in the drawings within section 4 of this report 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:

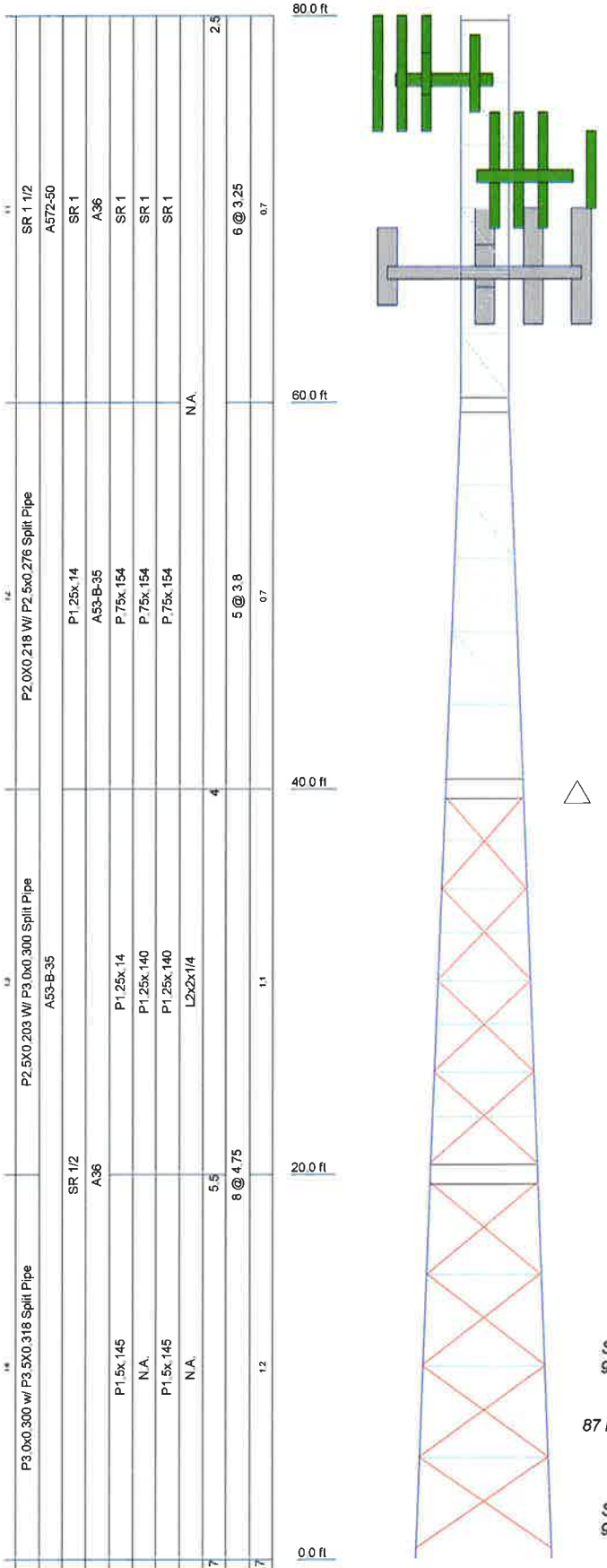
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or 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

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

RISATower Features:

- RISATower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- RISATower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.



Legs	P3.0x0.300 w/ P3.5X0.318 Split Pipe		P2.5X0.203 W/ P3.0x0.300 Split Pipe		P2.0X0.218 W/ P2.5x0.276 Split Pipe					SR 1 1/2
Leg Grade			A53-B-35							A572-50
Diagonals		SR 1/2			P1.25x.14					SR 1
Diagonal Grade		A36			A53-B-35					A36
Top Girts	P1.5x.145		P1.25x.14		P.75x.154					SR 1
Bottom Girts	N.A.		P1.25x.140		P.75x.154					SR 1
Horizontals	P1.5x.145		P1.25x.140		P.75x.154					SR 1
Sec. Horizontals	N.A.		L2x2x1/4		N.A.					
Face Width (ft)	7	5.5	4							2.5
# Panels @ (ft)		8 @ 4.75			5 @ 3.8					6 @ 3.25
Weight (K)	3.7	1.2	1.1		0.7					0.7

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
BXA-80063/4CF (Verizon - Existing)	77	Pirod 10' PCS Frame (1) (Verizon - Existing)	72
SBNHH-1D65B (Verizon - Proposed)	77	SBNHH-1D65B (Verizon - Proposed)	72
SBNHH-1D65B (Verizon - Proposed)	77	SBNHH-1D65B (Verizon - Proposed)	67
SBNHH-1D65B (Verizon - Proposed)	77	SBNHH-1D65B (Verizon - Proposed)	67
RRH4x30-B13 (Verizon - Proposed)	77	RRH2x60-PCS (Verizon - Proposed)	67
RRH4x45/2x90-AWS (Verizon - Proposed)	77	RRH4x30-B13 (Verizon - Proposed)	67
RRH2x60-PCS (Verizon - Proposed)	77	BXA-80063/4CF (Verizon - Existing)	67
Pirod 10' PCS Frame (1) (Verizon - Existing)	77	Pirod 10' PCS Frame (1) (Verizon - Existing)	67
RRH4x30-B13 (Verizon - Proposed)	72	SBNHH-1D65B (Verizon - Proposed)	67
BXA-80063/4CF (Verizon - Existing)	72	RRH4x45/2x90-AWS (Verizon - Proposed)	67
RRH4x45/2x90-AWS (Verizon - Proposed)	72	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	65
SBNHH-1D65B (Verizon - Proposed)	72	DB-T1-6Z-8AB-0Z (Verizon - Proposed)	65
RRH2x60-PCS (Verizon - Proposed)	72		
SBNHH-1D65B (Verizon - Proposed)	72		

MATERIAL STRENGTH

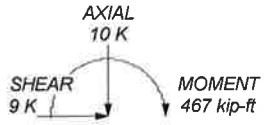
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A53-B-35	35 ksi	63 ksi
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

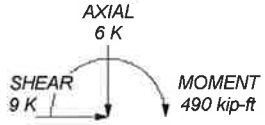
1. Tower designed for a 100 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 87 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, 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: 99.4%

MAX. CORNER REACTIONS AT BASE:
DOWN: 83 K
SHEAR: 4 K

UPLIFT: -78 K
SHEAR: 7 K



TORQUE 0 kip-ft
87 mph WIND - 0.5000 in ICE

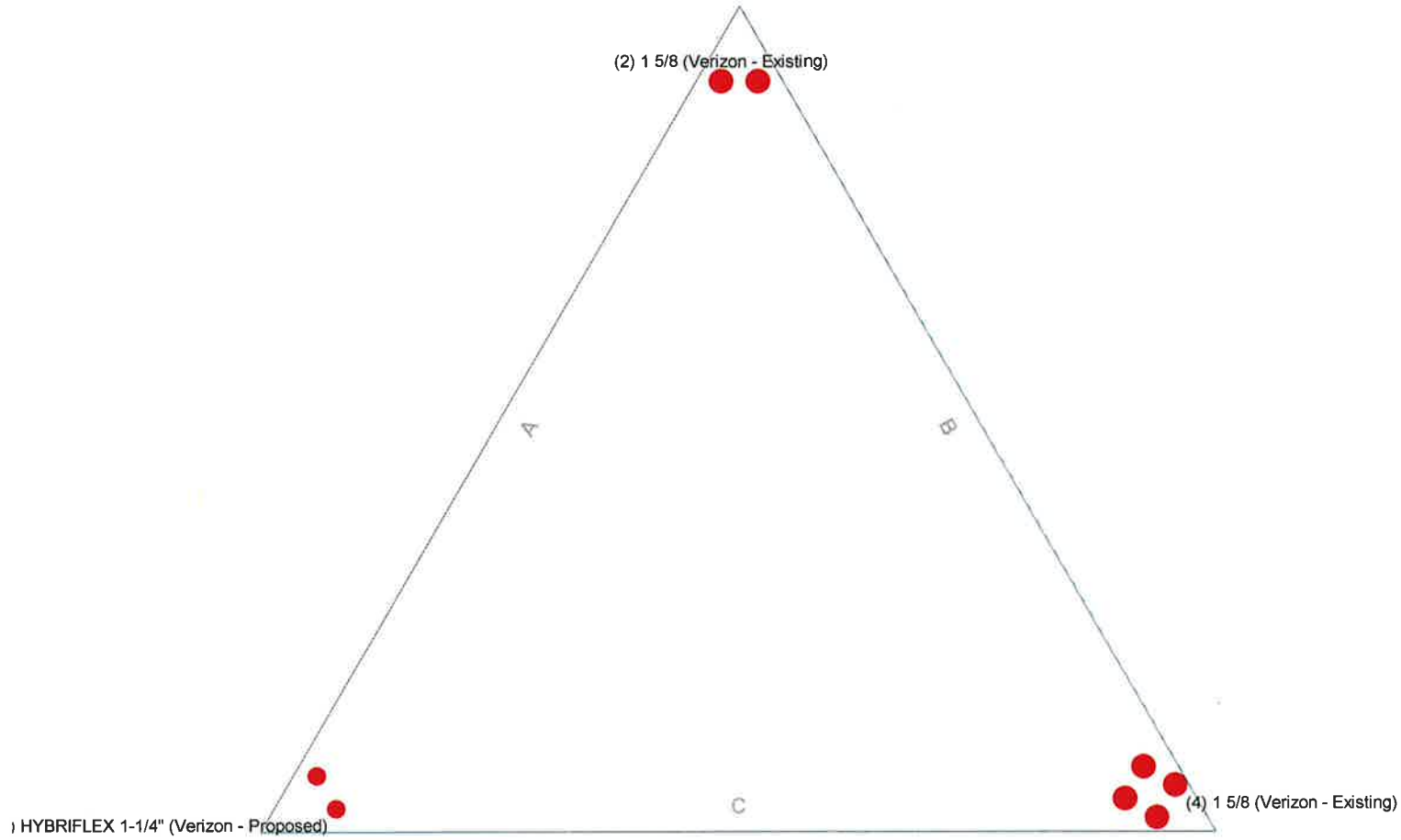


TORQUE 1 kip-ft
REACTIONS - 100 mph WIND

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

Job: *16001.30 - New London*			
Project: *80-ft SSV Lattice Tower - Westwood Ave., New London,*			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 09/06/16	Scale: NTS	
Path:		Dwg No. E-1	

Round Flat App In Face App Out Face



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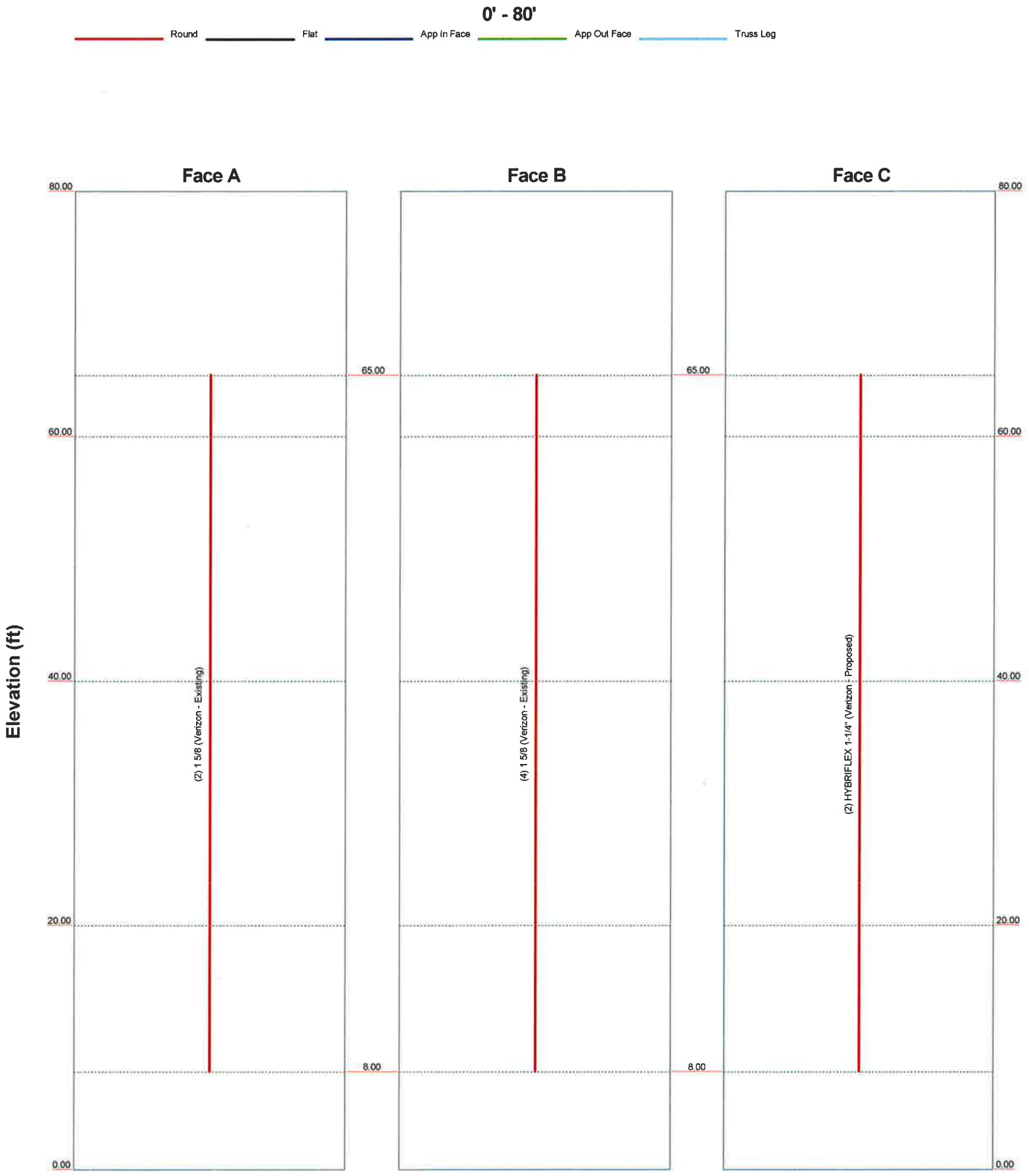
FAX: (203) 488-8587

Job: **16001.30 - New London**		
Project: ***80-ft SSV Lattice Tower - Westwood Ave., New London,***		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 09/06/16	Scale: NTS
Path:		Dwg No. E-7



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Job:	***16001.30 - New London***		
Project:	***80-ft SSV Lattice Tower - Westwood Ave., New London,***		
Client: Verizon Wireless		Drawn by: TJL	App'd:
Code: TIA/EIA-222-F		Date: 09/06/16	Scale: NTS
Path:			Dwg No. E-7

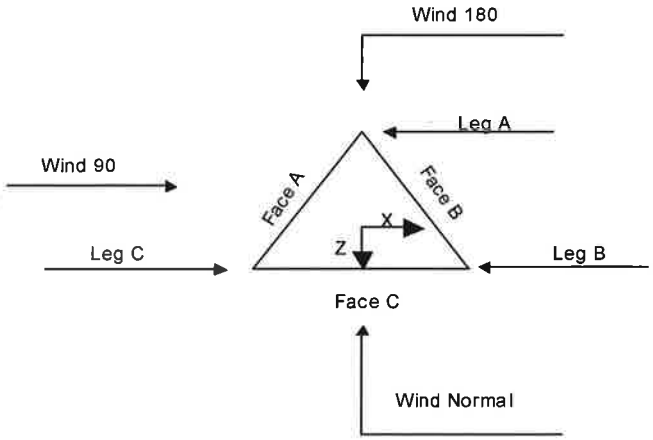
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 80.00 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 2.50 ft at the top and 7.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 100 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 87 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..
Tension only take-up is 0.0313 in.
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	80.00-60.00			2.50	1	20.00
T2	60.00-40.00			2.50	1	20.00
T3	40.00-20.00			4.00	1	20.00
T4	20.00-0.00			5.50	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	80.00-60.00	3.25	K Brace Right	No	Yes	3.0000	3.0000
T2	60.00-40.00	3.80	K Brace Left	No	Yes	6.0000	6.0000
T3	40.00-20.00	4.75	TX Brace	No	Yes	6.0000	6.0000
T4	20.00-0.00	4.75	TX Brace	No	Yes	6.0000	6.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 80.00-60.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	1	A36 (36 ksi)
T2 60.00-40.00	Arbitrary Shape	P2.0X0.218 W/ P2.5x0.276 Split Pipe	A53-B-35 (35 ksi)	Pipe	P1.25x.14	A53-B-35 (35 ksi)
T3 40.00-20.00	Arbitrary Shape	P2.5X0.203 W/ P3.0x0.300 Split Pipe	A53-B-35 (35 ksi)	Solid Round	1/2	A36 (36 ksi)
T4 20.00-0.00	Arbitrary Shape	P3.0x0.300 w/ P3.5X0.318 Split Pipe	A53-B-35 (35 ksi)	Solid Round	1/2	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 80.00-60.00	Solid Round	1	A36 (36 ksi)	Solid Round	1	A36 (36 ksi)
T2 60.00-40.00	Pipe	P.75x.154	A53-B-35 (35 ksi)	Pipe	P.75x.154	A53-B-35 (35 ksi)
T3 40.00-20.00	Pipe	P1.25x.14	A53-B-35 (35 ksi)	Pipe	P1.25x.140	A53-B-35 (35 ksi)
T4 20.00-0.00	Pipe	P1.5x.145	A53-B-35 (35 ksi)	Pipe		A53-B-35 (35 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 80.00-60.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	1	A36 (36 ksi)
T2 60.00-40.00	None	Single Angle		A36 (36 ksi)	Pipe	P.75x.154	A53-B-35 (35 ksi)
T3 40.00-20.00	None	Single Angle		A36 (36 ksi)	Pipe	P1.25x.140	A53-B-35 (35 ksi)
T4 20.00-0.00	None	Single Angle		A36 (36 ksi)	Pipe	P1.5x.145	A53-B-35 (35 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 40.00-20.00	Equal Angle	L2x2x1/4	A36 (36 ksi)	Single 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 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 20.00-0.00	0.00	0.0000	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	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	1	1
T4 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
				1	1	1	1	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 Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 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
T2 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
T3 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
T4 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		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 80.00-60.00	Flange	0.6250 A325N	4	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 60.00-40.00	Flange	0.6250 A325N	4	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 40.00-20.00	Flange	0.7500 A325N	4	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 20.00-0.00	Flange	0.7500 A449	0	1.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon - Existing)	A	No	Ar (Leg)	65.00 - 8.00	0.0000	0.08	2	1	1.0000	1.9800		1.04
1 5/8 (Verizon - Existing)	B	No	Ar (Leg)	65.00 - 8.00	0.0000	0.08	4	2	1.0000	1.9800		1.04
HYBRIFLEX 1-1/4" (Verizon - Proposed)	C	No	Ar (Leg)	65.00 - 8.00	0.0000	0.08	2	1	1.5400	1.5400		1.30

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	80.00-60.00	A	1.467	0.000	0.000	0.000	0.01
		B	2.475	0.000	0.000	0.000	0.02
		C	2.292	0.000	0.000	0.000	0.01
T2	60.00-40.00	A	5.867	0.000	0.000	0.000	0.04
		B	9.900	0.000	0.000	0.000	0.08
		C	9.167	0.000	0.000	0.000	0.05
T3	40.00-20.00	A	5.867	0.000	0.000	0.000	0.04
		B	9.900	0.000	0.000	0.000	0.08
		C	9.167	0.000	0.000	0.000	0.05
T4	20.00-0.00	A	3.520	0.000	0.000	0.000	0.02
		B	5.940	0.000	0.000	0.000	0.05
		C	5.500	0.000	0.000	0.000	0.03

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	80.00-60.00	A	0.500	2.300	0.000	0.000	0.000	0.03
		B		2.483	1.242	0.000	0.000	0.06
		C		2.300	1.242	0.000	0.000	0.03
T2	60.00-40.00	A	0.500	9.200	0.000	0.000	0.000	0.10
		B		9.933	4.967	0.000	0.000	0.23
		C		9.200	4.967	0.000	0.000	0.10
T3	40.00-20.00	A	0.500	9.200	0.000	0.000	0.000	0.10
		B		9.933	4.967	0.000	0.000	0.23
		C		9.200	4.967	0.000	0.000	0.10
T4	20.00-0.00	A	0.500	5.520	0.000	0.000	0.000	0.06
		B		5.960	2.980	0.000	0.000	0.14
		C		5.520	2.980	0.000	0.000	0.06

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	80.00-60.00	0.4172	0.1533	0.0434	-0.0251
T2	60.00-40.00	1.0230	0.3758	0.1274	-0.0736
T3	40.00-20.00	1.1728	0.4309	0.1380	-0.0797
T4	20.00-0.00	1.0300	0.3784	0.1219	-0.0704

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-80063/4CF	A	From Leg	2.00	0.0000	67.00	No Ice	5.16	2.25	0.01
(Verizon - Existing)			-5.00			1/2" Ice	5.55	2.55	0.04
			0.00						
SBNHH-1D65B	A	From Leg	2.00	0.0000	67.00	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	2.00	0.0000	67.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			2.50			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	A	From Leg	2.00	0.0000	67.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			5.00			1/2" Ice	8.88	5.79	0.09
			0.00						
BXA-80063/4CF	B	From Leg	2.00	0.0000	72.00	No Ice	5.16	2.25	0.01
(Verizon - Existing)			-5.00			1/2" Ice	5.55	2.55	0.04
			0.00						
SBNHH-1D65B	B	From Leg	2.00	0.0000	72.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			0.00			1/2" Ice	8.88	5.79	0.09

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						
SBNHH-1D65B	B	From Leg	2.00	0.0000	72.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			2.50			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	B	From Leg	2.00	0.0000	72.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			5.00			1/2" Ice	8.88	5.79	0.09
			0.00						
BXA-80063/4CF	C	From Leg	2.00	0.0000	77.00	No Ice	5.16	2.25	0.01
(Verizon - Existing)			-5.00			1/2" Ice	5.55	2.55	0.04
			0.00						
SBNHH-1D65B	C	From Leg	2.00	0.0000	77.00	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	2.00	0.0000	77.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			2.50			1/2" Ice	8.88	5.79	0.09
			0.00						
SBNHH-1D65B	C	From Leg	2.00	0.0000	77.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			5.00			1/2" Ice	8.88	5.79	0.09
			0.00						
RRH4x30-B13	A	From Leg	2.00	0.0000	67.00	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	2.00	0.0000	72.00	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	2.00	0.0000	77.00	No Ice	2.52	1.89	0.06
(Verizon - Proposed)			0.00			1/2" Ice	2.74	2.09	0.08
			0.00						
RRH4x45/2x90-AWS	A	From Leg	2.00	0.0000	67.00	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			0.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH4x45/2x90-AWS	B	From Leg	2.00	0.0000	72.00	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			0.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH4x45/2x90-AWS	C	From Leg	2.00	0.0000	77.00	No Ice	3.01	1.91	0.08
(Verizon - Proposed)			0.00			1/2" Ice	3.26	2.13	0.10
			0.00						
RRH2x60-PCS	A	From Leg	2.00	0.0000	67.00	No Ice	0.00	1.55	0.06
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.74	0.07
			0.00						
RRH2x60-PCS	B	From Leg	2.00	0.0000	72.00	No Ice	0.00	1.55	0.06
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.74	0.07
			0.00						
RRH2x60-PCS	C	From Leg	2.00	0.0000	77.00	No Ice	0.00	1.55	0.06
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.74	0.07
			0.00						
DB-T1-6Z-8AB-0Z	A	From Leg	2.00	0.0000	65.00	No Ice	0.00	2.33	0.04
(Verizon - Proposed)			0.00			1/2" Ice	0.00	2.56	0.08
			0.00						
DB-T1-6Z-8AB-0Z	B	From Leg	2.00	0.0000	65.00	No Ice	0.00	2.33	0.04
(Verizon - Proposed)			0.00			1/2" Ice	0.00	2.56	0.08
			0.00						
Pirod 10' PCS Frame (1)	A	From Leg	1.00	0.0000	67.00	No Ice	9.00	9.00	0.25
(Verizon - Existing)			0.00			1/2" Ice	13.20	13.20	0.35
			0.00						
Pirod 10' PCS Frame (1)	B	From Leg	1.00	0.0000	72.00	No Ice	9.00	9.00	0.25
(Verizon - Existing)			0.00			1/2" Ice	13.20	13.20	0.35

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
Pirod 10' PCS Frame (1)	C	From Leg	0.00 1.00 0.00	0.0000	77.00	No Ice	9.00	9.00	0.25
(Verizon - Existing)			0.00			1/2" Ice	13.20	13.20	0.35

Tower Pressures - No Ice

$G_H = 1.179$

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 80.00-60.00	70.00	1.24	32	52.500	A	0.000	9.800	5.000	51.02	0.000	0.000
					B	0.000	10.808		46.26	0.000	0.000
					C	0.000	10.625		47.06	0.000	0.000
T2 60.00-40.00	50.00	1.126	29	69.177	A	8.926	10.706	8.926	45.47	0.000	0.000
					B	8.926	14.740		37.72	0.000	0.000
					C	8.926	14.006		38.92	0.000	0.000
T3 40.00-20.00	30.00	1	26	100.854	A	2.968	22.731	11.678	45.44	0.000	0.000
					B	2.968	26.765		39.28	0.000	0.000
					C	2.968	26.031		40.27	0.000	0.000
T4 20.00-0.00	10.00	1	26	130.837	A	0.000	22.619	12.942	57.22	0.000	0.000
					B	0.000	25.039		51.69	0.000	0.000
					C	0.000	24.599		52.61	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.179$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	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 80.00-60.00	70.00	1.24	24	0.5000	54.167	A	0.000	17.299	8.333	48.17	0.000	0.000
						B	1.242	17.483		44.51	0.000	0.000
						C	1.242	17.299		44.95	0.000	0.000
T2 60.00-40.00	50.00	1.126	22	0.5000	70.845	A	11.151	17.514	11.151	38.90	0.000	0.000
						B	16.117	18.247		32.45	0.000	0.000
						C	16.117	17.514		33.16	0.000	0.000
T3 40.00-20.00	30.00	1	19	0.5000	102.521	A	2.968	36.949	15.014	37.61	0.000	0.000
						B	7.934	37.683		32.91	0.000	0.000
						C	7.934	36.949		33.45	0.000	0.000
T4 20.00-0.00	10.00	1	19	0.5000	132.505	A	0.000	34.874	16.279	46.68	0.000	0.000
						B	2.980	35.314		42.51	0.000	0.000
						C	2.980	34.874		43.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.179$

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 80.00-60.00	70.00	1.24	8	52.500	A	0.000	9.800	5.000	51.02	0.000	0.000
					B	0.000	10.808		46.26	0.000	0.000
					C	0.000	10.625		47.06	0.000	0.000
T2 60.00-40.00	50.00	1.126	7	69.177	A	8.926	10.706	8.926	45.47	0.000	0.000
					B	8.926	14.740		37.72	0.000	0.000
					C	8.926	14.006		38.92	0.000	0.000
T3 40.00-20.00	30.00	1	6	100.854	A	2.968	22.731	11.678	45.44	0.000	0.000
					B	2.968	26.765		39.28	0.000	0.000
					C	2.968	26.031		40.27	0.000	0.000
T4 20.00-0.00	10.00	1	6	130.837	A	0.000	22.619	12.942	57.22	0.000	0.000
					B	0.000	25.039		51.69	0.000	0.000
					C	0.000	24.599		52.61	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 80.00-60.00	0.04	0.70	A	0.187	2.641	0.588	1	1	5.760	0.62	30.81	B
			B	0.206	2.577	0.592	1	1	6.394			
			C	0.202	2.588	0.591	1	1	6.278			
T2 60.00-40.00	0.18	0.72	A	0.284	2.34	0.611	1	1	15.469	1.35	67.75	B
			B	0.342	2.19	0.63	1	1	18.208			
			C	0.332	2.216	0.626	1	1	17.695			
T3 40.00-20.00	0.18	1.11	A	0.255	2.423	0.603	1	1	16.677	1.35	67.64	B
			B	0.295	2.31	0.614	1	1	19.410			
			C	0.288	2.33	0.612	1	1	18.903			
T4 20.00-0.00	0.11	1.19	A	0.173	2.689	0.585	1	1	13.237	1.17	58.38	B
			B	0.191	2.625	0.589	1	1	14.740			
			C	0.188	2.637	0.588	1	1	14.465			
Sum Weight:	0.50	3.72						OTM	163.15 kip-ft	4.49		

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 80.00-60.00	0.04	0.70	A	0.187	2.641	0.588	0.825	1	5.760	0.62	30.81	B
			B	0.206	2.577	0.592	0.825	1	6.394			
			C	0.202	2.588	0.591	0.825	1	6.278			
T2 60.00-40.00	0.18	0.72	A	0.284	2.34	0.611	0.825	1	13.907	1.24	61.93	B
			B	0.342	2.19	0.63	0.825	1	16.646			

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
			C	0.332	2.216	0.626	0.825	1	16.133			
T3	0.18	1.11	A	0.255	2.423	0.603	0.825	1	16.158	1.32	65.83	B
40.00-20.00			B	0.295	2.31	0.614	0.825	1	18.891			
			C	0.288	2.33	0.612	0.825	1	18.384			
T4 20.00-0.00	0.11	1.19	A	0.173	2.689	0.585	0.825	1	13.237	1.17	58.38	B
			B	0.191	2.625	0.589	0.825	1	14.740			
			C	0.188	2.637	0.588	0.825	1	14.465			
Sum Weight:	0.50	3.72						OTM	156.25 kip-ft	4.34		

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	0.04	0.70	A	0.187	2.641	0.588	0.8	1	5.760	0.62	30.81	B
80.00-60.00			B	0.206	2.577	0.592	0.8	1	6.394			
			C	0.202	2.588	0.591	0.8	1	6.278			
T2	0.18	0.72	A	0.284	2.34	0.611	0.8	1	13.683	1.22	61.10	B
60.00-40.00			B	0.342	2.19	0.63	0.8	1	16.422			
			C	0.332	2.216	0.626	0.8	1	15.910			
T3	0.18	1.11	A	0.255	2.423	0.603	0.8	1	16.084	1.31	65.58	B
40.00-20.00			B	0.295	2.31	0.614	0.8	1	18.816			
			C	0.288	2.33	0.612	0.8	1	18.310			
T4 20.00-0.00	0.11	1.19	A	0.173	2.689	0.585	0.8	1	13.237	1.17	58.38	B
			B	0.191	2.625	0.589	0.8	1	14.740			
			C	0.188	2.637	0.588	0.8	1	14.465			
Sum Weight:	0.50	3.72						OTM	155.26 kip-ft	4.32		

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	0.04	0.70	A	0.187	2.641	0.588	0.85	1	5.760	0.62	30.81	B
80.00-60.00			B	0.206	2.577	0.592	0.85	1	6.394			
			C	0.202	2.588	0.591	0.85	1	6.278			
T2	0.18	0.72	A	0.284	2.34	0.611	0.85	1	14.130	1.26	62.76	B
60.00-40.00			B	0.342	2.19	0.63	0.85	1	16.869			
			C	0.332	2.216	0.626	0.85	1	16.356			
T3	0.18	1.11	A	0.255	2.423	0.603	0.85	1	16.232	1.32	66.09	B
40.00-20.00			B	0.295	2.31	0.614	0.85	1	18.965			
			C	0.288	2.33	0.612	0.85	1	18.458			
T4 20.00-0.00	0.11	1.19	A	0.173	2.689	0.585	0.85	1	13.237	1.17	58.38	B
			B	0.191	2.625	0.589	0.85	1	14.740			
			C	0.188	2.637	0.588	0.85	1	14.465			
Sum Weight:	0.50	3.72						OTM	157.23 kip-ft	4.36		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.11	0.89	A	0.319	2.246	0.622	1	1	10.761	0.75	37.56	B
80.00-60.00			B	0.346	2.182	0.631	1	1	12.272			
			C	0.342	2.19	0.63	1	1	12.136			
T2	0.44	1.11	A	0.405	2.055	0.653	1	1	22.596	1.40	70.24	B
60.00-40.00			B	0.485	1.92	0.69	1	1	28.708			
			C	0.475	1.935	0.685	1	1	28.113			
T3	0.44	1.63	A	0.389	2.085	0.647	1	1	26.885	1.49	74.49	B
40.00-20.00			B	0.445	1.982	0.671	1	1	33.218			
			C	0.438	1.994	0.668	1	1	32.607			
T4 20.00-0.00	0.26	1.74	A	0.263	2.399	0.605	1	1	21.110	1.30	64.77	B
			B	0.289	2.326	0.613	1	1	24.613			
			C	0.286	2.335	0.612	1	1	24.309			
Sum Weight:	1.25	5.37						OTM	180.47 kip-ft	4.94		

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	0.11	0.89	A	0.319	2.246	0.622	0.825	1	10.761	0.74	36.89	B
80.00-60.00			B	0.346	2.182	0.631	0.825	1	12.055			
			C	0.342	2.19	0.63	0.825	1	11.919			
T2	0.44	1.11	A	0.405	2.055	0.653	0.825	1	20.645	1.27	63.34	B
60.00-40.00			B	0.485	1.92	0.69	0.825	1	25.887			
			C	0.475	1.935	0.685	0.825	1	25.293			
T3	0.44	1.63	A	0.389	2.085	0.647	0.825	1	26.366	1.43	71.38	B
40.00-20.00			B	0.445	1.982	0.671	0.825	1	31.830			
			C	0.438	1.994	0.668	0.825	1	31.219			
T4 20.00-0.00	0.26	1.74	A	0.263	2.399	0.605	0.825	1	21.110	1.27	63.40	B
			B	0.289	2.326	0.613	0.825	1	24.091			
			C	0.286	2.335	0.612	0.825	1	23.788			
Sum Weight:	1.25	5.37						OTM	170.49 kip-ft	4.70		

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	0.11	0.89	A	0.319	2.246	0.622	0.8	1	10.761	0.74	36.80	B
80.00-60.00			B	0.346	2.182	0.631	0.8	1	12.024			
			C	0.342	2.19	0.63	0.8	1	11.888			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T2	0.44	1.11	A	0.405	2.055	0.653	0.8	1	20.366	1.25	62.35	B
60.00-40.00			B	0.485	1.92	0.69	0.8	1	25.485			
			C	0.475	1.935	0.685	0.8	1	24.890			
T3	0.44	1.63	A	0.389	2.085	0.647	0.8	1	26.292	1.42	70.94	B
40.00-20.00			B	0.445	1.982	0.671	0.8	1	31.631			
			C	0.438	1.994	0.668	0.8	1	31.020			
T4 20.00-0.00	0.26	1.74	A	0.263	2.399	0.605	0.8	1	21.110	1.26	63.20	B
			B	0.289	2.326	0.613	0.8	1	24.017			
			C	0.286	2.335	0.612	0.8	1	23.713			
Sum Weight:	1.25	5.37						OTM	169.07 kip-ft	4.67		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.11	0.89	A	0.319	2.246	0.622	0.85	1	10.761	0.74	36.99	B
80.00-60.00			B	0.346	2.182	0.631	0.85	1	12.086			
			C	0.342	2.19	0.63	0.85	1	11.950			
T2	0.44	1.11	A	0.405	2.055	0.653	0.85	1	20.923	1.29	64.32	B
60.00-40.00			B	0.485	1.92	0.69	0.85	1	26.290			
			C	0.475	1.935	0.685	0.85	1	25.696			
T3	0.44	1.63	A	0.389	2.085	0.647	0.85	1	26.440	1.44	71.83	B
40.00-20.00			B	0.445	1.982	0.671	0.85	1	32.028			
			C	0.438	1.994	0.668	0.85	1	31.417			
T4 20.00-0.00	0.26	1.74	A	0.263	2.399	0.605	0.85	1	21.110	1.27	63.60	B
			B	0.289	2.326	0.613	0.85	1	24.166			
			C	0.286	2.335	0.612	0.85	1	23.862			
Sum Weight:	1.25	5.37						OTM	171.92 kip-ft	4.73		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.04	0.70	A	0.187	2.641	0.588	1	1	5.760	0.15	7.70	B
80.00-60.00			B	0.206	2.577	0.592	1	1	6.394			
			C	0.202	2.588	0.591	1	1	6.278			
T2	0.18	0.72	A	0.284	2.34	0.611	1	1	15.469	0.34	16.94	B
60.00-40.00			B	0.342	2.19	0.63	1	1	18.208			
			C	0.332	2.216	0.626	1	1	17.695			
T3	0.18	1.11	A	0.255	2.423	0.603	1	1	16.677	0.34	16.91	B
40.00-20.00			B	0.295	2.31	0.614	1	1	19.410			
			C	0.288	2.33	0.612	1	1	18.903			
T4 20.00-0.00	0.11	1.19	A	0.173	2.689	0.585	1	1	13.237	0.29	14.59	B
			B	0.191	2.625	0.589	1	1	14.740			
			C	0.188	2.637	0.588	1	1	14.465			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	0.50	3.72						OTM	40.79 kip-ft	1.12		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.04	0.70	A	0.187	2.641	0.588	0.825	1	5.760	0.15	7.70	B
80.00-60.00			B	0.206	2.577	0.592	0.825	1	6.394			
			C	0.202	2.588	0.591	0.825	1	6.278			
T2	0.18	0.72	A	0.284	2.34	0.611	0.825	1	13.907	0.31	15.48	B
60.00-40.00			B	0.342	2.19	0.63	0.825	1	16.646			
			C	0.332	2.216	0.626	0.825	1	16.133			
T3	0.18	1.11	A	0.255	2.423	0.603	0.825	1	16.158	0.33	16.46	B
40.00-20.00			B	0.295	2.31	0.614	0.825	1	18.891			
			C	0.288	2.33	0.612	0.825	1	18.384			
T4 20.00-0.00	0.11	1.19	A	0.173	2.689	0.585	0.825	1	13.237	0.29	14.59	B
			B	0.191	2.625	0.589	0.825	1	14.740			
			C	0.188	2.637	0.588	0.825	1	14.465			
Sum Weight:	0.50	3.72						OTM	39.06 kip-ft	1.08		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.04	0.70	A	0.187	2.641	0.588	0.8	1	5.760	0.15	7.70	B
80.00-60.00			B	0.206	2.577	0.592	0.8	1	6.394			
			C	0.202	2.588	0.591	0.8	1	6.278			
T2	0.18	0.72	A	0.284	2.34	0.611	0.8	1	13.683	0.31	15.28	B
60.00-40.00			B	0.342	2.19	0.63	0.8	1	16.422			
			C	0.332	2.216	0.626	0.8	1	15.910			
T3	0.18	1.11	A	0.255	2.423	0.603	0.8	1	16.084	0.33	16.39	B
40.00-20.00			B	0.295	2.31	0.614	0.8	1	18.816			
			C	0.288	2.33	0.612	0.8	1	18.310			
T4 20.00-0.00	0.11	1.19	A	0.173	2.689	0.585	0.8	1	13.237	0.29	14.59	B
			B	0.191	2.625	0.589	0.8	1	14.740			
			C	0.188	2.637	0.588	0.8	1	14.465			
Sum Weight:	0.50	3.72						OTM	38.82 kip-ft	1.08		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.04	0.70	A	0.187	2.641	0.588	0.85	1	5.760	0.15	7.70	B
80.00-60.00			B	0.206	2.577	0.592	0.85	1	6.394			
			C	0.202	2.588	0.591	0.85	1	6.278			
T2	0.18	0.72	A	0.284	2.34	0.611	0.85	1	14.130	0.31	15.69	B
60.00-40.00			B	0.342	2.19	0.63	0.85	1	16.869			
			C	0.332	2.216	0.626	0.85	1	16.356			
T3	0.18	1.11	A	0.255	2.423	0.603	0.85	1	16.232	0.33	16.52	B
40.00-20.00			B	0.295	2.31	0.614	0.85	1	18.965			
			C	0.288	2.33	0.612	0.85	1	18.458			
T4 20.00-0.00	0.11	1.19	A	0.173	2.689	0.585	0.85	1	13.237	0.29	14.59	B
			B	0.191	2.625	0.589	0.85	1	14.740			
			C	0.188	2.637	0.588	0.85	1	14.465			
Sum Weight:	0.50	3.72						OTM	39.31 kip-ft	1.09		

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	2.35					
Bracing Weight	1.37					
Total Member Self-Weight	3.72			0.09	-0.28	
Total Weight	6.05			0.09	-0.28	
Wind 0 deg - No Ice		0.04	-8.92	-480.03	-3.97	0.52
Wind 30 deg - No Ice		4.46	-7.63	-412.43	-244.15	0.48
Wind 45 deg - No Ice		6.27	-6.23	-337.13	-342.56	0.41
Wind 60 deg - No Ice		7.64	-4.41	-239.22	-417.28	0.32
Wind 90 deg - No Ice		8.85	-0.04	-3.60	-481.64	0.08
Wind 120 deg - No Ice		7.75	4.42	236.96	-420.43	-0.19
Wind 135 deg - No Ice		6.21	6.17	332.10	-337.35	-0.30
Wind 150 deg - No Ice		4.39	7.59	408.92	-237.77	-0.40
Wind 180 deg - No Ice		-0.04	8.75	472.32	3.40	-0.50
Wind 210 deg - No Ice		-4.46	7.63	412.60	243.58	-0.48
Wind 225 deg - No Ice		-6.27	6.23	337.31	341.99	-0.41
Wind 240 deg - No Ice		-7.79	4.50	243.34	423.54	-0.33
Wind 270 deg - No Ice		-8.85	0.04	3.77	481.07	-0.08
Wind 300 deg - No Ice		-7.60	-4.34	-232.84	413.03	0.18
Wind 315 deg - No Ice		-6.21	-6.17	-331.92	336.78	0.30
Wind 330 deg - No Ice		-4.39	-7.59	-408.74	237.20	0.40
Member Ice	1.64					
Total Weight Ice	9.51			0.26	-0.93	
Wind 0 deg - Ice		0.03	-8.83	-458.47	-3.89	0.17
Wind 30 deg - Ice		4.36	-7.48	-391.08	-231.39	0.11
Wind 45 deg - Ice		6.13	-6.09	-319.14	-324.31	0.07
Wind 60 deg - Ice		7.46	-4.30	-225.96	-394.68	0.03
Wind 90 deg - Ice		8.66	-0.03	-2.69	-456.73	-0.06
Wind 120 deg - Ice		7.67	4.38	227.07	-401.60	-0.14
Wind 135 deg - Ice		6.08	6.05	315.49	-320.14	-0.16
Wind 150 deg - Ice		4.30	7.45	388.65	-226.27	-0.17
Wind 180 deg - Ice		-0.03	8.55	447.59	2.02	-0.16
Wind 210 deg - Ice		-4.36	7.48	391.60	229.53	-0.11
Wind 225 deg - Ice		-6.13	6.09	319.67	322.45	-0.07
Wind 240 deg - Ice		-7.70	4.44	232.18	402.68	-0.03
Wind 270 deg - Ice		-8.66	0.03	3.22	454.87	0.06

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 300 deg - Ice		-7.43	-4.25	-220.84	389.86	0.14
Wind 315 deg - Ice		-6.08	-6.05	-314.97	318.27	0.16
Wind 330 deg - Ice		-4.30	-7.45	-388.13	224.41	0.17
Total Weight	6.05			0.09	-0.28	
Wind 0 deg - Service		0.01	-2.23	-120.10	-1.04	0.13
Wind 30 deg - Service		1.11	-1.91	-103.20	-61.09	0.12
Wind 45 deg - Service		1.57	-1.56	-84.37	-85.69	0.10
Wind 60 deg - Service		1.91	-1.10	-59.90	-104.37	0.08
Wind 90 deg - Service		2.21	-0.01	-0.99	-120.46	0.02
Wind 120 deg - Service		1.94	1.11	59.15	-105.15	-0.05
Wind 135 deg - Service		1.55	1.54	82.93	-84.39	-0.08
Wind 150 deg - Service		1.10	1.90	102.14	-59.49	-0.10
Wind 180 deg - Service		-0.01	2.19	117.99	0.80	-0.13
Wind 210 deg - Service		-1.11	1.91	103.06	60.85	-0.12
Wind 225 deg - Service		-1.57	1.56	84.24	85.45	-0.10
Wind 240 deg - Service		-1.95	1.12	60.74	105.84	-0.08
Wind 270 deg - Service		-2.21	0.01	0.85	120.22	-0.02
Wind 300 deg - Service		-1.90	-1.08	-58.30	103.21	0.05
Wind 315 deg - Service		-1.55	-1.54	-83.07	84.15	0.08
Wind 330 deg - Service		-1.10	-1.90	-102.28	59.25	0.10

Load Combinations

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

Comb. No.	Description
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	80 - 60	Leg	Max Tension	5	27.43	0.15	-0.13
			Max. Compression	13	-28.94	0.32	-0.17
			Max. Mx	6	-6.29	0.49	0.14
			Max. My	3	-1.03	-0.18	-0.60
			Max. Vy	6	2.10	-0.32	-0.13
			Max. Vx	2	-2.20	-0.02	0.35
		Diagonal	Max Tension	14	7.14	0.00	0.00
			Max. Compression	6	-7.12	0.00	0.00
			Max. Mx	23	4.71	0.00	0.00
			Max. My	24	0.19	0.00	-0.00
			Max. Vy	23	-0.00	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Horizontal	Max Tension	10	1.52	0.00	0.00
			Max. Compression	2	-1.53	0.00	0.00
			Max. Mx	18	0.02	0.00	0.00
			Max. My	26	0.45	0.00	-0.00
			Max. Vy	18	-0.00	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
		Top Girt	Max Tension	16	0.16	0.00	0.00
			Max. Compression	8	-0.16	0.00	0.00
			Max. Mx	18	0.00	0.00	0.00
			Max. My	26	-0.01	0.00	-0.00
			Max. Vy	18	-0.00	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
		Bottom Girt	Max Tension	2	1.69	0.00	0.00
			Max. Compression	10	-1.62	0.00	0.00
			Max. Mx	18	-0.02	0.00	0.00
			Max. My	2	-1.06	0.00	-0.00
			Max. Vy	18	-0.00	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
T2	60 - 40	Leg	Max Tension	5	49.95	0.30	0.10
			Max. Compression	13	-52.52	0.24	-0.05
			Max. Mx	2	-30.64	0.85	-0.07
			Max. My	11	0.12	-0.12	0.79

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	2	-1.31	0.24	-0.05
			Max. Vx	3	1.29	0.11	-0.79
		Diagonal	Max Tension	17	4.76	0.00	0.00
			Max. Compression	9	-4.75	0.00	0.00
			Max. Mx	23	3.10	0.01	0.00
			Max. My	19	0.23	0.00	-0.00
			Max. Vy	23	-0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Horizontal	Max Tension	13	0.87	0.00	0.00
			Max. Compression	13	-0.87	0.00	0.00
			Max. Mx	18	0.03	0.00	0.00
			Max. My	2	0.85	0.00	0.00
			Max. Vy	18	-0.00	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Top Girt	Max Tension	10	1.50	0.00	0.00
			Max. Compression	2	-1.64	0.00	0.00
			Max. Mx	18	-0.01	0.00	0.00
			Max. My	2	-1.64	0.00	0.00
			Max. Vy	18	-0.00	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Bottom Girt	Max Tension	7	1.09	0.00	0.00
			Max. Compression	4	-1.24	0.00	0.00
			Max. Mx	18	-0.11	0.00	0.00
			Max. My	2	1.03	0.00	-0.00
			Max. Vy	18	-0.00	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
T3	40 - 20	Leg	Max Tension	5	65.09	0.46	0.01
			Max. Compression	13	-69.06	0.29	0.00
			Max. Mx	13	-52.53	0.89	0.02
			Max. My	3	-5.06	-0.01	-0.77
			Max. Vy	10	1.39	-0.23	0.00
			Max. Vx	3	1.06	-0.01	-0.77
		Diagonal	Max Tension	10	4.01	0.00	0.00
		Horizontal	Max Tension	13	1.20	0.00	0.00
			Max. Compression	13	-3.42	0.00	0.00
			Max. Mx	18	0.09	0.01	0.00
			Max. My	2	1.17	0.00	-0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	2	0.00	0.00	0.00
		Secondary Horizontal	Max Tension	13	1.20	0.00	0.00
			Max. Compression	13	-1.20	0.00	0.00
			Max. Mx	18	0.09	-0.02	0.00
			Max. My	25	1.07	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	25	-0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	2	-1.53	0.00	0.00
			Max. Mx	18	-1.17	0.01	0.00
			Max. My	2	-1.53	0.00	0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	2	-0.00	0.00	0.00
		Bottom Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	13	-2.02	0.00	0.00
			Max. Mx	18	-1.10	0.01	0.00
			Max. Vy	18	0.01	0.00	0.00
T4	20 - 0	Leg	Max Tension	5	77.88	1.73	0.02
			Max. Compression	13	-82.97	-0.00	-0.00
			Max. Mx	32	71.42	1.98	0.01
			Max. My	3	-2.48	-0.03	-0.84
			Max. Vy	32	3.96	-0.00	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	3	1.00	-0.03	-0.84
		Diagonal	Max Tension	34	3.54	0.00	0.00
		Horizontal	Max Tension	13	1.44	0.00	0.00
			Max. Compression	30	-3.33	0.00	0.00
			Max. Mx	18	0.09	0.02	0.00
			Max. Vy	18	0.01	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	2	-1.65	0.00	0.00
			Max. Mx	18	-1.36	0.02	0.00
			Max. Vy	18	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	13	82.89	3.03	-1.75
	Max. H_x	13	82.89	3.03	-1.75
	Max. H_z	21	-69.88	-6.19	3.71
	Min. Vert	5	-77.62	-6.17	3.52
	Min. H_x	22	-72.26	-6.39	3.69
	Min. H_z	13	82.89	3.03	-1.75
Leg B	Max. Vert	7	81.92	-3.00	-1.73
	Max. H_x	32	-71.14	6.34	3.68
	Max. H_z	16	-73.75	5.94	3.74
	Min. Vert	15	-76.48	6.08	3.54
	Min. H_x	7	81.92	-3.00	-1.73
	Min. H_z	7	81.92	-3.00	-1.73
Leg A	Max. Vert	2	81.49	-0.01	3.45
	Max. H_x	13	-38.27	0.50	-4.52
	Max. H_z	2	81.49	-0.01	3.45
	Min. Vert	10	-76.19	-0.07	-7.06
	Min. H_x	7	-37.22	-0.57	-4.51
	Min. H_z	27	-71.06	-0.01	-7.33

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	6.05	0.00	0.00	0.09	-0.28	0.00
Dead+Wind 0 deg - No Ice	6.05	0.04	-8.92	-481.81	-3.98	0.52
Dead+Wind 30 deg - No Ice	6.05	4.46	-7.63	-413.96	-245.06	0.48
Dead+Wind 45 deg - No Ice	6.05	6.27	-6.23	-338.39	-343.84	0.41
Dead+Wind 60 deg - No Ice	6.05	7.64	-4.41	-240.11	-418.85	0.32
Dead+Wind 90 deg - No Ice	6.05	8.85	-0.04	-3.61	-483.44	0.08
Dead+Wind 120 deg - No Ice	6.05	7.75	4.42	237.84	-422.00	-0.19
Dead+Wind 135 deg - No Ice	6.05	6.21	6.17	333.34	-338.62	-0.30
Dead+Wind 150 deg - No Ice	6.05	4.39	7.59	410.44	-238.66	-0.40
Dead+Wind 180 deg - No Ice	6.05	-0.04	8.75	474.08	3.42	-0.50
Dead+Wind 210 deg - No Ice	6.05	-4.46	7.63	414.14	244.50	-0.48
Dead+Wind 225 deg - No Ice	6.05	-6.27	6.23	338.56	343.28	-0.41
Dead+Wind 240 deg - No Ice	6.05	-7.79	4.50	244.24	425.13	-0.33

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 270 deg - No Ice	6.05	-8.85	0.04	3.79	482.87	-0.08
Dead+Wind 300 deg - No Ice	6.05	-7.60	-4.34	-233.70	414.58	0.18
Dead+Wind 315 deg - No Ice	6.05	-6.21	-6.17	-333.15	338.05	0.30
Dead+Wind 330 deg - No Ice	6.05	-4.39	-7.59	-410.26	238.09	0.40
Dead+Ice+Temp	9.51	0.00	0.00	0.26	-0.94	-0.00
Dead+Wind 0 deg+Ice+Temp	9.51	0.03	-8.83	-460.93	-3.91	0.17
Dead+Wind 30 deg+Ice+Temp	9.51	4.36	-7.48	-393.20	-232.65	0.12
Dead+Wind 45 deg+Ice+Temp	9.51	6.13	-6.09	-320.87	-326.08	0.08
Dead+Wind 60 deg+Ice+Temp	9.51	7.46	-4.30	-227.19	-396.83	0.03
Dead+Wind 90 deg+Ice+Temp	9.51	8.66	-0.03	-2.71	-459.22	-0.06
Dead+Wind 120 deg+Ice+Temp	9.51	7.67	4.38	228.29	-403.77	-0.14
Dead+Wind 135 deg+Ice+Temp	9.51	6.08	6.05	317.19	-321.88	-0.16
Dead+Wind 150 deg+Ice+Temp	9.51	4.30	7.45	390.75	-227.50	-0.18
Dead+Wind 180 deg+Ice+Temp	9.51	-0.03	8.55	450.01	2.04	-0.17
Dead+Wind 210 deg+Ice+Temp	9.51	-4.36	7.48	393.72	230.78	-0.12
Dead+Wind 225 deg+Ice+Temp	9.51	-6.13	6.09	321.39	324.21	-0.08
Dead+Wind 240 deg+Ice+Temp	9.51	-7.70	4.44	233.43	404.87	-0.03
Dead+Wind 270 deg+Ice+Temp	9.51	-8.66	0.03	3.23	457.34	0.06
Dead+Wind 300 deg+Ice+Temp	9.51	-7.43	-4.25	-222.04	391.98	0.14
Dead+Wind 315 deg+Ice+Temp	9.51	-6.08	-6.05	-316.66	320.00	0.16
Dead+Wind 330 deg+Ice+Temp	9.51	-4.30	-7.45	-390.22	225.63	0.18
Dead+Wind 0 deg - Service	6.05	0.01	-2.23	-120.39	-1.21	0.13
Dead+Wind 30 deg - Service	6.05	1.11	-1.91	-103.43	-61.48	0.12
Dead+Wind 45 deg - Service	6.05	1.57	-1.56	-84.53	-86.18	0.10
Dead+Wind 60 deg - Service	6.05	1.91	-1.10	-59.96	-104.93	0.08
Dead+Wind 90 deg - Service	6.05	2.21	-0.01	-0.84	-121.08	0.02
Dead+Wind 120 deg - Service	6.05	1.94	1.11	59.53	-105.71	-0.04
Dead+Wind 135 deg - Service	6.05	1.55	1.54	83.40	-84.87	-0.08
Dead+Wind 150 deg - Service	6.05	1.10	1.90	102.68	-59.88	-0.10
Dead+Wind 180 deg - Service	6.05	-0.01	2.19	118.59	0.64	-0.12
Dead+Wind 210 deg - Service	6.05	-1.11	1.91	103.60	60.91	-0.12
Dead+Wind 225 deg - Service	6.05	-1.57	1.56	84.71	85.61	-0.10
Dead+Wind 240 deg - Service	6.05	-1.95	1.12	61.13	106.07	-0.08
Dead+Wind 270 deg - Service	6.05	-2.21	0.01	1.02	120.51	-0.02
Dead+Wind 300 deg - Service	6.05	-1.90	-1.08	-58.36	103.44	0.04
Dead+Wind 315 deg - Service	6.05	-1.55	-1.54	-83.22	84.30	0.07
Dead+Wind 330 deg - Service	6.05	-1.10	-1.90	-102.50	59.31	0.10

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-6.05	0.00	0.00	6.05	0.00	0.000%
2	0.04	-6.05	-8.92	-0.04	6.05	8.92	0.000%
3	4.46	-6.05	-7.63	-4.46	6.05	7.63	0.000%
4	6.27	-6.05	-6.23	-6.27	6.05	6.23	0.000%
5	7.64	-6.05	-4.41	-7.64	6.05	4.41	0.000%
6	8.85	-6.05	-0.04	-8.85	6.05	0.04	0.000%
7	7.75	-6.05	4.42	-7.75	6.05	-4.42	0.000%
8	6.21	-6.05	6.17	-6.21	6.05	-6.17	0.000%
9	4.39	-6.05	7.59	-4.39	6.05	-7.59	0.001%
10	-0.04	-6.05	8.75	0.04	6.05	-8.75	0.000%
11	-4.46	-6.05	7.63	4.46	6.05	-7.63	0.000%
12	-6.27	-6.05	6.23	6.27	6.05	-6.23	0.000%
13	-7.79	-6.05	4.50	7.79	6.05	-4.50	0.000%
14	-8.85	-6.05	0.04	8.85	6.05	-0.04	0.000%
15	-7.60	-6.05	-4.34	7.60	6.05	4.34	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
16	-6.21	-6.05	-6.17	6.21	6.05	6.17	0.000%
17	-4.39	-6.05	-7.59	4.39	6.05	7.59	0.001%
18	0.00	-9.51	0.00	0.00	9.51	0.00	0.000%
19	0.03	-9.51	-8.83	-0.03	9.51	8.83	0.000%
20	4.36	-9.51	-7.48	-4.36	9.51	7.48	0.000%
21	6.13	-9.51	-6.09	-6.13	9.51	6.09	0.000%
22	7.46	-9.51	-4.30	-7.46	9.51	4.30	0.000%
23	8.66	-9.51	-0.03	-8.66	9.51	0.03	0.000%
24	7.67	-9.51	4.38	-7.67	9.51	-4.38	0.000%
25	6.08	-9.51	6.05	-6.08	9.51	-6.05	0.000%
26	4.30	-9.51	7.45	-4.30	9.51	-7.45	0.000%
27	-0.03	-9.51	8.55	0.03	9.51	-8.55	0.000%
28	-4.36	-9.51	7.48	4.36	9.51	-7.48	0.000%
29	-6.13	-9.51	6.09	6.13	9.51	-6.09	0.000%
30	-7.70	-9.51	4.44	7.70	9.51	-4.44	0.000%
31	-8.66	-9.51	0.03	8.66	9.51	-0.03	0.000%
32	-7.43	-9.51	-4.25	7.43	9.51	4.25	0.000%
33	-6.08	-9.51	-6.05	6.08	9.51	6.05	0.000%
34	-4.30	-9.51	-7.45	4.30	9.51	7.45	0.000%
35	0.01	-6.05	-2.23	-0.01	6.05	2.23	0.000%
36	1.11	-6.05	-1.91	-1.11	6.05	1.91	0.000%
37	1.57	-6.05	-1.56	-1.57	6.05	1.56	0.000%
38	1.91	-6.05	-1.10	-1.91	6.05	1.10	0.000%
39	2.21	-6.05	-0.01	-2.21	6.05	0.01	0.000%
40	1.94	-6.05	1.11	-1.94	6.05	-1.11	0.000%
41	1.55	-6.05	1.54	-1.55	6.05	-1.54	0.000%
42	1.10	-6.05	1.90	-1.10	6.05	-1.90	0.000%
43	-0.01	-6.05	2.19	0.01	6.05	-2.19	0.000%
44	-1.11	-6.05	1.91	1.11	6.05	-1.91	0.000%
45	-1.57	-6.05	1.56	1.57	6.05	-1.56	0.000%
46	-1.95	-6.05	1.12	1.95	6.05	-1.12	0.000%
47	-2.21	-6.05	0.01	2.21	6.05	-0.01	0.000%
48	-1.90	-6.05	-1.08	1.90	6.05	1.08	0.000%
49	-1.55	-6.05	-1.54	1.55	6.05	1.54	0.000%
50	-1.10	-6.05	-1.90	1.10	6.05	1.90	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	0.00003582
3	Yes	4	0.00000001	0.00000956
4	Yes	4	0.00000001	0.00000247
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000355
7	Yes	4	0.00000001	0.00002571
8	Yes	4	0.00000001	0.00001126
9	Yes	4	0.00000001	0.00000825
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00001342
12	Yes	4	0.00000001	0.00000550
13	Yes	4	0.00000001	0.00001276
14	Yes	4	0.00000001	0.00000362
15	Yes	4	0.00000001	0.00000479
16	Yes	4	0.00000001	0.00000269

17	Yes	4	0.00000001	0.00000734
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00003012
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00001164
25	Yes	4	0.00000001	0.00000705
26	Yes	4	0.00000001	0.00000721
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000576
30	Yes	4	0.00000001	0.00000546
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000887
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	80 - 60	2.152	46	0.2411	0.0484
T2	60 - 40	1.175	46	0.1986	0.0212
T3	40 - 20	0.495	46	0.1088	0.0090
T4	20 - 0	0.133	46	0.0456	0.0035

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
77.00	BXA-80063/4CF	46	1.997	0.2368	0.0393	52359
72.00	BXA-80063/4CF	46	1.741	0.2288	0.0292	32724
67.00	BXA-80063/4CF	46	1.494	0.2187	0.0246	20138
65.00	DB-T1-6Z-8AB-0Z	46	1.399	0.2138	0.0230	17453

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	80 - 60	8.615	13	0.9510	0.1694
T2	60 - 40	4.721	13	0.7947	0.0906
T3	40 - 20	2.002	13	0.4345	0.0585
T4	20 - 0	0.556	13	0.1817	0.0271

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
77.00	BXA-80063/4CF	13	7.996	0.9365	0.1449	13358
72.00	BXA-80063/4CF	13	6.977	0.9090	0.1118	8349
67.00	BXA-80063/4CF	13	5.994	0.8724	0.0932	5138
65.00	DB-T1-6Z-8AB-0Z	13	5.616	0.8538	0.0897	4453

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	80	Leg	A325N	0.6250	4	6.86	13.45	0.510 ✔	1.333	Bolt Tension
T2	60	Leg	A325N	0.6250	4	12.49	13.49	0.926 ✔	1.333	Bolt Tension
T3	40	Leg	A325N	0.7500	4	16.27	19.43	0.838 ✔	1.333	Bolt Tension

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	80 - 60	1 1/2	20.00	3.25	104.0 K=1.00	13.767	1.7672	-28.94	24.33	1.190 ✔
T2	60 - 40	P2.0X0.218 W/ P2.5x0.276 Split Pipe	20.02	3.80	56.3 K=1.00	17.353	2.2840	-52.52	39.63	1.325 ✔
T3	40 - 20	P2.5X0.203 W/ P3.0x0.300	20.02	2.48	32.4	19.250	3.2300	-69.06	62.18	1.111

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 $\frac{P}{P_a}$
		Split Pipe			K=1.00					✓
T4	20 - 0	P3.0x0.300 w/ P3.5X0.318 Split Pipe	20.02	4.75	51.9 K=1.00	17.738	4.2410	-82.97	75.23	1.103 ✓

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 $\frac{P}{P_a}$
T1	80 - 60	1	4.10	3.90	130.9 K=0.70	8.718	0.7854	-7.12	6.85	1.041 ✓
T2	60 - 40	P1.25x.14	4.65	4.36	96.9 K=1.00	13.158	0.6685	-4.75	8.80	0.540 ✓

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 $\frac{P}{P_a}$
T1	80 - 60	1	2.50	2.38	84.9 K=0.75	14.797	0.7854	-1.53	11.62	0.131 ✓
T2	60 - 40	P.75x.154	3.68	3.47	129.5 K=1.00	8.898	0.4335	-0.87	3.86	0.226 ✓
T3	40 - 20	P1.25x.140	5.11	4.81	107.1 K=1.00	11.921	0.6685	-3.11	7.97	0.390 ✓
T4	20 - 0	P1.5x.145	6.61	6.31	121.7 K=1.00	9.996	0.7995	-2.69	7.99	0.337* ✓

* DL controls

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	40 - 20	L2x2x1/4	5.28	4.99	140.3 K=0.92	7.584	0.9380	-1.20	7.11	0.168 ✓

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	80 - 60	1	2.50	2.38	84.9 K=0.75	14.797	0.7854	-0.16	11.62	0.013 ✔
T2	60 - 40	P.75x.154	2.54	2.33	87.0 K=1.00	14.292	0.4335	-1.64	6.20	0.265 ✔
T3	40 - 20	P1.25x.14	4.04	3.75	83.3 K=1.00	14.697	0.6685	-1.18	9.83	0.121* ✔
T4	20 - 0	P1.5x.145	5.54	5.25	101.1 K=1.00	12.655	0.7995	-1.37	10.12	0.136* ✔

* DL controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	80 - 60	1	2.50	2.38	84.9 K=0.75	14.797	0.7854	-1.62	11.62	0.140 ✔
T2	60 - 40	P.75x.154	3.96	3.76	140.2 K=1.00	7.599	0.4335	-1.24	3.29	0.375 ✔
T3	40 - 20	P1.25x.140	5.46	5.17	115.0 K=1.00	10.902	0.6685	-2.02	7.29	0.277 ✔

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	80 - 60	1 1/2	20.00	3.25	104.0	30.000	1.7672	27.43	53.01	0.517 ✔
T2	60 - 40	P2.0X0.218 W/ P2.5x0.276 Split Pipe	20.02	3.80	56.3	21.000	2.2840	49.95	47.96	1.041 ✔
T3	40 - 20	P2.5X0.203 W/ P3.0x0.300 Split Pipe	20.02	2.48	32.4	21.000	3.2300	65.09	67.83	0.960 ✔
T4	20 - 0	P3.0x0.300 w/ P3.5X0.318 Split Pipe	20.02	4.75	51.9	21.000	4.2410	77.88	89.06	0.874 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	80 - 60	1	4.10	3.90	187.0	21.600	0.7854	7.14	16.96	0.421 ✔
T2	60 - 40	P1.25x.14	4.65	4.36	96.9	21.000	0.6685	4.76	14.04	0.339 ✔
T3	40 - 20	1/2	6.35	5.96	572.1	21.600	0.1963	4.01	4.24	0.944 ✔
T4	20 - 0	1/2	8.28	7.93	760.9	21.600	0.1963	3.54	4.24	0.835 ✔

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 $\frac{P}{P_a}$
T1	80 - 60	1	2.50	2.38	114.0	21.600	0.7854	1.52	16.96	0.090 ✔
T2	60 - 40	P.75x.154	3.68	3.47	129.5	21.000	0.4335	0.87	9.10	0.096 ✔
T3	40 - 20	P1.25x.140	5.11	4.81	107.1	21.000	0.6685	1.20	14.04	0.085 ✔
T4	20 - 0	P1.5x.145	6.61	6.31	121.7	21.000	0.7995	1.44	16.79	0.086 ✔

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	40 - 20	L2x2x1/4	5.28	4.99	98.3	21.600	0.9380	1.20	20.26	0.059 ✔

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	80 - 60	1	2.50	2.38	114.0	21.600	0.7854	0.16	16.96	0.009 ✔
T2	60 - 40	P.75x.154	2.54	2.33	87.0	21.000	0.4335	1.50	9.10	0.164 ✔

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	80 - 60	1	2.50	2.38	114.0	21.600	0.7854	1.69	16.96	0.100 ✔
T2	60 - 40	P.75x.154	3.96	3.76	140.2	21.000	0.4335	1.09	9.10	0.120 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	80 - 60	Leg	1 1/2	1	-28.94	32.43	89.3	Pass
T2	60 - 40	Leg	P2.0X0.218 W/ P2.5x0.276 Split Pipe	43	-52.52	52.83	99.4	Pass
T3	40 - 20	Leg	P2.5X0.203 W/ P3.0x0.300 Split Pipe	79	-69.06	82.88	83.3	Pass
T4	20 - 0	Leg	P3.0x0.300 w/ P3.5X0.318 Split Pipe	133	-82.97	100.28	82.7	Pass
T1	80 - 60	Diagonal	1	22	-7.12	9.13	78.1	Pass
T2	60 - 40	Diagonal	P1.25x.14	77	-4.75	11.73	40.5	Pass
T3	40 - 20	Diagonal	1/2	127	4.01	5.65	70.8	Pass
T4	20 - 0	Diagonal	1/2	141	3.54	5.65	62.6	Pass
T1	80 - 60	Horizontal	1	39	-1.53	15.49	9.8	Pass
T2	60 - 40	Horizontal	P.75x.154	55	-0.87	5.14	17.0	Pass
T3	40 - 20	Horizontal	P1.25x.140	95	-3.11	10.62	29.3	Pass
T4	20 - 0	Horizontal	P1.5x.145	147	-2.69	7.99	33.7	Pass
T3	40 - 20	Secondary Horizontal	L2x2x1/4	99	-1.20	9.48	12.6	Pass
T1	80 - 60	Top Girt	1	4	-0.16	15.49	1.0	Pass
T2	60 - 40	Top Girt	P.75x.154	47	-1.64	8.26	19.9	Pass
T3	40 - 20	Top Girt	P1.25x.14	84	-1.18	9.83	12.1	Pass
T4	20 - 0	Top Girt	P1.5x.145	138	-1.37	10.12	13.6	Pass
T1	80 - 60	Bottom Girt	1	8	-1.62	15.49	10.5	Pass
T2	60 - 40	Bottom Girt	P.75x.154	49	-1.24	4.39	28.1	Pass
T3	40 - 20	Bottom Girt	P1.25x.140	86	-2.02	9.72	20.8	Pass
							Summary	
						Leg (T2)	99.4	Pass
						Diagonal (T1)	78.1	Pass
						Horizontal (T4)	33.7	Pass
						Secondary Horizontal (T3)	12.6	Pass
						Top Girt (T2)	19.9	Pass
						Bottom Girt (T2)	28.1	Pass
						Bolt Checks	69.4	Pass
						RATING =	**99.4**	**Pass**

tnxTower	Job	Page
	16001.30 - New London	27 of 27
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Project 80-ft SSV Lattice Tower - Westwood Ave., New London, CT	Date 11:17:28 09/06/16
	Client Verizon Wireless	Designed by TJL

CENTEK engineering
Centered on Solutions
63-2 North Branford Road
Branford, CT 06405
www.centekeng.com
P: (203) 488-0580
F: (203) 488-8587

Subject:	FOUNDATION ANALYSIS
Location:	New London, CT
Rev. 0: 9/6/16	Prepared by: T.J.L. Checked by: C.F.C. Job No. 16001.30

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 490 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 9 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 6 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 83 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 78 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 80 \cdot ft$	(User Input)	
Tower Width =	$W_t := 7 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 4.33 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 5.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 14.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 0 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 0 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 32 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 125 \cdot pcf$	(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)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 6$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.75 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 16$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 6$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 0.75 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 16$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pad Top Reinforcement Bar Area =

$$A_{btop} := \frac{\pi \cdot d_{btop}^{2}}{4} = 0.442 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =

$$A_{bbot} := \frac{\pi \cdot d_{bbot}^{2}}{4} = 0.442 \cdot in^2$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.255$$

Load Factor =

$$LF := \begin{cases} 1.333 & \text{if } H_t \le 700 \cdot ft \\ 1.7 & \text{if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft} \right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$$

Stability of Footing:

Adjusted Concrete Unit Weight =

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

Adjusted Soil Unit Weight =

$$\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 125 \cdot pcf$$

Passive Pressure =

$$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$$

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = -0.273 \cdot ksf$$

$$P_{top} := if\left[n < (D_f - T_f), P_{pt}, P_{pn}\right] = 0 \cdot ksf$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.762 \cdot ksf$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.881 \cdot ksf$$

$$T_p := if\left[n < (D_f - T_f), T_f, (D_f - n)\right] = 4.33$$

$$A_p := W_f \cdot T_p = 60.62$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 53.392 \cdot kip$$

Weight of Concrete Pad =

$$WT_{pad} := \left(W_f^2 \cdot T_f\right) \cdot \gamma_c = 147 \cdot kip$$

Weight of Concrete Piers =

$$WT_{pier} := 3 \cdot \left[\left(L_p \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot \gamma_c\right] = 0 \cdot kip$$

Total Weight of Concrete =

$$WT_c := WT_{pad} + WT_{pier} = 147 \cdot kip$$

Weight of Soil Above Footing =

$$WT_{s1} := \left(W_f^2 - 3 \cdot \frac{d_p^2 \cdot \pi}{4}\right) \cdot (L_p - L_{pag}) \cdot \gamma_s = 0 \cdot kip$$

Weight of Soil Back Face =

$$WT_{s2} := \left[\frac{\tan(\Phi_s) \cdot (D_f)^2}{2} \cdot W_f\right] \cdot \gamma_s = 10 \cdot kip$$

Tower Offset =

$$X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{2}\right] \qquad X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{3}$$

$$X_t := if(Pos_t, X_{t1}, X_{t2}) = 3.969$$

$$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 1.01$$

Resisting Moment =

$$M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3}\right] = 1262 \cdot kip$$

Overturning Moment =

$$M_{ot} := OM + S_t \cdot (L_p + T_f) = 535 \cdot kip \cdot ft$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 2.36$$

Factor of Safety Required =

$$FS_{req} := 2$$

$$OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$$

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 153 \cdot kip$

Area of the Mat = $A_{mat} := W_f^{\,2} = 196$

Section Modulus of Mat = $S := \frac{W_f^{\,3}}{6} = 457.33 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.95 \cdot ksf$

$Max\_Pressure\_Check := if\left(P_{max} < q_s, "Okay", "No Good"\right)$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.389 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 3.89$

Distance to Kern = $X_k := \frac{W_f}{6} = 2.333$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 3.497$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e\right)} = 2.08 \cdot ksf$

$q_{adj} := if\left(P_{min} < 0, P_a, P_{max}\right) = 2.08 \cdot ksf$

$Pressure\_Check := if\left(q_{adj} < q_s, "Okay", "No Good"\right)$

Pressure_Check = "Okay"

Shear Strength of Concrete:

Beam Shear:

(Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - \frac{d_{bbot}}{2} = 56.625 \cdot in$

$FL := \frac{C_t}{W_f^2} = 0.4235 \cdot ksf$

$V_{req} := LF \cdot FL \cdot \left(X_t - 0.5 \cdot d_p - d\right) \cdot W_f = -5.926 \cdot kip$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 1023 \cdot kip$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if\left(V_{req} < V_{Avail}, "Okay", "No Good"\right)$

Beam_Shear_Check = "Okay"

Punching Shear:

(Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear =

$b_o := \left(d_p + d\right) \cdot \pi = 14.8$

Required Shear Strength =

$V_{req} := LF \cdot FL \cdot \left[W_f^2 - \left(d_p + d\right)^2 \cdot \frac{\pi}{4}\right] = 100.8 \cdot kips$

Available Shear Strength =

$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 2166.1 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if\left(V_{req} < V_{Avail}, "Okay", "No Good"\right)$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$$M_{nT} := LF\cdot\left[U_t\cdot\left(W_t\cdot\sin(60\cdot deg) - \frac{d_p}{2}\right) + S_t\cdot\left(D_f + L_{pag}\right)\right] - WT_t\cdot X_{off} = 676\cdot ft\cdot k$$

$$M_{nS} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left[\gamma_s\cdot\left(T_f - T_f\right)\right]\right]$$

$$M_{nC} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left(\gamma_c\cdot T_f\right)\right]$$

Design Moment = $M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 513.987\cdot kips\cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500\cdot psi \le f_c \le 4000\cdot psi \\ 0.65 & \text{if } f_c > 8000\cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right]\cdot 0.5\right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$b_{eff} := W_t\cdot\cos(30\cdot deg) + d_p = 72.746\cdot in$

$d := T_f - Cvr_{pad} - d_{bbot} = 56.25\cdot in$

$A_s := \frac{M_n}{\left(f_y\cdot d\right)} = 1.828\cdot in^2$

$a := \frac{A_s\cdot f_y}{\beta\cdot f_c\cdot b_{eff}} = 0.443\cdot in$

$A_s := \frac{M_n}{f_y\cdot\left(d - \frac{a}{2}\right)} = 1.835\cdot in^2$

$\rho := \frac{A_s}{b_{eff}\,d} = 0.00045$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018 \qquad \text{(ACI -2008 7.12.2.1)}$$

Check Bottom Bars:

$$As := \begin{cases} \left(\rho \cdot b_{eff} \cdot d\right) & \text{if } \left(\rho \cdot b_{eff} \cdot d\right) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d & \text{otherwise} \end{cases} = 3.683 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 7.1 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 3.7 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 7.1 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 10 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0 \qquad \text{(ACI-2008 12.2.3)}$$

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 13.3 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in \qquad \text{(ACI-2008 12.2.1)}$$

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right) = "Use\ L.dbt"$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 39 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No Good"\right)$$

Lpad_Check = "Okay"

verizonwireless

TOWER REINFORCEMENT DESIGN

VERIZON SITE REF: NEW LONDON
59 WESTWOOD AVE
NEW LONDON, CT 06320

VICINITY MAP

NORTH

PROJECT SUMMARY

SITE ADDRESS:	59 WESTWOOD AVE NEW LONDON, CT 06320
PROJECT COORDINATES:	LAT: 41°-20'-48.50"N LON: 72°-06'-47.20"W ELEV:±108' AMSL
VERIZON SITE REF.:	NEW LONDON
VERIZON CONTACT:	HOLLIS REDDING 860.966.0989
ANTENNA CL HEIGHT:	67'-0" / 72'-0" / 77'-0"
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	CARLO F. CENTORE, PE 203.488.0580 ext. 122

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
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REV.	DATE	BY	CHK'D	DESCRIPTION
0	9/8/16	TA	CFC	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

VERIZON WIRELESS
NEW LONDON
59 WESTWOOD AVE
NEW LONDON, CT 06320

DATE: 9/8/16
SCALE: AS SHOWN
JOB NO. 16001.30

TITLE SHEET

SHEET NO.
T-1

DESIGN BASIS

1. GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CT STATE BUILDING CODE AND 2009 AMENDMENTS.

2. TIA/EIA-222-F-1996 "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".

3. DESIGN CRITERIA

   WIND LOAD: (TIA/EIA-222-F-1996)
   BASIC WIND SPEED (V) = 85 MPH (FASTEST MILE)

   WIND LOAD: (2005 CT STATE BUILDING CODE APPENDIX K)
   BASIC WIND SPEED (V) = 120 MPH (3-SECOND GUST)
   EQUIVALENT TO (V) = 100 MPH (FASTEST MILE)

   APPENDIX-K WIND SPEED CONTROLS

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., DATED 9/6/16.

2. THE TOWER GEOMETRY, STRUCTURE MEMBER SIZES AND FOUNDATION INFORMATION WERE OBTAINED FROM A PREVIOUS STRUCTURAL REPORT PREPARED BY CENTEK JOB NO. 13001.C09, MARKED REVISION #1, DATED MARCH 19, 2013.

3. ALL STEEL REINFORCEMENT SHOWN HEREIN APPLIES TO ALL SIDES OF THE TOWER.

4. PROVIDE TEMPORARY ANCHORS, GUYING AND/OR BRACING AS REQUIRED TO SAFELY CONDUCT THE WORK.

5. ALL WORK SHALL BE IN ACCORDANCE WITH TIA-222-F "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".

6. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE TOWER STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIE-DOWNS, WHICH MIGHT BE NECESSARY.

7. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.

8. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.

9 ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

10. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.

11. TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.

12. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.

13. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

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Valley Transmission Office

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181 WESTWOOD AVE
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JOB NO. 16001.30

DESIGN BASIS AND GENERAL NOTES

SHEET NO.
N-1
Sheet No. 2 of 6

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD).

2. MATERIAL SPECIFICATIONS

   A. STRUCTURAL STEEL (SOLID ROUND – LEGS) ---ASTM A572-50 (FY = 50 KSI)
   B. STRUCTURAL STEEL (SOLID ROUND – BRACING) ---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   D. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
   E. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   F. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   G. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

   A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
   B. U-BOLTS---ASTM A307
   C. ANCHOR RODS---ASTM F1554
   D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.

4. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

5. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

6. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

7. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

8. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

9. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

10. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

11. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".

12. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING THE SCHEDULED ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

13. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

14. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

15. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.

16. LOCK WASHER ARE NOT PERMITTED FOR A325 BOLTED STEEL ASSEMBLIES.

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

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

19. FABRICATE BEAMS WITH MILL CAMBER UP.

20. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

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

REV.	DATE	DRAWN BY/CHK'D BY	DESCRIPTION
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CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
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DATE: 9/6/16
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STRUCTURAL STEEL NOTES

SHEET NO.
N-2

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	–	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	–	EARTHWORK: BACKFILL MATERIAL & COMPACTION	–	POST-INSTALLED ANCHOR ROD PULL-OUT TEST
–	EOR APPROVED POST-INSTALLED ANCHOR MPII	–	REBAR & FORMWORK GEOMETRY VERIFICATION	X	PHOTOGRAPHS
–	FABRICATION INSPECTION	–	CONCRETE TESTING		
–	FABRICATOR CERTIFIED WELDER INSPECTION	X	STEEL INSPECTION		
X	MATERIAL CERTIFICATIONS	–	POST INSTALLED ANCHOR ROD VERIFICATION		
		–	BASE PLATE GROUT VERIFICATION		
		–	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON-SITE COLD GALVANIZING VERIFICATION		
		X	CONTRACTOR AS-BUILT REDLINE DRAWINGS		

NOTES:
1. REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
2. "X" DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
3. "–" DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
4. EOR – ENGINEER OF RECORD
4. MPII – "MANUFACTURER'S PRINTED INSTALLATION GUIDELINES"

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:

   – REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   – WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
   – DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON-SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:

   – REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   – WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
   – DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:

   – CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
   – WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS-BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:

   – PRE-CONSTRUCTION: GENERAL CONDITION OF THE SITE.
   – DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
   – POST-CONSTRUCTION: FINAL CONDITION OF THE SITE

REV	DATE	DRAWN	CHECKED	DESCRIPTION
0	9/6/16	TA	CFC	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

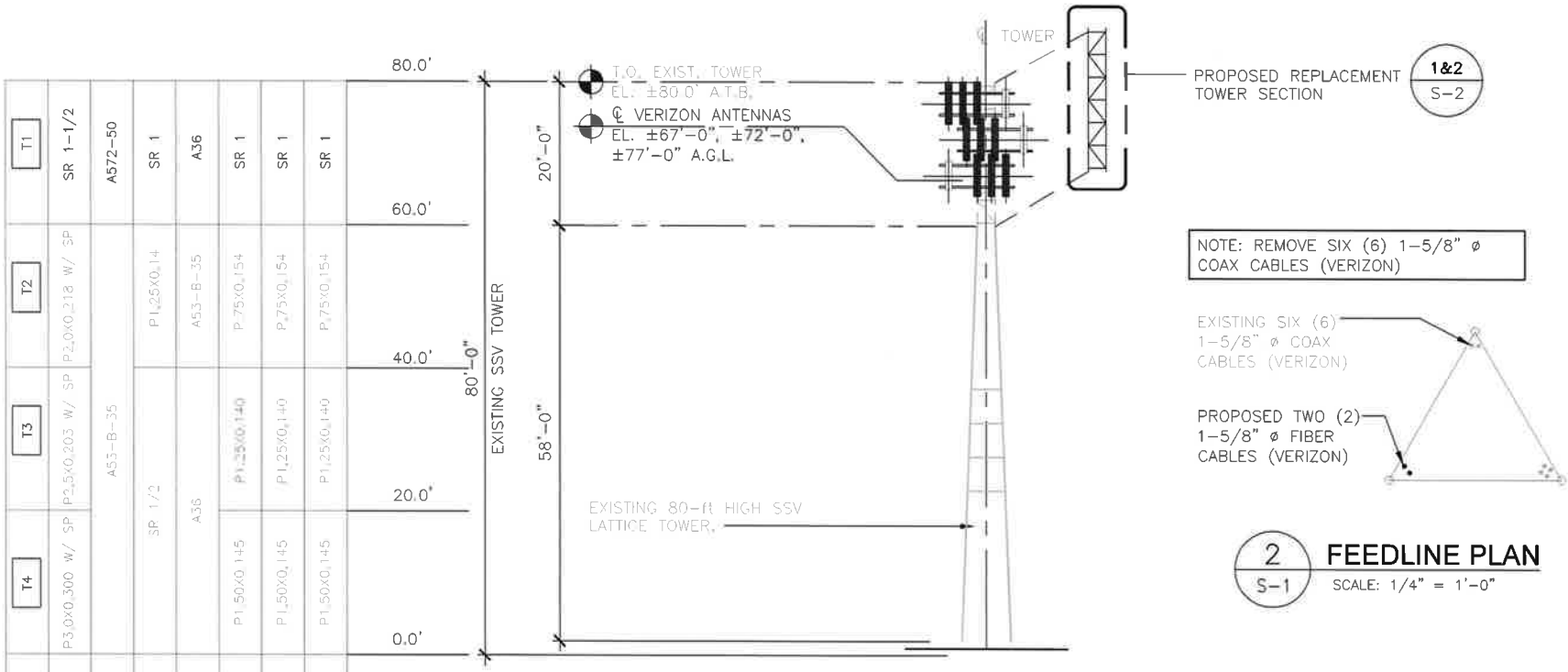
CENTEK engineering
Centered on Solutions
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

VERIZON WIRELESS
Client Representative Name
NEW LONDON
68 WESTWOOD AVE
NEW LONDON, CT 06320

DATE: 9/6/16
SCALE: AS SHOWN
JOB NO. 16001.30

MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 1 of 5



NOTE: REMOVE SIX (6) 1-5/8" ø COAX CABLES (VERIZON)

2 / S-1 **FEEDLINE PLAN**
SCALE: 1/4" = 1'-0"

LEGEND:
1. A.G.L.= ABOVE GROUND LEVEL
2. A.T.B.= ABOVE TOWER BASE

[TXX] DENOTES RISA TOWER OUTPUT SECTION NUMBER

MAX. TOWER STEEL USAGE w/ ABOVE REINFORCEMENTS:
LOAD CASE #1 = 99.4%
(LEG SECTION T2 40'-0"-60'-0")

1 / S-1 **TOWER ELEVATION**
SCALE: 1/20" = 1'-0"

NO.	DATE	BY	DESCRIPTION
0	9/6/16	TJL	CFC ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

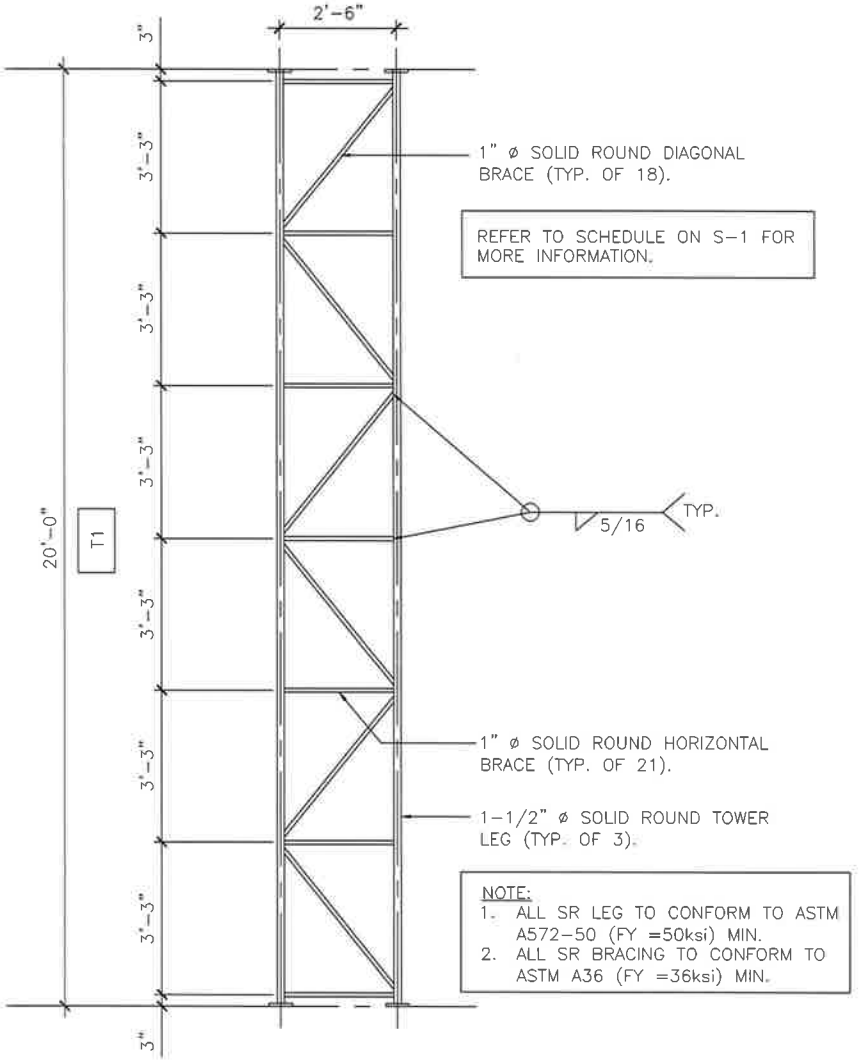
VERIZON WIRELESS
TOWER REPLACEMENT DESIGN

NEW LONDON
84 WESTWOOD AVE
NEW LONDON, CT 06320

DATE: 9/6/16
SCALE: AS SHOWN
JOB NO. 16001.30

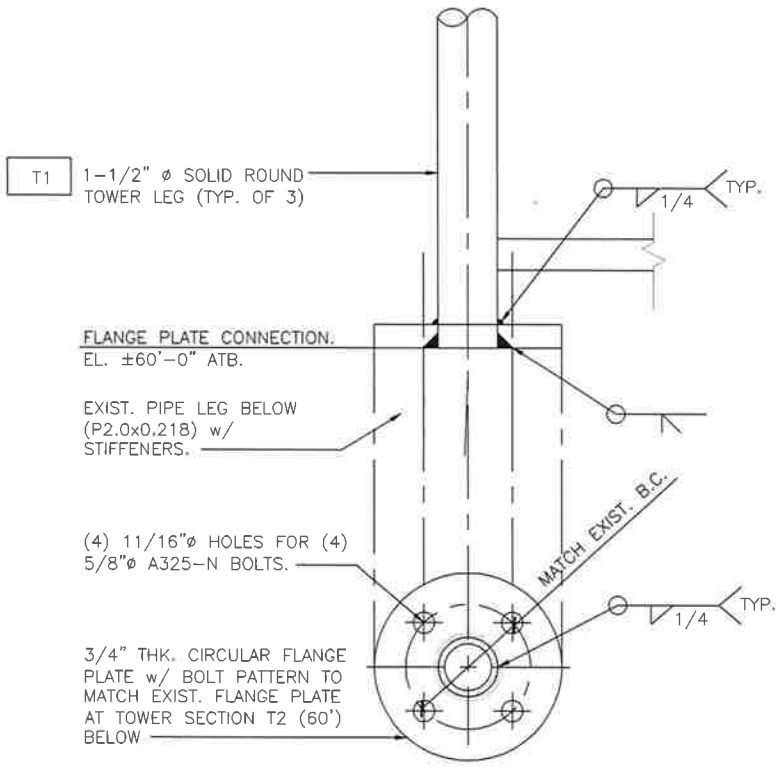
TOWER ELEVATION AND FEEDLINE PLAN

SHEET NO.
S-1
Sheet No. 1 of 5



1 / S-2 **TOWER SECTION T-1 ELEVATION**

SCALE: 3/8" = 1'-0"



2 / S-2 **TOWER SECTION T-1 FLANGE CONNECTION**

SCALE: 3" = 1'-0"

REV	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	9/6/16	EA	CFC	ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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

VERIZON WIRELESS

NEW LONDON

69 WESTWOOD AVE
NEW LONDON, CT 06320

DATE: 9/6/16
SCALE: AS SHOWN
JOB NO. 16001.30

TOWER REINFORCEMENT DETAILS

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

SITE NAME	NEW LONDON CT	ECP - CELL #	2	133
LATITUDE	41-20-48.00 N	LONGITUDE	72-06-47.00 W	
Notes: Change 700,AWS and PCS to RET Add RRH 4X45 AWS Add RRH 2X60 700/PCS		SAVE BUTTON		
		STRUCTURE TYPE	Lattice	

700 Mhz - LTE Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	eNodeB	eNodeB	eNodeB
ANTENNA TYPE	BXA-70063-6CF_2	BXA-70063-6CF_2	BXA-70063-6CF_2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	160	260
DOWN TILT (MECH/ELEC)	5/0	0/0	0/0
RAD CTR (FT AGL)	76	66.9	72
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

700 Mhz - LTE Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	eNodeB	eNodeB	eNodeB
ANTENNA TYPE	SBNHH-1D65B	SBNHH-1D65B	SBNHH-1D65B
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	350	160	260
DOWN TILT (MECH/ELEC)	0/7	0	0
RAD CTR (FT AGL)	76	66.9	72
TMA - QTY / MODEL	1 ALU RH_2X60 700	1 ALU RH_2X60 700	1 ALU RH_2X60 700
DIPLEXER - QTY / MODEL			

850 Celluar - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Mod 4.0B	Cellular Mod 4.0B	Cellular Mod 4.0B
ANTENNA TYPE	BXA-80063/4CF 5	BXA-80063/4CF	BXA-80063/4CF
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	160	260
DOWN TILT (MECH/ELEC)	0	0	0
RAD CTR (FT AGL)	76	66.9	72
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

850 Celluar - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Mod 4.0B	Cellular Mod 4.0B	Cellular Mod 4.0B
ANTENNA TYPE	BXA-80063/4CF 5	BXA-80063/4CF	BXA-80063/4CF
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	160	260
DOWN TILT (MECH/ELEC)	0	0	0
RAD CTR (FT AGL)	76	66.9	72
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0B	PCS Modcell 4.0B	PCS Modcell 4.0B
ANTENNA TYPE	BXA-171063-8BF_2	BXA-171063-8BF_2	BXA-171063-8BF_2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	160	260
DOWN TILT (MECH/ELEC)	0/0	0/0	0/0
RAD CTR (FT AGL)	76	66.9	72
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			

1900 PCS - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Modcell 4.0B		PCS Modcell 4.0B		PCS Modcell 4.0B	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	350		160		260	
DOWN TILT (MECH/ELEC)	0/0		0/0		0/0	
RAD CTR (FT AGL)	76		66.9		72	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
	1	ALU RH_2X60 PCS	1	ALU RH_2X60 PCS	1	ALU RH_2X60 PCS
AWS - LTE Current Config	**ALPHA**		**BETA**		**GAMMA**	
EQUIPMENT TYPE	2100 MHz BBU		2100 MHz BBU		2100 MHz BBU	
ANTENNA TYPE	BXA-171063-12CF_2		BXA-171063-12CF_2		BXA-171063-12CF_2	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		160		260	
DOWN TILT (MECH/ELEC)	0/0		0/0		0/0	
RAD CTR (FT AGL)	76		66.9		72	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX	1				DB-T1-6Z-8AB-0Z	
AWS - LTE Future Config	**ALPHA**		**BETA**		**GAMMA**	
EQUIPMENT TYPE	2100 MHz BBU		2100 MHz BBU		2100 MHz BBU	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	350		160		260	
DOWN TILT (MECH/ELEC)	0/3		0/0		0/0	
RAD CTR (FT AGL)	76		66.9		72	
TMA - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_4X45-AWS	1	ALU RH_4X45-AWS	1	ALU RH_4X45-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX	2				DB-T1-6Z-8AB-0Z	

NUMBER OF CABLE'S NEEDED					ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES		6	MAINLINE (FT)			
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS		6	TOP JUMPER (FT)			0
Equipment Cable Ordering		**MAIN CABLE**	12 -	6	**TOP JUMPER #**	3	+	3
FIBER LINE SIZE	1 5/8"	TOTAL # OF FIBER LINES		1	FIBER LINE MODEL #			158-1-08U8-S8
JUMPER SIZE	5/8"	TOTAL # OF TOP JUMPERS		36	TOP JUMPER MODEL #			058-1-08U1-S1
Fiber Cable Ordering		**FIBER CABLE**	0 +	1	**TOP JUMPER #**	3	+	3

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	**PCS F / AWS-Band**	**700 Mhz C - E**	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975 / 2145-21	TX - 746-757	PCS (Watts)	60
RX - 824-835,845-846.5 MHz	RX - 1890-1895 / 1745-17	RX - 776-787	LTE (Watts)	40
			AWS(Watts)	60

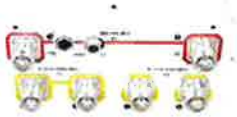
ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By: Ray Paradis	Rob Hesselbach	RLP	12/26/2014
Revised By: Ray Paradis	Alejandro Restrepo	RLP	8/18/2016

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.

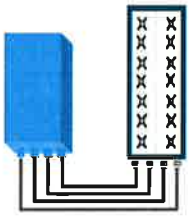
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

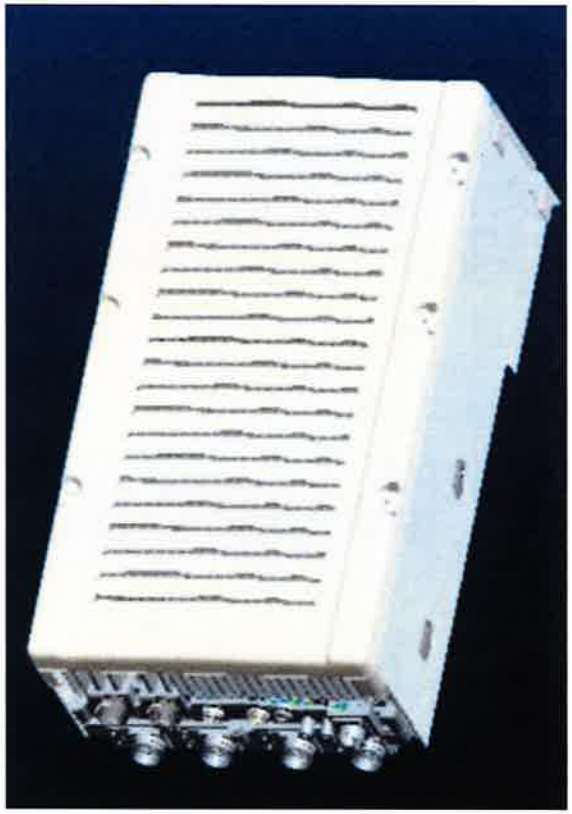
TECHNICAL SPECIFICATIONS

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

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

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



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

Alcatel·Lucent

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

Product Data Sheet DB-B1 and DB-T1 Series

DC and Fiber Management Distribution Boxes for HYBRIFLEX™ Cable

Product Description

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

Features/Benefits

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

Technical Specifications

Mechanical Specifications

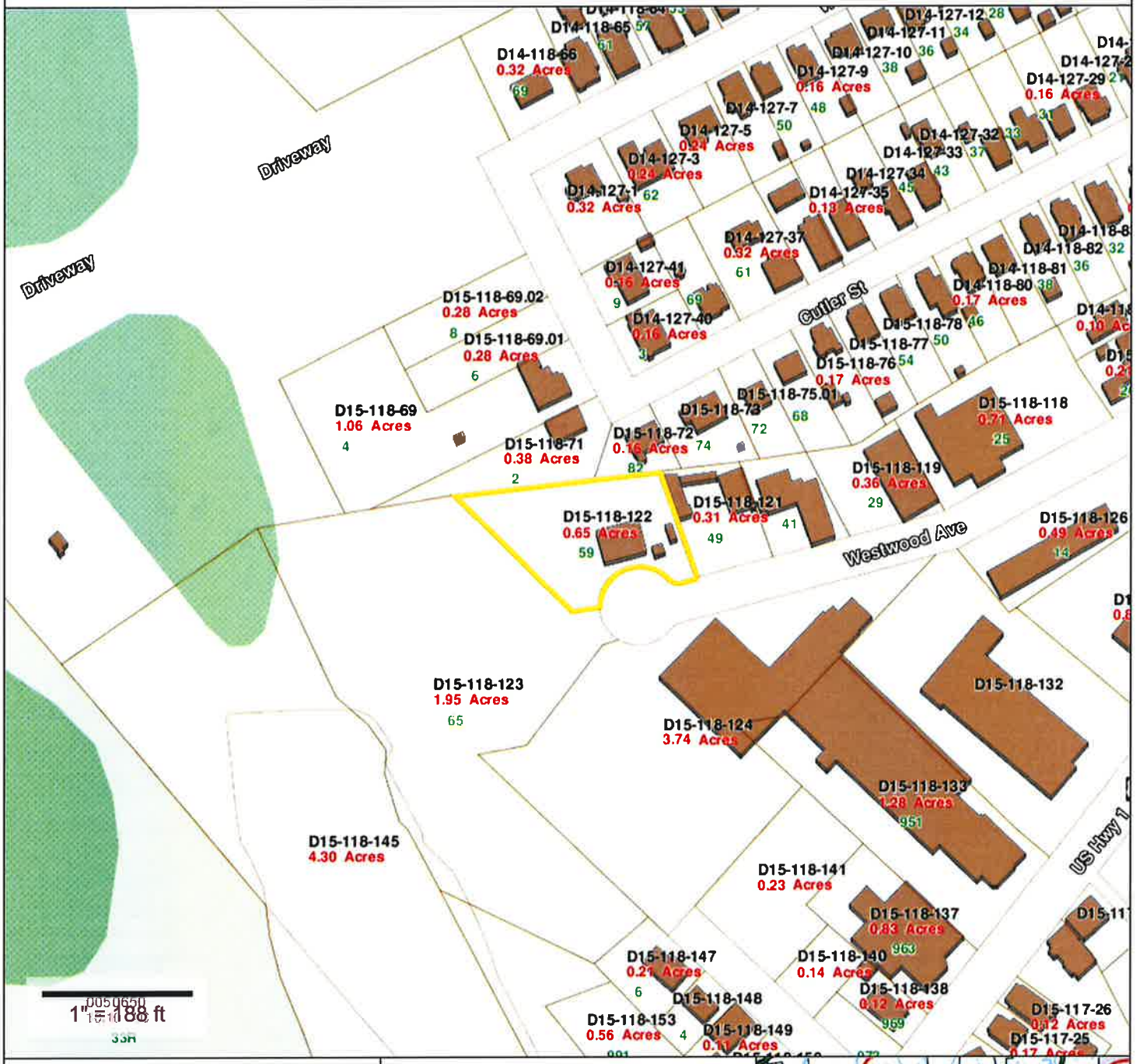
Model Number	DB-B1-6C-8AB-0Z	DB-T1-6Z-8AB-0Z
Enclosure Design	Standard, 6 OVP's	Standard without OVP
Dimensions - H x W x D, mm (in)	610 x 610 x 254 (24 x 24 x 10)	610 x 610 x 254 (24 x 24 x 10)
Weight, kg (lb)	20 (44)	20 (44)
Suppression Connection Method	Compression lug, #2-#14 AWG Copper, #2-#12 Aluminum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

Electrical Specifications

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

* This data is provisional and subject to change.

ATTACHMENT 4



Property Information

Property ID 95-D15-118-122
Location 59 WESTWOOD AVE
Owner METROCAST COMMUNICATIONS

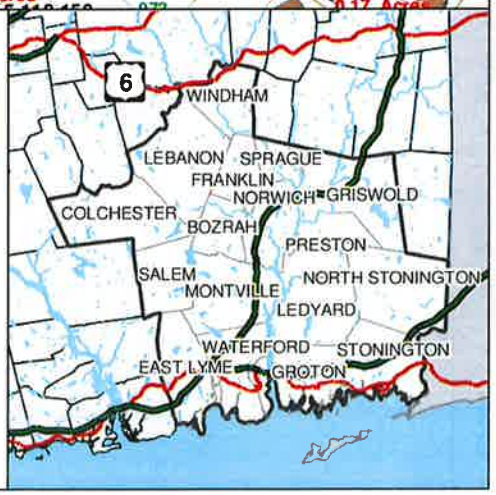
* Confirmed with Assessor current owner is ATLANTIC BROADBAND CT LLC as noted on property card

SCCOG Southeastern Connecticut Council of Governments Geographic Information System

MAP FOR REFERENCE ONLY NOT A LEGAL DOCUMENT

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

Parcels updated October 1, 2013



59 WESTWOOD AVE

Location	59 WESTWOOD AVE	**Mblu**	D15/ 118/ 122/ /
Acct#	D15 0118 0122	**Owner**	ATLANTIC BROADBAND (CT) LLC
Assessment	$178,290	**Appraisal**	$254,700
PID	4009	**Building Count**	2

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$112,600	$142,100	$254,700

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2013	$78,820	$99,470	$178,290

Owner of Record

Owner	ATLANTIC BROADBAND (CT) LLC
Co-Owner	
Address	TWO BATTERYMARCH PARK 2ND FLR QUINCY, MA 02169

Sale Price	$254,700
Certificate	
Book & Page	2129/ 68
Sale Date	08/24/2015
Instrument	03

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
ATLANTIC BROADBAND (CT) LLC	$254,700		2129/ 68	03	08/24/2015
METROCAST COMMUNICATIONS OF CT LLC	$325,000		1666/ 312	03	09/20/2006
EASTERN CONN CABLE TV INC	$0		354/ 249		01/01/1700

Building Information

Building 1 : Section 1

Year Built:	1989
Living Area:	1,944
Replacement Cost:	$110,166
Building Percent Good:	67

Replacement Cost Less Depreciation: $73,800

Building Attributes	
Field	**Description**
STYLE	Warehouse
MODEL	Ind/Lg UnfinCM
Grade	Average
Stories:	1
Occupancy	1
Exterior Wall 1	Concr/Cinder
Exterior Wall 2	
Roof Structure	Gable/Hip
Roof Cover	Asph/F Gls/Cmp
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr-Finished
Interior Floor 2	
Heating Fuel	Gas
Heating Type	Floor Furnace
AC Type	None
Bldg Use	COMM WHSE MDL-96
Total Rooms	
Total Bedrms	00
Total Baths	0
Conv Type	
1st Floor Use:	316I
Heat/AC	NONE
Frame Type	MASONRY
Baths/Plumbing	LIGHT
Ceiling/Wall	SUSP-CEIL ONLY
Rooms/Prtns	LIGHT
Wall Height	16
% Comn Wall	0

Building 2 : Section 1

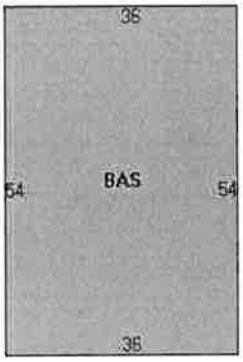
Year Built: 2007
Living Area: 360
Replacement Cost: $27,780
Building Percent Good: 91
Replacement Cost Less Depreciation: $25,300

Building Attributes : Bldg 2 of 2

Building Photo

(http://images.vgsi.com/photos/NewLondonCTPhotos//\00\00\1

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	1,944	1,944
		1,944	1,944

Field	Description
STYLE	Industrial
MODEL	Ind/Lg UnfinCM
Grade	Above Ave
Stories:	1
Occupancy	1
Exterior Wall 1	Stucco/Masonry
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Concrete Tile
Interior Wall 1	Minim/Masonry
Interior Wall 2	
Interior Floor 1	Concr Abv Grad
Interior Floor 2	
Heating Fuel	Electric
Heating Type	Electr Basebrd
AC Type	None
Bldg Use	COMM WHSE MDL-96
Total Rooms	
Total Bedrms	
Total Baths	
Conv Type	
1st Floor Use:	
Heat/AC	NONE
Frame Type	REINF. CONCR
Baths/Plumbing	NONE
Ceiling/Wall	NONE
Rooms/Prtns	LIGHT
Wall Height	8
% Comn Wall	0

Building Photo

(http://images.vgsi.com/photos/NewLondonCTPhotos//default.j

Building Layout

Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	360	360
		360	360

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 316I

Land Line Valuation

Size (Acres) 0.65

Description	COMM WHSE MDL-96	**Frontage**	0
Zone	C-1	**Depth**	0
Neighborhood	X505	**Assessed Value**	$99,470
Alt Land Appr	No	**Appraised Value**	$142,100
Category			

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
PAV1	PAVING-ASPHALT			4000 S.F.	$6,000	1
FN3	FENCE-6' CHAIN			770 L.F.	$4,600	1
SHD1	SHED FRAME			180 S.F.	$2,200	1
GT1	GATE			2 UNITS	$700	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$112,600	$142,100	$254,700
2014	$112,600	$142,100	$254,700
2013	$112,600	$142,100	$254,700

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$78,820	$99,470	$178,290
2014	$78,820	$99,470	$178,290
2013	$78,820	$99,470	$178,290