Robinson+Cole

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Also admitted in Massachusetts

October 6, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
37 Bacon Road, Enfield, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains fifteen (15) wireless telecommunications antennas at the 150-foot level of the existing 180-foot tower at 37 Bacon Road in Enfield, Connecticut (the "Property"). The tower is owned by SAI. The Council approved Cellco's use of this tower in 2005. Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model SBNHH-1D65B, 700/2100 MHz antennas and three (3) model SBNHH-1D65B, 1900 MHz antennas, all at the same 150-foot level on the tower. Cellco also intends to replace three (3) existing remote radio heads ("RRHs") and install six (6) new RRHs behind its antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Lee Erdmann, Enfield's Acting Town Manager. A copy of this letter is also being sent to Shaker Pines Fire Department, the owner of the Property and SAI, the owner of the tower.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be located at the 150-foot level on the 180-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 modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

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

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

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:
Lee Erdmann, Enfield Acting Town Manager
Shaker Pines Fire Department
SAI
Tim Parks

ATTACHMENT 1

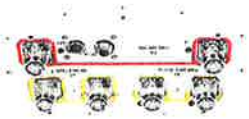
Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

SBNHH-1D65B

Andrew® Tri-band 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, 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	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, 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	1695 – 2360 MHz | 698 – 896 MHz
Performance Note	Outdoor usage

Product Specifications

SBNHH-1D65B

Mechanical Specifications

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	1851.0 mm | 72.9 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®

Packed Dimensions

Depth	299.0 mm | 11.8 in
Length	1970.0 mm | 77.6 in
Width	409.0 mm | 16.1 in
Shipping Weight	31.0 kg | 68.3 lb

Regulatory Compliance/Certifications

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

Included Products

Product Specifications

SBNHH-1D65B

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

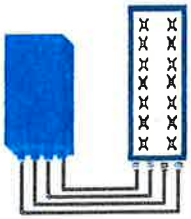
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

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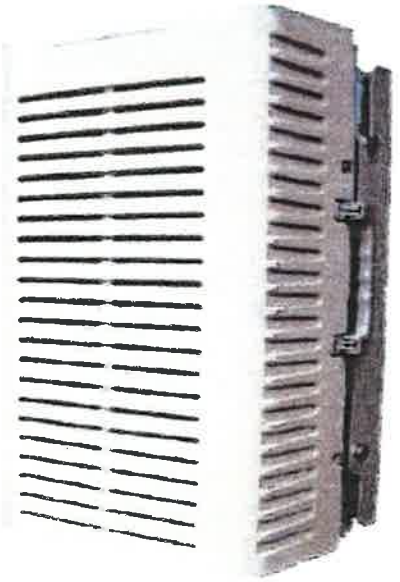
Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W 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

PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

	RRH2x60
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver 1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA
	Internal Smart Bias-T
Power	-48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (top mounted)

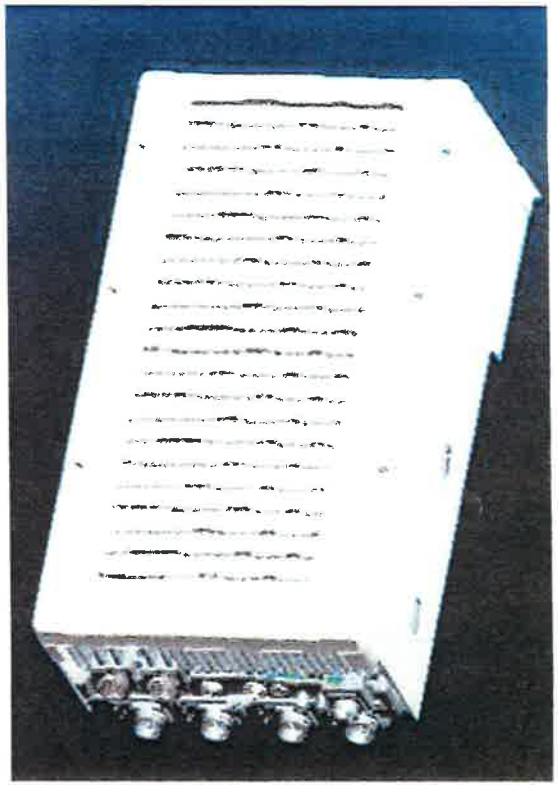


** Not a Verizon Wireless deployed product

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.)

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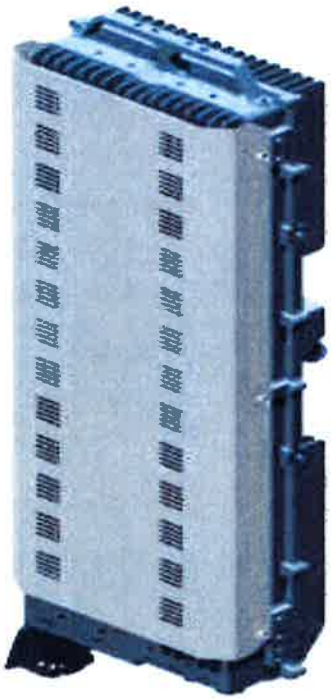
ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

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



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

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

SUPERIOR RF PERFORMANCE

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

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

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

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

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

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

OPTIMIZED TCO

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

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

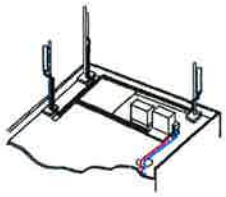
EASY INSTALLATION

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

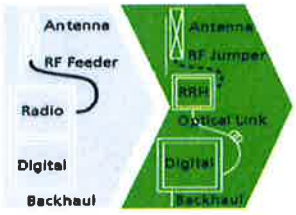
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

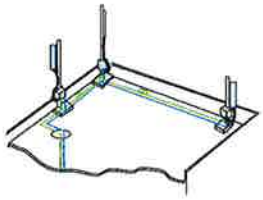
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

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

BENEFITS

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

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

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

RF Characteristics

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

Connectivity

- Two CPRI optical ports for 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 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

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

Safety and Regulatory Data

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

Alcatel·Lucent

AT THE SPEED OF IDEAS™

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)

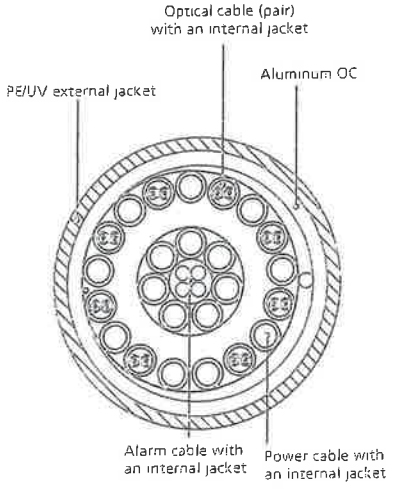


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Somers W (Enfield)								
Tower Height: 180'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Omnipoint	8	199	160	0.0241	1950	1.0000	0.24%	
*Town - UHF	2	250	180	0.0059	450	0.3000	0.20%	
*Town - VHF	1	60	180	0.0007	34	0.2000	0.04%	
*AT&T UMTS	2	565	168	0.0155	880	0.5867	0.26%	
*AT&T UMTS	2	1077	168	0.0295	1900	1.0000	0.30%	
*AT&T GSM	1	647	168	0.0089	880	0.5867	0.15%	
*AT&T GSM	4	934	168	0.0512	1900	1.0000	0.51%	
*AT&T LTE	1	1615	168	0.0221	734	0.4893	0.45%	
Verizon	**11**	**408**	**150**	**0.0717**	**1970**	**1.0000**	**7.17%**	
Verizon	**9**	**386**	**150**	**0.0555**	**869**	**0.5793**	**9.58%**	
Verizon	**1**	**3500**	**150**	**0.0559**	**2145**	**1.0000**	**5.59%**	
Verizon	**1**	**2100**	**150**	**0.0336**	**746**	**0.4973**	**6.75%**	
								31.2%
* Source: Siting Council								

ATTACHMENT 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180-ft Existing Sabre Monopole

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Somers West

37 Bacon Road
Enfield, CT

Centek Project No. 15001.066

~~Date: July 20, 2015~~
~~Rev 1: August 28, 2015~~
Rev 2: September 24, 2015

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

Table of Contents

Introduction

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

The host tower is a 180-ft tall, four-section, eighteen sided, tapered monopole, originally designed and manufactured by Sabre Communications Corp. job no; 04-07104, dated July 23, 2003. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned Sabre design documents. The tower was previously reinforced by Hudson Design Group job no. 1103 dated May 29, 2013.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek engineering job no; 13001.097 dated November 22, 2013 and a Verizon RF data sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 14.40-in at the top and 53.23-in at the base.

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

- UNKNOWN (EXISTING):
  Antennas: One (1) 10-ft Omni-directional whip, one (1) 1'x1' panel antenna and one (1) 2-ft dish mounted on two (2) existing 4-ft Dual Standoff Mounts with an elevation of 177-ft above grade.
  Coax Cables: Two (2) 1-1/4" ∅ and two (2) 1/2" ∅ coax cables running on the inside of the existing tower.
- AT&T (EXISTING):
  Antennas: Two (2) KMW AM-X-CD-16-65-00T panel antennas, two (2) Andrew SBNH-1D656C panel antennas, two (2) Powerwave P65-17-XLH-RR panel antennas, three (3) Kathrein 800-10121 panel antennas, six (6) Kathrein 860-10025 remote control units, six (6) Powerwave LGP21401 TMA's, twelve (12) Powerwave LGP21901 diplexers and three (3) DTMABP7819VG12A TMA's mounted on three (3) existing T-Arms with a RAD center elevation of 168-ft above grade.
  Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- AT&T (EXISTING/RESERVED):
  Antennas: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor flush mounted with an elevation of 168-ft above grade.
  Cables: One (1) fiber cable and two (2) dc control cables running on the inside of the existing tower.

- T-MOBILE (EXISTING):
  Antennas: Three (3) EMS RR90-17-02DP panel antennas and six (6) 10"x8"x3" TMA's mounted on three (3) existing T-Arms w/ work support platforms with a RAD center elevation of 160-ft above grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- VERIZON WIRELESS (Existing to Remain):
  Antennas: Three (3) Antel BXA-70063-6CF panel antennas, six (6) Antel LPA-80080-4CF panel antennas and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on a low profile platform with a RAD center elevation of 150-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable running on the inside of the existing tower.
- VERIZON WIRELESS (Existing to Remove):
  Antennas: Three (3) Antel BXA-171085-8BF panel antennas, three (3) BXA-171063-12CF panel antennas, six (6) RFS FD9R6004/2C-3L Diplexers and three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads mounted on a low profile platform with a RAD center elevation of 150-ft above grade.
- **VERIZON (Proposed):**
  Antennas: Six (6) 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 RRH2x60-AWS remote radio heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on a low profile platform with a RAD center elevation of 150-ft above grade.
  Coax Cables: One (1) 1-5/8" ∅ fiber cable running on the inside of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

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

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

Tower Loading

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

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

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

Tower Capacity

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

- Calculated stresses **with the reinforcements outlined in drawings T-1, N-1, N-2, MI-1, S-1 and S-2 located within Section 4 of this report** were found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L5)	21.00'-48.75'	96.7%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7-ft square x 4.5-ft long reinforced concrete pier on a 23.0-ft square x 2.0-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned design documents prepared by Sabre Communications Corp. job no; 04-07104, dated July 23, 2003. The base of the tower is connected to the foundation by means of (16) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 6-ft into the concrete foundation structure.

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

Location	Vector	Proposed Reactions
Base	Shear	24 kips
	Compression	34 kips
	Moment	3028 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Pad and Pier	OTM[2]	2.0	2.06	**PASS**

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

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	65.3%	**PASS**
Base Plate	Bending	78.9%	**PASS**

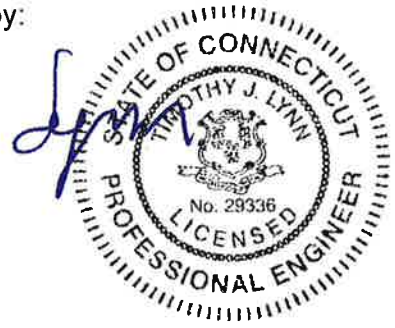
Conclusion

This analysis shows that **with the reinforcements outlined in drawings T-1, N-1, N-2, MI-1, S-1 and S-2 located within Section 4 of this report, the subject tower is adequate** to support the proposed antenna configuration.

The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

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

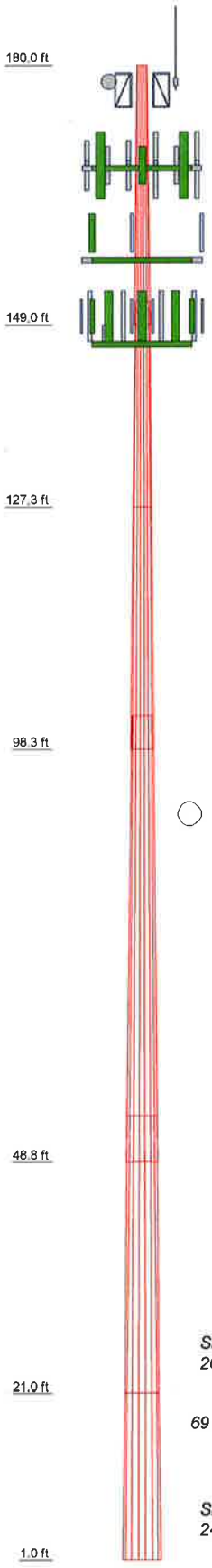
General Description of Structural Analysis Program

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

tnxTower Features:

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

Section	1	2	3	4	5	6
Length (ft)	31.00	24.50	29.00	53.50	33.25	20.00
Number of Sides	18	18	18	18	18	18
Thickness (in)	0.1875	0.2500	0.3000	0.3400	0.3400	0.3500
Socket Length (ft)	2.75		4.00	5.50		
Top Dia (in)	14.4000	20.3858	25.9100	30.9393	41.1698	48.9500
Bot Dia (in)	21.3800	25.9100	32.4400	43.1000	48.9500	53.2300
Grade	A572-65					
Weight (K)	1.1	1.5	2.7	7.2	5.5	3.8



AXIAL
40 K
SHEAR
20 K
MOMENT
2626 kip-ft

TORQUE 1 kip-ft
69 mph WIND - 0.5000 in ICE

AXIAL
34 K
SHEAR
24 K
MOMENT
3028 kip-ft

TORQUE 1 kip-ft
REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
HP2-4.7	178	(2) TMA 10"x8"x3" (T-Mobile - Existing)	157
4-ft Dual Mount Standoff	177	(2) TMA 10"x8"x3" (T-Mobile - Existing)	157
10' x 1" Dia Omni	177	12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	157
1' x 1' Panel	177		
4-ft Dual Mount Standoff	177	12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	157
Valmont T-Arm (1) (ATI - Existing)	168	12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	157
Valmont T-Arm (1) (ATI - Existing)	168		
(2) AM-X-CD-16-65-00T-RET(72") (ATI - Existing)	168	(2) TMA 10"x8"x3" (T-Mobile - Existing)	157
(2) SBNH-1D6565C (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	150
(2) P65-17-XLH-RR (ATI - Existing)	168	BXA-70063/6CF (Verizon - Existing)	150
(2) RRUS-11 (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	150
(2) RRUS-11 (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(2) RRUS-11 (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	150
800 10121 (ATI - Existing)	168	BXA-70063/6CF (Verizon - Existing)	150
800 10121 (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	150
800 10121 (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(2) 860 10025 RCU (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(2) 860 10025 RCU (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	150
(2) 860 10025 RCU (ATI - Existing)	168	BXA-70063/6CF (Verizon - Existing)	150
(2) LGP21401 TMA (ATI - Existing)	168	SBNHH-1D65B (Verizon - Proposed)	150
(2) LGP21401 TMA (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(2) LGP21401 TMA (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(4) LGP21901 Diplexer (ATI - Existing)	168	RRH2x60-07-U (Verizon - Proposed)	148
(4) LGP21901 Diplexer (ATI - Existing)	168	RRH2x60-07-U (Verizon - Proposed)	148
(4) LGP21901 Diplexer (ATI - Existing)	168	RRH2x60-AWS (Verizon - Proposed)	148
DTMABP7819VG12A TMA (ATI - Existing)	168	RRH2x60-AWS (Verizon - Proposed)	148
		RRH2x60-AWS (Verizon - Proposed)	148
		RRH2x60-PCS (Verizon - Proposed)	148
DTMABP7819VG12A TMA (ATI - Existing)	168	RRH2x60-PCS (Verizon - Proposed)	148
		RRH2x60-PCS (Verizon - Proposed)	148
DTMABP7819VG12A TMA (ATI - Existing)	168	DB-T1-6Z-8AB-0Z (Verizon - Existing)	148
		DB-T1-6Z-8AB-0Z (Verizon - Proposed)	148
Valmont T-Arm (1) (ATI - Existing)	168		
RR90-17-02DP (T-Mobile - Existing)	160	RRH2x60-07-U (Verizon - Proposed)	148
RR90-17-02DP (T-Mobile - Existing)	160	Andrew 12'-6" Low Profile Platform (Verizon - Existing)	147
RR90-17-02DP (T-Mobile - Existing)	160		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
5. Welds are fabricated with ER-70S-6 electrodes.
6. TOWER RATING: 96.7%

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

Job: 15001.066 - Somers West			
Project: 180' Sabre Monopole - 37 Bacon Rd., Enfield, CT			
Client: Verizon Wireless	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 08/28/15	Scale: N	
Path:		Dwg No.	

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56.0 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	180.00-149.00	31.00	2.75	18	14.4000	21.3800	0.1875	0.7500	A572-65 (65 ksi)
L2	149.00-127.25	24.50	0.00	18	20.3858	25.9100	0.2500	1.0000	A572-65 (65 ksi)
L3	127.25-98.25	29.00	4.00	18	25.9100	32.4400	0.3000	1.2000	A572-65 (65 ksi)
L4	98.25-48.75	53.50	5.50	18	30.9393	43.1000	0.3400	1.3600	A572-65 (65 ksi)
L5	48.75-21.00	33.25	0.00	18	41.1698	48.9500	0.3400	1.3600	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L6	21.00-1.00	20.00		18	48.9500	53.2300	0.3500	1.4000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	14.6221	8.4582	215.8525	5.0454	7.3152	29.5074	431.9890	4.2299	2.2044	11.757
	21.7098	12.6122	715.6361	7.5233	10.8610	65.8902	1432.2138	6.3073	3.4329	18.309
L2	21.3299	15.9778	818.4487	7.1482	10.3560	79.0314	1637.9743	7.9904	3.1479	12.592
	26.3097	20.3612	1693.7696	9.1093	13.1623	128.6836	3389.7679	10.1825	4.1202	16.481
L3	26.3097	24.3858	2020.6652	9.0915	13.1623	153.5194	4043.9892	12.1952	4.0322	13.441
	32.9404	30.6037	3993.9557	11.4097	16.4795	242.3587	7993.1668	15.3048	5.1814	17.271
L4	32.3398	33.0216	3906.2335	10.8628	15.7172	248.5329	7817.6070	16.5139	4.8469	14.256
	43.7649	46.1449	10659.4888	15.1798	21.8948	486.8502	21333.0037	23.0768	6.9872	20.551
L5	43.1117	44.0619	9280.1754	14.4946	20.9143	443.7244	18572.5619	22.0351	6.6475	19.551
	49.7051	52.4580	15660.3027	17.2566	24.8666	629.7726	31341.2117	26.2340	8.0168	23.579
L6	49.7051	53.9897	16110.9528	17.2530	24.8666	647.8953	32243.1048	27.0000	7.9992	22.855
	54.0512	58.7444	20753.2805	18.7724	27.0408	767.4791	41533.8687	29.3778	8.7525	25.007

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
L1 180.00-149.00				1	1	1		
L2 149.00-127.25				1	1	1		
L3 127.25-98.25				1	1	1		
L4 98.25-48.75				1	1	1		
L5 48.75-21.00				1	1	1		
L6 21.00-1.00				1	1	1		

Monopole Base Plate Data

Base Plate Data	
Base plate is square	
Base plate is grouted	√
Anchor bolt grade	A615-75
Anchor bolt size	2.2500 in
Number of bolts	16
Embedment length	60.0000 in
f'_c	4.000 ksi
Grout space	3.0000 in
Base plate grade	A572-60
Base plate thickness	2.2500 in
Bolt circle diameter	60.0000 in
Outer diameter	66.0000 in
Inner diameter	40.0000 in

Base Plate Data	
Base plate type	Plain Plate

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 1/4	C	No	Inside Pole	180.00 - 1.00	2	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
1/2	C	No	Inside Pole	180.00 - 1.00	2	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1 5/8 (AT&T - Existing)	C	No	Inside Pole	171.00 - 1.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile - Existing)	C	No	Inside Pole	161.00 - 1.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Verizon - Existing)	C	No	Inside Pole	151.00 - 1.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
#8 AWG Copper WIre (AT&T - Existing)	C	No	Inside Pole	171.00 - 1.00	2	No Ice	0.00	0.05
						1/2" Ice	0.00	0.05
RG6-Fiber (AT&T - Existing)	C	No	Inside Pole	171.00 - 1.00	1	No Ice	0.00	1.00
						1/2" Ice	0.00	1.00
HYBRIFLEX 1-5/8" (Verizon - Existing)	C	No	Inside Pole	151.00 - 1.00	1	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90
HYBRIFLEX 1-5/8" (Verizon - Proposed)	C	No	Inside Pole	151.00 - 1.00	1	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	180.00-149.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.46
L2	149.00-127.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.82
L3	127.25-98.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1.10
L4	98.25-48.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1.88
L5	48.75-21.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1.05
L6	21.00-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.76

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
L1	180.00-149.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.46
L2	149.00-127.25	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.82
L3	127.25-98.25	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1.10
L4	98.25-48.75	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1.88
L5	48.75-21.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1.05
L6	21.00-1.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.76

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	180.00-149.00	0.0000	0.0000	0.0000	0.0000
L2	149.00-127.25	0.0000	0.0000	0.0000	0.0000
L3	127.25-98.25	0.0000	0.0000	0.0000	0.0000
L4	98.25-48.75	0.0000	0.0000	0.0000	0.0000
L5	48.75-21.00	0.0000	0.0000	0.0000	0.0000
L6	21.00-1.00	0.0000	0.0000	0.0000	0.0000

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
4-ft Dual Mount Standoff	A	From Face	2.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	5.20 6.30	5.20 6.30	0.05 0.06
4-ft Dual Mount Standoff	B	From Face	2.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	5.20 6.30	5.20 6.30	0.05 0.06
10' x 1" Dia Omni	B	From Face	4.00 0.00 5.00	0.0000	177.00	No Ice 1/2" Ice	1.00 2.02	1.00 2.02	0.03 0.04
1' x 1' Panel	B	From Face	4.00 0.00 1.00	0.0000	177.00	No Ice 1/2" Ice	1.40 1.56	0.35 0.45	0.02 0.03

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
Valmont T-Arm (1)	A	From Face	4.00	0.0000	168.00	No Ice	10.54	10.54	0.34
(AT&T - Existing)			0.00			1/2" Ice	14.45	14.45	0.41
			0.00						
Valmont T-Arm (1)	B	From Face	4.00	0.0000	168.00	No Ice	10.54	10.54	0.34
(AT&T - Existing)			0.00			1/2" Ice	14.45	14.45	0.41
			0.00						
Valmont T-Arm (1)	C	From Face	4.00	0.0000	168.00	No Ice	10.54	10.54	0.34
(AT&T - Existing)			0.00			1/2" Ice	14.45	14.45	0.41
			0.00						
(2) AM-X-CD-16-65-00T-RET(72")	A	From Face	4.00	0.0000	168.00	No Ice	8.26	4.64	0.05
			0.00			1/2" Ice	8.81	5.09	0.10
(AT&T - Existing)			0.00						
(2) SBNH-1D6565C	B	From Face	4.00	0.0000	168.00	No Ice	11.41	7.70	0.06
(AT&T - Existing)			0.00			1/2" Ice	12.03	8.29	0.13
			0.00						
(2) P65-17-XLH-RR	C	From Face	4.00	0.0000	168.00	No Ice	11.47	6.80	0.06
(AT&T - Existing)			0.00			1/2" Ice	12.08	7.38	0.12
			0.00						
(2) RRUS-11	A	From Face	0.50	0.0000	168.00	No Ice	0.00	1.25	0.05
(AT&T - Existing)			0.00			1/2" Ice	0.00	1.41	0.07
			0.00						
(2) RRUS-11	B	From Face	0.50	0.0000	168.00	No Ice	0.00	1.25	0.05
(AT&T - Existing)			0.00			1/2" Ice	0.00	1.41	0.07
			0.00						
(2) RRUS-11	C	From Face	0.50	0.0000	168.00	No Ice	0.00	1.25	0.05
(AT&T - Existing)			0.00			1/2" Ice	0.00	1.41	0.07
			0.00						
DC6-48-60-18-8F Surge Arrestor	C	From Face	0.50	0.0000	168.00	No Ice	2.23	2.23	0.02
			0.00			1/2" Ice	2.45	2.45	0.04
(AT&T - Existing)			0.00						
800 10121	A	From Face	4.00	0.0000	168.00	No Ice	5.46	3.29	0.05
(AT&T - Existing)			0.00			1/2" Ice	5.88	3.64	0.08
			0.00						
800 10121	B	From Face	4.00	0.0000	168.00	No Ice	5.46	3.29	0.05
(AT&T - Existing)			0.00			1/2" Ice	5.88	3.64	0.08
			0.00						
800 10121	C	From Face	4.00	0.0000	168.00	No Ice	5.46	3.29	0.05
(AT&T - Existing)			0.00			1/2" Ice	5.88	3.64	0.08
			0.00						
(2) 860 10025 RCU	A	From Face	4.00	0.0000	168.00	No Ice	0.00	0.00	0.00
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.00	0.00
			0.00						
(2) 860 10025 RCU	B	From Face	4.00	0.0000	168.00	No Ice	0.00	0.00	0.00
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.00	0.00
			0.00						
(2) 860 10025 RCU	C	From Face	4.00	0.0000	168.00	No Ice	0.00	0.00	0.00
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.00	0.00
			0.00						
(2) LGP21401 TMA	A	From Face	4.00	0.0000	168.00	No Ice	0.95	0.37	0.02
(AT&T - Existing)			0.00			1/2" Ice	1.09	0.48	0.02
			0.00						
(2) LGP21401 TMA	B	From Face	4.00	0.0000	168.00	No Ice	0.95	0.37	0.02
(AT&T - Existing)			0.00			1/2" Ice	1.09	0.48	0.02
			0.00						
(2) LGP21401 TMA	C	From Face	4.00	0.0000	168.00	No Ice	0.95	0.37	0.02
(AT&T - Existing)			0.00			1/2" Ice	1.09	0.48	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
(4) LGP21901 Diplexer (AT&T - Existing)	A	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.12 0.17	0.01 0.01
(4) LGP21901 Diplexer (AT&T - Existing)	B	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.12 0.17	0.01 0.01
(4) LGP21901 Diplexer (AT&T - Existing)	C	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.12 0.17	0.01 0.01
DTMABP7819VG12A TMA (AT&T - Existing)	A	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.58 0.70	0.02 0.03
DTMABP7819VG12A TMA (AT&T - Existing)	B	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.58 0.70	0.02 0.03
DTMABP7819VG12A TMA (AT&T - Existing)	C	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.58 0.70	0.02 0.03
RR90-17-02DP (T-Mobile - Existing)	A	From Face	4.00 6.00 0.00	0.0000	160.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
RR90-17-02DP (T-Mobile - Existing)	B	From Face	4.00 6.00 0.00	0.0000	160.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
RR90-17-02DP (T-Mobile - Existing)	C	From Face	4.00 6.00 0.00	0.0000	160.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
(2) TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	157.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.02 0.02
(2) TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	157.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.02 0.02
(2) TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	157.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.02 0.02
12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	A	From Face	4.00 0.00 0.00	0.0000	157.00	No Ice 1/2" Ice	14.20 19.70	14.20 19.70	0.49 0.57
12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	B	From Face	4.00 0.00 0.00	0.0000	157.00	No Ice 1/2" Ice	14.20 19.70	14.20 19.70	0.49 0.57
12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	C	From Face	4.00 0.00 0.00	0.0000	157.00	No Ice 1/2" Ice	14.20 19.70	14.20 19.70	0.49 0.57
LPA-80080-4CF (Verizon - Existing)	A	From Face	4.00 6.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
SBNHH-1D65B (Verizon - Proposed)	A	From Face	4.00 4.00 0.00	0.0000	150.00	No Ice 1/2" Ice	8.33 8.88	5.34 5.79	0.04 0.09
BXA-70063/6CF (Verizon - Existing)	A	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.01 0.05
SBNHH-1D65B (Verizon - Proposed)	A	From Face	4.00 -4.00	0.0000	150.00	No Ice 1/2" Ice	8.33 8.88	5.34 5.79	0.04 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						
LPA-80080-4CF	A	From Face	4.00	0.0000	150.00	No Ice	2.62	6.06	0.01
(Verizon - Existing)			-6.00			1/2" Ice	2.92	6.45	0.05
			0.00						
LPA-80080-4CF	B	From Face	4.00	0.0000	150.00	No Ice	2.62	6.06	0.01
(Verizon - Existing)			6.00			1/2" Ice	2.92	6.45	0.05
			0.00						
SBNHH-1D65B	B	From Face	4.00	0.0000	150.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
BXA-70063/6CF	B	From Face	4.00	0.0000	150.00	No Ice	7.73	4.16	0.01
(Verizon - Existing)			0.00			1/2" Ice	8.27	4.60	0.05
			0.00						
SBNHH-1D65B	B	From Face	4.00	0.0000	150.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			-4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
LPA-80080-4CF	B	From Face	4.00	0.0000	150.00	No Ice	2.62	6.06	0.01
(Verizon - Existing)			-6.00			1/2" Ice	2.92	6.45	0.05
			0.00						
LPA-80080-4CF	C	From Face	4.00	0.0000	150.00	No Ice	2.62	6.06	0.01
(Verizon - Existing)			6.00			1/2" Ice	2.92	6.45	0.05
			0.00						
SBNHH-1D65B	C	From Face	4.00	0.0000	150.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
BXA-70063/6CF	C	From Face	4.00	0.0000	150.00	No Ice	7.73	4.16	0.01
(Verizon - Existing)			0.00			1/2" Ice	8.27	4.60	0.05
			0.00						
SBNHH-1D65B	C	From Face	4.00	0.0000	150.00	No Ice	8.33	5.34	0.04
(Verizon - Proposed)			-4.00			1/2" Ice	8.88	5.79	0.09
			0.00						
LPA-80080-4CF	C	From Face	4.00	0.0000	150.00	No Ice	2.62	6.06	0.01
(Verizon - Existing)			-6.00			1/2" Ice	2.92	6.45	0.05
			0.00						
RRH2x60-07-U	A	From Face	4.00	0.0000	148.00	No Ice	0.00	1.63	0.05
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.83	0.07
			0.00						
RRH2x60-07-U	B	From Face	4.00	0.0000	148.00	No Ice	0.00	1.63	0.05
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.83	0.07
			0.00						
RRH2x60-07-U	C	From Face	4.00	0.0000	148.00	No Ice	0.00	1.63	0.05
(Verizon - Proposed)			0.00			1/2" Ice	0.00	1.83	0.07
			0.00						
RRH2x60-AWS	A	From Face	4.00	0.0000	148.00	No Ice	0.00	2.07	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	0.00	2.35	0.08
			0.00						
RRH2x60-AWS	B	From Face	4.00	0.0000	148.00	No Ice	0.00	2.07	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	0.00	2.35	0.08
			0.00						
RRH2x60-AWS	C	From Face	4.00	0.0000	148.00	No Ice	0.00	2.07	0.06
(Verizon - Proposed)			-4.00			1/2" Ice	0.00	2.35	0.08
			0.00						
RRH2x60-PCS	A	From Face	4.00	0.0000	148.00	No Ice	0.00	1.55	0.06
(Verizon - Proposed)			4.00			1/2" Ice	0.00	1.74	0.07
			0.00						
RRH2x60-PCS	B	From Face	4.00	0.0000	148.00	No Ice	0.00	1.55	0.06
(Verizon - Proposed)			4.00			1/2" Ice	0.00	1.74	0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
RRH2x60-PCS	C	From Face	4.00	0.0000	148.00	No Ice	0.00	1.55	0.06
(Verizon - Proposed)			4.00			1/2" Ice	0.00	1.74	0.07
			0.00						
DB-T1-6Z-8AB-0Z	A	From Face	4.00	0.0000	148.00	No Ice	5.60	2.33	0.04
(Verizon - Existing)			0.00			1/2" Ice	5.92	2.56	0.08
			0.00						
DB-T1-6Z-8AB-0Z	C	From Face	4.00	0.0000	148.00	No Ice	0.00	2.33	0.04
(Verizon - Proposed)			0.00			1/2" Ice	0.00	2.56	0.08
			0.00						
Andrew 12'-6" Low Profile Platform	C	None		0.0000	147.00	No Ice	14.45	14.45	1.30
(Verizon - Existing)						1/2" Ice	19.00	19.00	1.69

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
HP2-4.7	A	Paraboloid w/Shroud (HP)	From Face	4.00 0.00 0.00	Worst		178.00	2.00	No Ice 1/2" Ice	3.14 3.41	0.03 0.04

Tower Pressures - No Ice

$G_H = 1.690$

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
L1	163.60	1.58	25.88	46.216	A	0.000	46.216	46.216	100.00	0.000	0.000
180.00-149.00					B	0.000	46.216		100.00	0.000	0.000
					C	0.000	46.216		100.00	0.000	0.000
L2	137.75	1.504	24.64	42.518	A	0.000	42.518	42.518	100.00	0.000	0.000
149.00-127.25					B	0.000	42.518		100.00	0.000	0.000
					C	0.000	42.518		100.00	0.000	0.000
L3	112.21	1.419	23.24	70.506	A	0.000	70.506	70.506	100.00	0.000	0.000
127.25-98.25					B	0.000	70.506		100.00	0.000	0.000
					C	0.000	70.506		100.00	0.000	0.000
L4 98.25-48.75	72.86	1.254	20.44	154.581	A	0.000	154.581	154.581	100.00	0.000	0.000
					B	0.000	154.581		100.00	0.000	0.000
					C	0.000	154.581		100.00	0.000	0.000
L5 48.75-21.00	34.55	1.013	16.60	105.689	A	0.000	105.689	105.689	100.00	0.000	0.000
					B	0.000	105.689		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	105.689		100.00	0.000	0.000
L6 21.00-1.00	10.86	1	16.38	85.150	A	0.000	85.150	85.150	100.00	0.000	0.000
					B	0.000	85.150		100.00	0.000	0.000
					C	0.000	85.150		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1	163.60	1.58	19.41	0.5000	48.799	A	0.000	48.799	48.799	100.00	0.000	0.000
180.00-149.00						B	0.000	48.799		100.00	0.000	0.000
						C	0.000	48.799		100.00	0.000	0.000
L2	137.75	1.504	18.48	0.5000	44.330	A	0.000	44.330	44.330	100.00	0.000	0.000
149.00-127.25						B	0.000	44.330		100.00	0.000	0.000
						C	0.000	44.330		100.00	0.000	0.000
L3 127.25-98.25	112.21	1.419	17.43	0.5000	72.923	A	0.000	72.923	72.923	100.00	0.000	0.000
						B	0.000	72.923		100.00	0.000	0.000
						C	0.000	72.923		100.00	0.000	0.000
L4 98.25-48.75	72.86	1.254	15.33	0.5000	158.706	A	0.000	158.706	158.706	100.00	0.000	0.000
						B	0.000	158.706		100.00	0.000	0.000
						C	0.000	158.706		100.00	0.000	0.000
L5 48.75-21.00	34.55	1.013	12.45	0.5000	108.002	A	0.000	108.002	108.002	100.00	0.000	0.000
						B	0.000	108.002		100.00	0.000	0.000
						C	0.000	108.002		100.00	0.000	0.000
L6 21.00-1.00	10.86	1	12.29	0.5000	86.817	A	0.000	86.817	86.817	100.00	0.000	0.000
						B	0.000	86.817		100.00	0.000	0.000
						C	0.000	86.817		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

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
L1	163.60	1.58	10.11	46.216	A	0.000	46.216	46.216	100.00	0.000	0.000
180.00-149.00					B	0.000	46.216		100.00	0.000	0.000
					C	0.000	46.216		100.00	0.000	0.000
L2	137.75	1.504	9.63	42.518	A	0.000	42.518	42.518	100.00	0.000	0.000
149.00-127.25					B	0.000	42.518		100.00	0.000	0.000
					C	0.000	42.518		100.00	0.000	0.000
L3	112.21	1.419	9.08	70.506	A	0.000	70.506	70.506	100.00	0.000	0.000
127.25-98.25					B	0.000	70.506		100.00	0.000	0.000
					C	0.000	70.506		100.00	0.000	0.000
L4 98.25-48.75	72.86	1.254	7.98	154.581	A	0.000	154.581	154.581	100.00	0.000	0.000
					B	0.000	154.581		100.00	0.000	0.000
					C	0.000	154.581		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L5 48.75-21.00	34.55	1.013	6.48	105.689	A	0.000	105.689	105.689	100.00	0.000	0.000
					B	0.000	105.689		100.00	0.000	0.000
					C	0.000	105.689		100.00	0.000	0.000
L6 21.00-1.00	10.86	1	6.40	85.150	A	0.000	85.150	85.150	100.00	0.000	0.000
					B	0.000	85.150		100.00	0.000	0.000
					C	0.000	85.150		100.00	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
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	1.31	42.38	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	0.82	1.51	A	1	0.65	1	1	1	42.518	1.15	52.92	C
149.00-127.25			B	1	0.65	1	1	1	42.518			
			C	1	0.65	1	1	1	42.518			
L3	1.10	2.71	A	1	0.65	1	1	1	70.506	1.80	62.07	C
127.25-98.25			B	1	0.65	1	1	1	70.506			
			C	1	0.65	1	1	1	70.506			
L4	1.88	7.21	A	1	0.65	1	1	1	154.581	3.47	70.10	C
98.25-48.75			B	1	0.65	1	1	1	154.581			
			C	1	0.65	1	1	1	154.581			
L5	1.05	5.46	A	1	0.65	1	1	1	105.689	1.93	69.45	C
48.75-21.00			B	1	0.65	1	1	1	105.689			
			C	1	0.65	1	1	1	105.689			
L6 21.00-1.00	0.76	3.84	A	1	0.65	1	1	1	85.150	1.53	76.63	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	6.07	21.84						OTM	900.32 kip-ft	11.19		

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
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	1.31	42.38	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	0.82	1.51	A	1	0.65	1	1	1	42.518	1.15	52.92	C
149.00-127.25			B	1	0.65	1	1	1	42.518			
			C	1	0.65	1	1	1	42.518			
L3	1.10	2.71	A	1	0.65	1	1	1	70.506	1.80	62.07	C
127.25-98.25			B	1	0.65	1	1	1	70.506			
			C	1	0.65	1	1	1	70.506			
L4	1.88	7.21	A	1	0.65	1	1	1	154.581	3.47	70.10	C
98.25-48.75			B	1	0.65	1	1	1	154.581			
			C	1	0.65	1	1	1	154.581			
L5	1.05	5.46	A	1	0.65	1	1	1	105.689	1.93	69.45	C

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
48.75-21.00			B	1	0.65	1	1	1	105.689			
			C	1	0.65	1	1	1	105.689			
L6 21.00-1.00	0.76	3.84	A	1	0.65	1	1	1	85.150	1.53	76.63	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	6.07	21.84						OTM	900.32 kip-ft	11.19		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	1.31	42.38	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	0.82	1.51	A	1	0.65	1	1	1	42.518	1.15	52.92	C
149.00-127.25			B	1	0.65	1	1	1	42.518			
			C	1	0.65	1	1	1	42.518			
L3	1.10	2.71	A	1	0.65	1	1	1	70.506	1.80	62.07	C
127.25-98.25			B	1	0.65	1	1	1	70.506			
			C	1	0.65	1	1	1	70.506			
L4	1.88	7.21	A	1	0.65	1	1	1	154.581	3.47	70.10	C
98.25-48.75			B	1	0.65	1	1	1	154.581			
			C	1	0.65	1	1	1	154.581			
L5	1.05	5.46	A	1	0.65	1	1	1	105.689	1.93	69.45	C
48.75-21.00			B	1	0.65	1	1	1	105.689			
			C	1	0.65	1	1	1	105.689			
L6 21.00-1.00	0.76	3.84	A	1	0.65	1	1	1	85.150	1.53	76.63	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	6.07	21.84						OTM	900.32 kip-ft	11.19		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.46	1.46	A	1	0.65	1	1	1	48.799	1.04	33.56	C
180.00-149.00			B	1	0.65	1	1	1	48.799			
			C	1	0.65	1	1	1	48.799			
L2	0.82	1.84	A	1	0.65	1	1	1	44.330	0.90	41.38	C
149.00-127.25			B	1	0.65	1	1	1	44.330			
			C	1	0.65	1	1	1	44.330			
L3	1.10	3.24	A	1	0.65	1	1	1	72.923	1.40	48.15	C
127.25-98.25			B	1	0.65	1	1	1	72.923			
			C	1	0.65	1	1	1	72.923			
L4	1.88	8.37	A	1	0.65	1	1	1	158.706	2.67	53.98	C

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
98.25-48.75			B	1	0.65	1	1	1	158.706			
			C	1	0.65	1	1	1	158.706			
L5	1.05	6.25	A	1	0.65	1	1	1	108.002	1.48	53.23	C
48.75-21.00			B	1	0.65	1	1	1	108.002			
			C	1	0.65	1	1	1	108.002			
L6 21.00-1.00	0.76	4.47	A	1	0.65	1	1	1	86.817	1.17	58.59	C
			B	1	0.65	1	1	1	86.817			
			C	1	0.65	1	1	1	86.817			
Sum Weight:	6.07	25.63						OTM	700.64 kip-ft	8.66		

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
L1	0.46	1.46	A	1	0.65	1	1	1	48.799	1.04	33.56	C
180.00-149.00			B	1	0.65	1	1	1	48.799			
			C	1	0.65	1	1	1	48.799			
L2	0.82	1.84	A	1	0.65	1	1	1	44.330	0.90	41.38	C
149.00-127.25			B	1	0.65	1	1	1	44.330			
			C	1	0.65	1	1	1	44.330			
L3	1.10	3.24	A	1	0.65	1	1	1	72.923	1.40	48.15	C
127.25-98.25			B	1	0.65	1	1	1	72.923			
			C	1	0.65	1	1	1	72.923			
L4	1.88	8.37	A	1	0.65	1	1	1	158.706	2.67	53.98	C
98.25-48.75			B	1	0.65	1	1	1	158.706			
			C	1	0.65	1	1	1	158.706			
L5	1.05	6.25	A	1	0.65	1	1	1	108.002	1.48	53.23	C
48.75-21.00			B	1	0.65	1	1	1	108.002			
			C	1	0.65	1	1	1	108.002			
L6 21.00-1.00	0.76	4.47	A	1	0.65	1	1	1	86.817	1.17	58.59	C
			B	1	0.65	1	1	1	86.817			
			C	1	0.65	1	1	1	86.817			
Sum Weight:	6.07	25.63						OTM	700.64 kip-ft	8.66		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.46	A	1	0.65	1	1	1	48.799	1.04	33.56	C
180.00-149.00			B	1	0.65	1	1	1	48.799			
			C	1	0.65	1	1	1	48.799			
L2	0.82	1.84	A	1	0.65	1	1	1	44.330	0.90	41.38	C
149.00-127.25			B	1	0.65	1	1	1	44.330			
			C	1	0.65	1	1	1	44.330			
L3	1.10	3.24	A	1	0.65	1	1	1	72.923	1.40	48.15	C

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
127.25-98.25			B	1	0.65	1	1	1	72.923			
			C	1	0.65	1	1	1	72.923			
L4	1.88	8.37	A	1	0.65	1	1	1	158.706	2.67	53.98	C
98.25-48.75			B	1	0.65	1	1	1	158.706			
			C	1	0.65	1	1	1	158.706			
L5	1.05	6.25	A	1	0.65	1	1	1	108.002	1.48	53.23	C
48.75-21.00			B	1	0.65	1	1	1	108.002			
			C	1	0.65	1	1	1	108.002			
L6 21.00-1.00	0.76	4.47	A	1	0.65	1	1	1	86.817	1.17	58.59	C
			B	1	0.65	1	1	1	86.817			
			C	1	0.65	1	1	1	86.817			
Sum Weight:	6.07	25.63						OTM	700.64 kip-ft	8.66		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	0.51	16.55	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	0.82	1.51	A	1	0.65	1	1	1	42.518	0.45	20.67	C
149.00-127.25			B	1	0.65	1	1	1	42.518			
			C	1	0.65	1	1	1	42.518			
L3	1.10	2.71	A	1	0.65	1	1	1	70.506	0.70	24.25	C
127.25-98.25			B	1	0.65	1	1	1	70.506			
			C	1	0.65	1	1	1	70.506			
L4	1.88	7.21	A	1	0.65	1	1	1	154.581	1.36	27.38	C
98.25-48.75			B	1	0.65	1	1	1	154.581			
			C	1	0.65	1	1	1	154.581			
L5	1.05	5.46	A	1	0.65	1	1	1	105.689	0.75	27.13	C
48.75-21.00			B	1	0.65	1	1	1	105.689			
			C	1	0.65	1	1	1	105.689			
L6 21.00-1.00	0.76	3.84	A	1	0.65	1	1	1	85.150	0.60	29.93	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	6.07	21.84						OTM	351.69 kip-ft	4.37		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	0.51	16.55	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	0.82	1.51	A	1	0.65	1	1	1	42.518	0.45	20.67	C

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
149.00-127.25			B	1	0.65	1	1	1	42.518			
			C	1	0.65	1	1	1	42.518			
L3	1.10	2.71	A	1	0.65	1	1	1	70.506	0.70	24.25	C
127.25-98.25			B	1	0.65	1	1	1	70.506			
			C	1	0.65	1	1	1	70.506			
L4	1.88	7.21	A	1	0.65	1	1	1	154.581	1.36	27.38	C
98.25-48.75			B	1	0.65	1	1	1	154.581			
			C	1	0.65	1	1	1	154.581			
L5	1.05	5.46	A	1	0.65	1	1	1	105.689	0.75	27.13	C
48.75-21.00			B	1	0.65	1	1	1	105.689			
			C	1	0.65	1	1	1	105.689			
L6 21.00-1.00	0.76	3.84	A	1	0.65	1	1	1	85.150	0.60	29.93	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	6.07	21.84						OTM	351.69 kip-ft	4.37		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	0.51	16.55	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	0.82	1.51	A	1	0.65	1	1	1	42.518	0.45	20.67	C
149.00-127.25			B	1	0.65	1	1	1	42.518			
			C	1	0.65	1	1	1	42.518			
L3	1.10	2.71	A	1	0.65	1	1	1	70.506	0.70	24.25	C
127.25-98.25			B	1	0.65	1	1	1	70.506			
			C	1	0.65	1	1	1	70.506			
L4	1.88	7.21	A	1	0.65	1	1	1	154.581	1.36	27.38	C
98.25-48.75			B	1	0.65	1	1	1	154.581			
			C	1	0.65	1	1	1	154.581			
L5	1.05	5.46	A	1	0.65	1	1	1	105.689	0.75	27.13	C
48.75-21.00			B	1	0.65	1	1	1	105.689			
			C	1	0.65	1	1	1	105.689			
L6 21.00-1.00	0.76	3.84	A	1	0.65	1	1	1	85.150	0.60	29.93	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	6.07	21.84						OTM	351.69 kip-ft	4.37		

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	21.84					

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
Bracing Weight	0.00					
Total Member Self-Weight	21.84			-0.96	0.21	
Total Weight	34.04			-0.96	0.21	
Wind 0 deg - No Ice		-0.04	-23.61	-2870.17	4.85	0.21
Wind 30 deg - No Ice		11.82	-20.43	-2483.45	-1437.48	-0.08
Wind 60 deg - No Ice		20.52	-11.77	-1431.54	-2494.58	-0.36
Wind 90 deg - No Ice		23.71	0.04	3.69	-2883.21	-0.54
Wind 120 deg - No Ice		20.55	11.84	1437.68	-2499.23	-0.57
Wind 150 deg - No Ice		11.89	20.46	2486.18	-1445.52	-0.45
Wind 180 deg - No Ice		0.04	23.61	2868.26	-4.44	-0.21
Wind 210 deg - No Ice		-11.82	20.43	2481.54	1437.89	0.08
Wind 240 deg - No Ice		-20.52	11.77	1429.63	2495.00	0.36
Wind 270 deg - No Ice		-23.71	-0.04	-5.60	2883.62	0.54
Wind 300 deg - No Ice		-20.55	-11.84	-1439.59	2499.64	0.57
Wind 330 deg - No Ice		-11.89	-20.46	-2488.09	1445.94	0.45
Member Ice	3.79					
Total Weight Ice	40.37			-0.85	0.19	
Wind 0 deg - Ice		-0.03	-19.66	-2448.33	4.07	0.28
Wind 30 deg - Ice		9.85	-17.01	-2118.49	-1226.40	-0.05
Wind 60 deg - Ice		17.09	-9.80	-1221.23	-2128.21	-0.36
Wind 90 deg - Ice		19.75	0.03	3.03	-2459.72	-0.57
Wind 120 deg - Ice		17.12	9.86	1226.25	-2132.09	-0.63
Wind 150 deg - Ice		9.90	17.04	2120.67	-1233.12	-0.52
Wind 180 deg - Ice		0.03	19.66	2446.63	-3.68	-0.28
Wind 210 deg - Ice		-9.85	17.01	2116.79	1226.79	0.05
Wind 240 deg - Ice		-17.09	9.80	1219.53	2128.60	0.36
Wind 270 deg - Ice		-19.75	-0.03	-4.73	2460.10	0.57
Wind 300 deg - Ice		-17.12	-9.86	-1227.95	2132.48	0.63
Wind 330 deg - Ice		-9.90	-17.04	-2122.37	1233.51	0.52
Total Weight	34.04			-0.96	0.21	
Wind 0 deg - Service		-0.01	-9.22	-1121.74	2.02	0.08
Wind 30 deg - Service		4.62	-7.98	-970.68	-561.39	-0.03
Wind 60 deg - Service		8.01	-4.60	-559.78	-974.32	-0.14
Wind 90 deg - Service		9.26	0.01	0.86	-1126.13	-0.21
Wind 120 deg - Service		8.03	4.62	561.01	-976.13	-0.22
Wind 150 deg - Service		4.64	7.99	970.58	-564.53	-0.18
Wind 180 deg - Service		0.01	9.22	1119.83	-1.61	-0.08
Wind 210 deg - Service		-4.62	7.98	968.77	561.80	0.03
Wind 240 deg - Service		-8.01	4.60	557.87	974.73	0.14
Wind 270 deg - Service		-9.26	-0.01	-2.77	1126.54	0.21
Wind 300 deg - Service		-8.03	-4.62	-562.92	976.55	0.22
Wind 330 deg - Service		-4.64	-7.99	-972.49	564.95	0.18

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	180 - 149	Pole	Max Tension	36	0.00	-0.00	-0.00
			Max. Compression	14	-6.90	-0.14	1.07
			Max. Mx	11	-3.93	132.36	0.38
			Max. My	2	-3.92	-0.45	134.15
			Max. Vy	11	-9.52	132.36	0.38
			Max. Vx	2	-9.59	-0.45	134.15
			Max. Torque	10			-1.23
L2	149 - 127.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-13.25	0.20	0.90
			Max. Mx	11	-8.12	496.54	1.06
			Max. My	2	-8.14	0.33	496.11
			Max. Vy	11	-16.10	496.54	1.06
			Max. Vx	2	-15.99	0.33	496.11
			Max. Torque	6			0.98
L3	127.25 - 98.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-16.95	0.20	0.90
			Max. Mx	11	-11.72	917.96	2.04
			Max. My	2	-11.74	1.28	914.84
			Max. Vy	11	-17.65	917.96	2.04
			Max. Vx	2	-17.55	1.28	914.84
			Max. Torque	19			0.62
L4	98.25 - 48.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-26.63	0.20	0.90
			Max. Mx	11	-20.99	1841.20	3.90

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-21.00	3.10	1832.88
			Max. Vy	11	-20.77	1841.20	3.90
			Max. Vx	2	-20.66	3.10	1832.88
			Max. Torque	19			0.61
L5	48.75 - 21	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-35.14	0.20	0.90
			Max. Mx	11	-29.09	2563.96	5.15
			Max. My	2	-29.09	4.34	2552.08
			Max. Vy	11	-22.64	2563.96	5.15
			Max. Vx	2	-22.53	4.34	2552.08
			Max. Torque	19			0.61
L6	21 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-40.37	0.20	0.90
			Max. Mx	11	-34.03	3027.26	5.89
			Max. My	2	-34.03	5.08	3013.28
			Max. Vy	11	-23.72	3027.26	5.89
			Max. Vx	2	-23.62	5.08	3013.28
			Max. Torque	19			0.61

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	18	40.37	-19.75	-0.03
	Max. H_x	11	34.04	23.71	0.04
	Max. H_z	2	34.04	0.04	23.61
	Max. M_x	2	3013.28	0.04	23.61
	Max. M_z	5	3026.82	-23.71	-0.04
	Max. Torsion	19	0.61	-17.12	-9.86
	Min. Vert	1	34.04	0.00	0.00
	Min. H_x	5	34.04	-23.71	-0.04
	Min. H_z	8	34.04	-0.04	-23.61
	Min. M_x	8	-3011.22	-0.04	-23.61
	Min. M_z	11	-3027.26	23.71	0.04
	Min. Torsion	25	-0.60	17.12	9.86

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	34.04	0.00	-0.00	-1.00	0.22	0.00
Dead+Wind 0 deg - No Ice	34.04	-0.04	-23.61	-3013.28	5.08	0.26
Dead+Wind 30 deg - No Ice	34.04	11.82	-20.43	-2607.30	-1509.13	-0.02
Dead+Wind 60 deg - No Ice	34.04	20.52	-11.77	-1502.95	-2618.88	-0.29
Dead+Wind 90 deg - No Ice	34.04	23.71	0.04	3.81	-3026.82	-0.48
Dead+Wind 120 deg - No Ice	34.04	20.55	11.84	1509.25	-2623.70	-0.55
Dead+Wind 150 deg - No Ice	34.04	11.89	20.46	2610.05	-1517.52	-0.46
Dead+Wind 180 deg - No Ice	34.04	0.04	23.61	3011.22	-4.62	-0.25
Dead+Wind 210 deg - No Ice	34.04	-11.82	20.43	2605.23	1509.59	0.02
Dead+Wind 240 deg - No Ice	34.04	-20.52	11.77	1500.86	2619.33	0.29
Dead+Wind 270 deg - No Ice	34.04	-23.71	-0.04	-5.89	3027.26	0.48

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 300 deg - No Ice	34.04	-20.55	-11.84	-1511.31	2624.14	0.54
Dead+Wind 330 deg - No Ice	34.04	-11.89	-20.46	-2612.10	1517.96	0.46
Dead+Ice+Temp	40.37	-0.00	-0.00	-0.90	0.20	0.00
Dead+Wind 0 deg+Ice+Temp	40.37	-0.03	-19.66	-2612.40	4.33	0.33
Dead+Wind 30 deg+Ice+Temp	40.37	9.85	-17.01	-2260.48	-1308.56	0.03
Dead+Wind 60 deg+Ice+Temp	40.37	17.09	-9.80	-1303.11	-2270.74	-0.28
Dead+Wind 90 deg+Ice+Temp	40.37	19.75	0.03	3.15	-2624.40	-0.51
Dead+Wind 120 deg+Ice+Temp	40.37	17.12	9.86	1308.30	-2274.82	-0.61
Dead+Wind 150 deg+Ice+Temp	40.37	9.90	17.04	2262.66	-1315.66	-0.54
Dead+Wind 180 deg+Ice+Temp	40.37	0.03	19.66	2610.50	-3.88	-0.33
Dead+Wind 210 deg+Ice+Temp	40.37	-9.85	17.01	2258.57	1309.00	-0.03
Dead+Wind 240 deg+Ice+Temp	40.37	-17.09	9.80	1301.19	2271.16	0.28
Dead+Wind 270 deg+Ice+Temp	40.37	-19.75	-0.03	-5.06	2624.82	0.51
Dead+Wind 300 deg+Ice+Temp	40.37	-17.12	-9.86	-1310.20	2275.24	0.60
Dead+Wind 330 deg+Ice+Temp	40.37	-9.90	-17.04	-2264.55	1316.09	0.54
Dead+Wind 0 deg - Service	34.04	-0.01	-9.22	-1181.07	2.13	0.10
Dead+Wind 30 deg - Service	34.04	4.62	-7.98	-1022.05	-591.05	-0.01
Dead+Wind 60 deg - Service	34.04	8.01	-4.60	-589.43	-1025.80	-0.12
Dead+Wind 90 deg - Service	34.04	9.26	0.01	0.84	-1185.60	-0.19
Dead+Wind 120 deg - Service	34.04	8.03	4.62	590.59	-1027.69	-0.22
Dead+Wind 150 deg - Service	34.04	4.64	7.99	1021.82	-594.34	-0.19
Dead+Wind 180 deg - Service	34.04	0.01	9.22	1178.95	-1.67	-0.10
Dead+Wind 210 deg - Service	34.04	-4.62	7.98	1019.93	591.51	0.01
Dead+Wind 240 deg - Service	34.04	-8.01	4.60	587.31	1026.26	0.12
Dead+Wind 270 deg - Service	34.04	-9.26	-0.01	-2.96	1186.06	0.19
Dead+Wind 300 deg - Service	34.04	-8.03	-4.62	-592.72	1028.15	0.22
Dead+Wind 330 deg - Service	34.04	-4.64	-7.99	-1023.94	594.80	0.19

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	-34.04	0.00	0.00	34.04	0.00	0.000%
2	-0.04	-34.04	-23.61	0.04	34.04	23.61	0.000%
3	11.82	-34.04	-20.43	-11.82	34.04	20.43	0.000%
4	20.52	-34.04	-11.77	-20.52	34.04	11.77	0.000%
5	23.71	-34.04	0.04	-23.71	34.04	-0.04	0.000%
6	20.55	-34.04	11.84	-20.55	34.04	-11.84	0.000%
7	11.89	-34.04	20.46	-11.89	34.04	-20.46	0.000%
8	0.04	-34.04	23.61	-0.04	34.04	-23.61	0.000%
9	-11.82	-34.04	20.43	11.82	34.04	-20.43	0.000%
10	-20.52	-34.04	11.77	20.52	34.04	-11.77	0.000%
11	-23.71	-34.04	-0.04	23.71	34.04	0.04	0.000%
12	-20.55	-34.04	-11.84	20.55	34.04	11.84	0.000%
13	-11.89	-34.04	-20.46	11.89	34.04	20.46	0.000%
14	0.00	-40.37	0.00	0.00	40.37	0.00	0.000%
15	-0.03	-40.37	-19.66	0.03	40.37	19.66	0.000%
16	9.85	-40.37	-17.01	-9.85	40.37	17.01	0.000%
17	17.09	-40.37	-9.80	-17.09	40.37	9.80	0.000%
18	19.75	-40.37	0.03	-19.75	40.37	-0.03	0.000%
19	17.12	-40.37	9.86	-17.12	40.37	-9.86	0.000%
20	9.90	-40.37	17.04	-9.90	40.37	-17.04	0.000%
21	0.03	-40.37	19.66	-0.03	40.37	-19.66	0.000%
22	-9.85	-40.37	17.01	9.85	40.37	-17.01	0.000%
23	-17.09	-40.37	9.80	17.09	40.37	-9.80	0.000%
24	-19.75	-40.37	-0.03	19.75	40.37	0.03	0.000%
25	-17.12	-40.37	-9.86	17.12	40.37	9.86	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
26	-9.90	-40.37	-17.04	9.90	40.37	17.04	0.000%
27	-0.01	-34.04	-9.22	0.01	34.04	9.22	0.000%
28	4.62	-34.04	-7.98	-4.62	34.04	7.98	0.000%
29	8.01	-34.04	-4.60	-8.01	34.04	4.60	0.000%
30	9.26	-34.04	0.01	-9.26	34.04	-0.01	0.000%
31	8.03	-34.04	4.62	-8.03	34.04	-4.62	0.000%
32	4.64	-34.04	7.99	-4.64	34.04	-7.99	0.000%
33	0.01	-34.04	9.22	-0.01	34.04	-9.22	0.000%
34	-4.62	-34.04	7.98	4.62	34.04	-7.98	0.000%
35	-8.01	-34.04	4.60	8.01	34.04	-4.60	0.000%
36	-9.26	-34.04	-0.01	9.26	34.04	0.01	0.000%
37	-8.03	-34.04	-4.62	8.03	34.04	4.62	0.000%
38	-4.64	-34.04	-7.99	4.64	34.04	7.99	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00003910
3	Yes	6	0.00000001	0.00040553
4	Yes	6	0.00000001	0.00040790
5	Yes	5	0.00000001	0.00009640
6	Yes	6	0.00000001	0.00040240
7	Yes	6	0.00000001	0.00041082
8	Yes	5	0.00000001	0.00008952
9	Yes	6	0.00000001	0.00040551
10	Yes	6	0.00000001	0.00040302
11	Yes	5	0.00000001	0.00015428
12	Yes	6	0.00000001	0.00041125
13	Yes	6	0.00000001	0.00040295
14	Yes	4	0.00000001	0.00001350
15	Yes	6	0.00000001	0.00010542
16	Yes	7	0.00000001	0.00007991
17	Yes	7	0.00000001	0.00008031
18	Yes	6	0.00000001	0.00010652
19	Yes	7	0.00000001	0.00007922
20	Yes	7	0.00000001	0.00008100
21	Yes	6	0.00000001	0.00010625
22	Yes	7	0.00000001	0.00007975
23	Yes	7	0.00000001	0.00007934
24	Yes	6	0.00000001	0.00010782
25	Yes	7	0.00000001	0.00008114
26	Yes	7	0.00000001	0.00007937
27	Yes	4	0.00000001	0.00053363
28	Yes	6	0.00000001	0.00006479
29	Yes	6	0.00000001	0.00006550
30	Yes	4	0.00000001	0.00069066
31	Yes	5	0.00000001	0.00098334
32	Yes	6	0.00000001	0.00006567
33	Yes	4	0.00000001	0.00057166
34	Yes	5	0.00000001	0.00099360
35	Yes	5	0.00000001	0.00098545
36	Yes	4	0.00000001	0.00076285
37	Yes	6	0.00000001	0.00006662
38	Yes	5	0.00000001	0.00099590

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 149	69.944	37	3.6377	0.0117
L2	151.75 - 127.25	48.816	37	3.3940	0.0031
L3	127.25 - 98.25	32.861	37	2.7477	0.0016
L4	102.25 - 48.75	20.329	37	2.0401	0.0009
L5	54.25 - 21	5.292	37	0.9483	0.0003
L6	21 - 1	0.702	37	0.3400	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	HP2-4.7	37	68.411	3.6299	0.0109	17046
177.00	4-ft Dual Mount Standoff	37	67.645	3.6259	0.0105	17046
168.00	Valmont T-Arm (1)	37	60.787	3.5816	0.0072	7101
160.00	RR90-17-02DP	37	54.802	3.5134	0.0049	4260
157.00	(2) TMA 10"x8"x3"	37	52.599	3.4768	0.0042	3704
150.00	LPA-80080-4CF	37	47.578	3.3603	0.0029	2876
148.00	RRH2x60-07-U	37	46.178	3.3184	0.0027	2724
147.00	Andrew 12'-6" Low Profile Platform	37	45.485	3.2961	0.0025	2655

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 149	177.512	11	9.2344	0.0304
L2	151.75 - 127.25	124.044	11	8.6223	0.0087
L3	127.25 - 98.25	83.599	11	6.9891	0.0044
L4	102.25 - 48.75	51.764	11	5.1946	0.0024
L5	54.25 - 21	13.492	12	2.4177	0.0008
L6	21 - 1	1.790	12	0.8674	0.0002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	HP2-4.7	11	173.635	9.2155	0.0284	7107
177.00	4-ft Dual Mount Standoff	11	171.697	9.2058	0.0274	7107
168.00	Valmont T-Arm (1)	11	154.347	9.0953	0.0195	2959
160.00	RR90-17-02DP	11	139.199	8.9237	0.0136	1772

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
157.00	(2) TMA 10"x8"x3"	11	133.623	8.8314	0.0118	1540
150.00	LPA-80080-4CF	11	120.908	8.5375	0.0083	1191
148.00	RRH2x60-07-U	11	117.364	8.4316	0.0076	1125
147.00	Andrew 12'-6" Low Profile Platform	11	115.607	8.3753	0.0073	1096

Base Plate Design Data

Plate Thickness	Number of Anchor Bolts	Anchor Bolt Size	Actual / Allowable Ratio Bolt Tension	Actual / Allowable Ratio Concrete Stress	Actual / Allowable Ratio Plate Stress	Actual / Allowable Ratio Stiffener Stress	Controlling Condition	Critical Ratio
in		in	K	ksi	ksi	ksi		
2.2500	16	2.2500	114.68	1.958	47.303		Plate	1.05
			131.21	2.800	45.000			✔
			0.87	0.70	1.05			

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
L1	180 - 178.513	TP21.38x14.4x0.1875	31.00	0.00	0.0	39.000	8.6574	-0.06	337.64	0.000
	178.513 - 177.026					39.000	8.8567	-0.17	345.41	0.000
	177.026 - 175.539					39.000	9.0559	-0.35	353.18	0.001
	175.539 - 174.053					39.000	9.2552	-0.29	360.95	0.001
	174.053 - 172.566					39.000	9.4544	-0.35	368.72	0.001
	172.566 - 171.079					39.000	9.6536	-0.41	376.49	0.001
	171.079 - 169.592					39.000	9.8529	-0.47	384.26	0.001
	169.592 - 168.105					39.000	10.0521	-0.53	392.03	0.001
	168.105 - 166.618					39.000	10.2513	-1.90	399.80	0.005
	166.618 - 165.132					39.000	10.4506	-1.97	407.57	0.005
	165.132 - 163.645					39.000	10.6498	-2.03	415.34	0.005
	163.645 - 162.158					39.000	10.8490	-2.10	423.11	0.005
	162.158 - 160.671					39.000	11.0483	-2.17	430.88	0.005

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 $\frac{P}{P_a}$
	160.671 - 159.184					39.000	11.2475	-2.24	438.65	0.005
	159.184 - 157.697					39.000	11.4467	-2.32	446.42	0.005
	157.697 - 156.211					39.000	11.6460	-3.67	454.19	0.008
	156.211 - 154.724					39.000	11.8452	-3.75	461.96	0.008
	154.724 - 153.237					39.000	12.0445	-3.84	469.73	0.008
	153.237 - 151.75					39.000	12.2437	-3.92	477.50	0.008
	151.75 - 149					39.000	12.6122	-1.65	491.88	0.003
L2	151.75 - 149	TP25.91x20.3858x0.25	24.50	0.00	0.0	39.000	16.4698	-2.36	642.32	0.004
	149 - 147.855					39.000	16.6746	-4.64	650.31	0.007
	147.855 - 146.711					39.000	16.8794	-5.95	658.30	0.009
	146.711 - 145.566					39.000	17.0842	-6.07	666.28	0.009
	145.566 - 144.421					39.000	17.2890	-6.18	674.27	0.009
	144.421 - 143.276					39.000	17.4938	-6.31	682.26	0.009
	143.276 - 142.132					39.000	17.6987	-6.43	690.25	0.009
	142.132 - 140.987					39.000	17.9035	-6.55	698.24	0.009
	140.987 - 139.842					39.000	18.1083	-6.68	706.22	0.009
	139.842 - 138.697					39.000	18.3131	-6.80	714.21	0.010
	138.697 - 137.553					39.000	18.5179	-6.93	722.20	0.010
	137.553 - 136.408					39.000	18.7227	-7.06	730.19	0.010
	136.408 - 135.263					39.000	18.9275	-7.19	738.17	0.010
	135.263 - 134.118					39.000	19.1323	-7.32	746.16	0.010
	134.118 - 132.974					39.000	19.3372	-7.43	754.15	0.010
	132.974 - 131.829					39.000	19.5420	-7.57	762.14	0.010
	131.829 - 130.684					39.000	19.7468	-7.71	770.12	0.010
	130.684 - 129.539					39.000	19.9516	-7.84	778.11	0.010
	129.539 - 128.395					39.000	20.1564	-7.98	786.10	0.010
	128.395 - 127.25					39.000	20.3612	-8.12	794.09	0.010
L3	127.25 - 125.934	TP32.44x25.91x0.3	29.00	0.00	0.0	39.000	24.6680	-8.30	962.05	0.009
	125.934 - 124.618					39.000	24.9501	-8.48	973.05	0.009
	124.618 - 123.303					39.000	25.2322	-8.65	984.06	0.009
	123.303 - 121.987					39.000	25.5143	-8.83	995.06	0.009
	121.987 -					39.000	25.7964	-9.02	1006.06	0.009

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 $\frac{P}{P_a}$
	120.671									
	120.671 - 119.355					39.000	26.0785	-9.20	1017.06	0.009
	119.355 - 118.039					39.000	26.3607	-9.38	1028.07	0.009
	118.039 - 116.724					39.000	26.6428	-9.57	1039.07	0.009
	116.724 - 115.408					39.000	26.9249	-9.76	1050.07	0.009
	115.408 - 114.092					39.000	27.2070	-9.95	1061.07	0.009
	114.092 - 112.776					39.000	27.4891	-10.14	1072.08	0.009
	112.776 - 111.461					39.000	27.7712	-10.33	1083.08	0.010
	111.461 - 110.145					39.000	28.0534	-10.53	1094.08	0.010
	110.145 - 108.829					39.000	28.3355	-10.72	1105.08	0.010
	108.829 - 107.513					39.000	28.6176	-10.92	1116.09	0.010
	107.513 - 106.197					39.000	28.8997	-11.12	1127.09	0.010
	106.197 - 104.882					39.000	29.1818	-11.32	1138.09	0.010
	104.882 - 103.566					39.000	29.4640	-11.52	1149.09	0.010
	103.566 - 102.25					39.000	29.7461	-11.72	1160.10	0.010
	102.25 - 98.25					39.000	30.6037	-6.07	1193.54	0.005
L4	102.25 - 98.25	TP43.1x30.9393x0.34	53.50	0.00	0.0	39.000	34.0027	-6.67	1326.11	0.005
	98.25 - 95.8056					39.000	34.6023	-13.15	1349.49	0.010
	95.8056 - 93.3611					39.000	35.2020	-13.57	1372.88	0.010
	93.3611 - 90.9167					39.000	35.8016	-14.00	1396.26	0.010
	90.9167 - 88.4722					39.000	36.4012	-14.43	1419.65	0.010
	88.4722 - 86.0278					39.000	37.0008	-14.86	1443.03	0.010
	86.0278 - 83.5833					39.000	37.6004	-15.30	1466.42	0.010
	83.5833 - 81.1389					39.000	38.2000	-15.75	1489.80	0.011
	81.1389 - 78.6944					39.000	38.7996	-16.20	1513.19	0.011
	78.6944 - 76.25					39.000	39.3992	-16.65	1536.57	0.011
	76.25 - 73.8056					39.000	39.9989	-17.11	1559.96	0.011
	73.8056 - 71.3611					39.000	40.5985	-17.58	1583.34	0.011
	71.3611 - 68.9167					39.000	41.1981	-18.05	1606.73	0.011
	68.9167 - 66.4722					39.000	41.7977	-18.53	1630.11	0.011
	66.4722 - 64.0278					39.000	42.3973	-19.01	1653.49	0.011
	64.0278 - 61.5833					39.000	42.9969	-19.50	1676.88	0.012
	61.5833 - 59.1389					39.000	43.5965	-19.99	1700.26	0.012

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 $\frac{P}{P_a}$
	59.1389 - 56.6944					39.000	44.1961	-20.49	1723.65	0.012
	56.6944 - 54.25					39.000	44.7958	-20.99	1747.03	0.012
	54.25 - 48.75					39.000	46.1449	-11.60	1799.65	0.006
L5	54.25 - 48.75	TP48.95x41.1698x0.34	33.25	0.00	0.0	39.000	44.0619	-10.48	1718.42	0.006
	48.75 - 47.2895					39.000	45.4507	-22.96	1772.58	0.013
	47.2895 - 45.8289					39.000	45.8195	-23.27	1786.96	0.013
	45.8289 - 44.3684					39.000	46.1883	-23.58	1801.35	0.013
	44.3684 - 42.9079					39.000	46.5571	-23.89	1815.73	0.013
	42.9079 - 41.4474					39.000	46.9259	-24.20	1830.11	0.013
	41.4474 - 39.9868					39.000	47.2948	-24.52	1844.50	0.013
	39.9868 - 38.5263					39.000	47.6636	-24.83	1858.88	0.013
	38.5263 - 37.0658					39.000	48.0324	-25.15	1873.26	0.013
	37.0658 - 35.6053					39.000	48.4012	-25.47	1887.65	0.013
	35.6053 - 34.1447					39.000	48.7700	-25.80	1902.03	0.014
	34.1447 - 32.6842					39.000	49.1388	-26.12	1916.41	0.014
	32.6842 - 31.2237					39.000	49.5076	-26.44	1930.79	0.014
	31.2237 - 29.7632					39.000	49.8764	-26.77	1945.18	0.014
	29.7632 - 28.3026					39.000	50.2452	-27.10	1959.56	0.014
	28.3026 - 26.8421					39.000	50.6140	-27.43	1973.94	0.014
	26.8421 - 25.3816					39.000	50.9828	-27.77	1988.33	0.014
	25.3816 - 23.9211					39.000	51.3516	-28.10	2002.71	0.014
	23.9211 - 22.4605					39.000	51.7204	-28.44	2017.09	0.014
	22.4605 - 21					39.000	52.0892	-28.78	2031.48	0.014
L6	21 - 20	TP53.23x48.95x0.35	20.00	0.00	0.0	39.000	54.2275	-29.33	2114.87	0.014
	20 - 19					39.000	54.2275	-29.35	2114.87	0.014
	19 - 18					39.000	54.4652	-29.59	2124.14	0.014
	18 - 17					39.000	54.7029	-29.83	2133.41	0.014
	17 - 16					39.000	54.9407	-30.07	2142.69	0.014
	16 - 15					39.000	55.1784	-30.31	2151.96	0.014
	15 - 14					39.000	55.4161	-30.56	2161.23	0.014
	14 - 13					39.000	55.6539	-30.80	2170.50	0.014
	13 - 12					39.000	55.8916	-31.05	2179.77	0.014
	12 - 11					39.000	56.1293	-31.29	2189.04	0.014
	11 - 10					39.000	56.3671	-31.54	2198.32	0.014
	10 - 9					39.000	56.6048	-31.78	2207.59	0.014
	9 - 8					39.000	56.8425	-32.03	2216.86	0.014
	8 - 7					39.000	57.0803	-32.28	2226.13	0.015
	7 - 6					39.000	57.3180	-32.53	2235.40	0.015
	6 - 5					39.000	57.5557	-32.78	2244.67	0.015
	5 - 4					39.000	57.7935	-33.03	2253.95	0.015
	4 - 3					39.000	58.0312	-33.28	2263.22	0.015
	3 - 2					38.955	58.5067	-33.77	2279.14	0.015

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 $\frac{P}{P_a}$
	2 - 1					38.887	58.7444	-34.03	2284.38	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	180 - 178.513	TP21.38x14.4x0.1875	0.05	0.018	39.000	0.000	0.00	0.000	39.000	0.000
	178.513 - 177.026		0.48	0.179	39.000	0.005	0.00	0.000	39.000	0.000
	177.026 - 175.539		2.31	0.820	39.000	0.021	0.00	0.000	39.000	0.000
	175.539 - 174.053		3.76	1.276	39.000	0.033	0.00	0.000	39.000	0.000
	174.053 - 172.566		5.32	1.729	39.000	0.044	0.00	0.000	39.000	0.000
	172.566 - 171.079		6.98	2.175	39.000	0.056	0.00	0.000	39.000	0.000
	171.079 - 169.592		8.75	2.617	39.000	0.067	0.00	0.000	39.000	0.000
	169.592 - 168.105		10.63	3.055	39.000	0.078	0.00	0.000	39.000	0.000
	168.105 - 166.618		19.49	5.383	39.000	0.138	0.00	0.000	39.000	0.000
	166.618 - 165.132		28.94	7.691	39.000	0.197	0.00	0.000	39.000	0.000
	165.132 - 163.645		38.55	9.863	39.000	0.253	0.00	0.000	39.000	0.000
	163.645 - 162.158		48.27	11.898	39.000	0.305	0.00	0.000	39.000	0.000
	162.158 - 160.671		58.10	13.806	39.000	0.354	0.00	0.000	39.000	0.000
	160.671 - 159.184		68.38	15.675	39.000	0.402	0.00	0.000	39.000	0.000
	159.184 - 157.697		79.05	17.493	39.000	0.449	0.00	0.000	39.000	0.000
	157.697 - 156.211		92.06	19.677	39.000	0.505	0.00	0.000	39.000	0.000
	156.211 - 154.724		106.03	21.904	39.000	0.562	0.00	0.000	39.000	0.000
	154.724 - 153.237		120.11	23.995	39.000	0.615	0.00	0.000	39.000	0.000
	153.237 - 151.75		134.30	25.961	39.000	0.666	0.00	0.000	39.000	0.000
	151.75 - 149		73.92	13.462	39.000	0.345	0.00	0.000	39.000	0.000
L2	151.75 - 149	TP25.91x20.3858x0.25	90.63	12.946	39.000	0.332	0.00	0.000	39.000	0.000
	149 - 147.855		179.83	25.057	39.000	0.642	0.00	0.000	39.000	0.000
	147.855 - 146.711		196.12	26.665	39.000	0.684	0.00	0.000	39.000	0.000
	146.711 - 145.566		213.17	28.288	39.000	0.725	0.00	0.000	39.000	0.000
	145.566 - 144.421		230.29	29.836	39.000	0.765	0.00	0.000	39.000	0.000
	144.421 - 143.276		247.48	31.313	39.000	0.803	0.00	0.000	39.000	0.000
	143.276 -		264.75	32.723	39.000	0.839	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	142.132									
	142.132 - 140.987		282.10	34.069	39.000	0.874	0.00	0.000	39.000	0.000
	140.987 - 139.842		299.51	35.355	39.000	0.907	0.00	0.000	39.000	0.000
	139.842 - 138.697		317.01	36.583	39.000	0.938	0.00	0.000	39.000	0.000
	138.697 - 137.553		334.57	37.756	39.000	0.968	0.00	0.000	39.000	0.000
	137.553 - 136.408		352.21	38.878	39.000	0.997	0.00	0.000	39.000	0.000
	136.408 - 135.263		369.93	39.950	39.000	1.024	0.00	0.000	39.000	0.000
	135.263 - 134.118		387.73	40.975	39.000	1.051	0.00	0.000	39.000	0.000
	134.118 - 132.974		405.62	41.958	39.000	1.076	0.00	0.000	39.000	0.000
	132.974 - 131.829		423.70	42.910	39.000	1.100	0.00	0.000	39.000	0.000
	131.829 - 130.684		441.85	43.821	39.000	1.124	0.00	0.000	39.000	0.000
	130.684 - 129.539		460.09	44.693	39.000	1.146	0.00	0.000	39.000	0.000
	129.539 - 128.395		478.40	45.527	39.000	1.167	0.00	0.000	39.000	0.000
	128.395 - 127.25		496.79	46.326	39.000	1.188	0.00	0.000	39.000	0.000
L3	127.25 - 125.934	TP32.44x25.91x0.3	518.02	39.565	39.000	1.015	0.00	0.000	39.000	0.000
	125.934 - 124.618		539.35	40.263	39.000	1.032	0.00	0.000	39.000	0.000
	124.618 - 123.303		560.79	40.928	39.000	1.049	0.00	0.000	39.000	0.000
	123.303 - 121.987		582.34	41.560	39.000	1.066	0.00	0.000	39.000	0.000
	121.987 - 120.671		603.99	42.162	39.000	1.081	0.00	0.000	39.000	0.000
	120.671 - 119.355		625.74	42.736	39.000	1.096	0.00	0.000	39.000	0.000
	119.355 - 118.039		647.60	43.282	39.000	1.110	0.00	0.000	39.000	0.000
	118.039 - 116.724		669.56	43.803	39.000	1.123	0.00	0.000	39.000	0.000
	116.724 - 115.408		691.64	44.298	39.000	1.136	0.00	0.000	39.000	0.000
	115.408 - 114.092		713.82	44.771	39.000	1.148	0.00	0.000	39.000	0.000
	114.092 - 112.776		736.11	45.221	39.000	1.160	0.00	0.000	39.000	0.000
	112.776 - 111.461		758.50	45.651	39.000	1.171	0.00	0.000	39.000	0.000
	111.461 - 110.145		781.01	46.060	39.000	1.181	0.00	0.000	39.000	0.000
	110.145 - 108.829		803.62	46.450	39.000	1.191	0.00	0.000	39.000	0.000
	108.829 - 107.513		826.35	46.821	39.000	1.201	0.00	0.000	39.000	0.000
	107.513 - 106.197		849.17	47.176	39.000	1.210	0.00	0.000	39.000	0.000
	106.197 -		872.13	47.514	39.000	1.218	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	104.882									
	104.882 - 103.566		895.18	47.836	39.000	1.227	0.00	0.000	39.000	0.000
	103.566 - 102.25		918.35	48.143	39.000	1.234	0.00	0.000	39.000	0.000
	102.25 - 98.25		478.93	23.713	39.000	0.608	0.00	0.000	39.000	0.000
L4	102.25 - 98.25	TP43.1x30.9393x0.34	510.69	23.248	39.000	0.596	0.00	0.000	39.000	0.000
	98.25 - 95.8056		1033.76	45.434	39.000	1.165	0.00	0.000	39.000	0.000
	95.8056 - 93.3611		1078.29	45.782	39.000	1.174	0.00	0.000	39.000	0.000
	93.3611 - 90.9167		1123.19	46.097	39.000	1.182	0.00	0.000	39.000	0.000
	90.9167 - 88.4722		1168.47	46.381	39.000	1.189	0.00	0.000	39.000	0.000
	88.4722 - 86.0278		1214.13	46.636	39.000	1.196	0.00	0.000	39.000	0.000
	86.0278 - 83.5833		1260.16	46.865	39.000	1.202	0.00	0.000	39.000	0.000
	83.5833 - 81.1389		1306.58	47.071	39.000	1.207	0.00	0.000	39.000	0.000
	81.1389 - 78.6944		1353.36	47.254	39.000	1.212	0.00	0.000	39.000	0.000
	78.6944 - 76.25		1400.53	47.417	39.000	1.216	0.00	0.000	39.000	0.000
	76.25 - 73.8056		1448.06	47.561	39.000	1.220	0.00	0.000	39.000	0.000
	73.8056 - 71.3611		1495.97	47.688	39.000	1.223	0.00	0.000	39.000	0.000
	71.3611 - 68.9167		1544.27	47.798	39.000	1.226	0.00	0.000	39.000	0.000
	68.9167 - 66.4722		1592.93	47.894	39.000	1.228	0.00	0.000	39.000	0.000
	66.4722 - 64.0278		1641.97	47.976	39.000	1.230	0.00	0.000	39.000	0.000
	64.0278 - 61.5833		1691.38	48.045	39.000	1.232	0.00	0.000	39.000	0.000
	61.5833 - 59.1389		1741.17	48.103	39.000	1.233	0.00	0.000	39.000	0.000
	59.1389 - 56.6944		1791.33	48.149	39.000	1.235	0.00	0.000	39.000	0.000
	56.6944 - 54.25		1841.87	48.186	39.000	1.236	0.00	0.000	39.000	0.000
	54.25 - 48.75		1001.88	24.695	39.000	0.633	0.00	0.000	39.000	0.000
L5	54.25 - 48.75	TP48.95x41.1698x0.34	899.01	24.313	39.000	0.623	0.00	0.000	39.000	0.000
	48.75 - 47.2895		1957.19	49.732	39.000	1.275	0.00	0.000	39.000	0.000
	47.2895 - 45.8289		1988.18	49.706	39.000	1.275	0.00	0.000	39.000	0.000
	45.8289 - 44.3684		2019.28	49.678	39.000	1.274	0.00	0.000	39.000	0.000
	44.3684 - 42.9079		2050.48	49.646	39.000	1.273	0.00	0.000	39.000	0.000
	42.9079 - 41.4474		2081.80	49.612	39.000	1.272	0.00	0.000	39.000	0.000
	41.4474 - 39.9868		2113.22	49.576	39.000	1.271	0.00	0.000	39.000	0.000
	39.9868 - 38.5263		2144.76	49.537	39.000	1.270	0.00	0.000	39.000	0.000
	38.5263 -		2176.40	49.496	39.000	1.269	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	37.0658									
	37.0658 - 35.6053		2208.15	49.453	39.000	1.268	0.00	0.000	39.000	0.000
	35.6053 - 34.1447		2240.02	49.408	39.000	1.267	0.00	0.000	39.000	0.000
	34.1447 - 32.6842		2271.99	49.361	39.000	1.266	0.00	0.000	39.000	0.000
	32.6842 - 31.2237		2304.07	49.312	39.000	1.264	0.00	0.000	39.000	0.000
	31.2237 - 29.7632		2336.28	49.262	39.000	1.263	0.00	0.000	39.000	0.000
	29.7632 - 28.3026		2368.58	49.210	39.000	1.262	0.00	0.000	39.000	0.000
	28.3026 - 26.8421		2401.01	49.157	39.000	1.260	0.00	0.000	39.000	0.000
	26.8421 - 25.3816		2433.54	49.102	39.000	1.259	0.00	0.000	39.000	0.000
	25.3816 - 23.9211		2466.19	49.046	39.000	1.258	0.00	0.000	39.000	0.000
	23.9211 - 22.4605		2498.95	48.989	39.000	1.256	0.00	0.000	39.000	0.000
	22.4605 - 21		2531.82	48.931	39.000	1.255	0.00	0.000	39.000	0.000
L6	21 - 20	TP53.23x48.95x0.35	2587.47	47.503	39.000	1.218	0.00	0.000	39.000	0.000
	20 - 19		2587.47	47.503	39.000	1.218	0.00	0.000	39.000	0.000
	19 - 18		2610.18	47.501	39.000	1.218	0.00	0.000	39.000	0.000
	18 - 17		2632.95	47.498	39.000	1.218	0.00	0.000	39.000	0.000
	17 - 16		2655.77	47.495	39.000	1.218	0.00	0.000	39.000	0.000
	16 - 15		2678.63	47.490	39.000	1.218	0.00	0.000	39.000	0.000
	15 - 14		2701.56	47.486	39.000	1.218	0.00	0.000	39.000	0.000
	14 - 13		2724.54	47.480	39.000	1.217	0.00	0.000	39.000	0.000
	13 - 12		2747.57	47.473	39.000	1.217	0.00	0.000	39.000	0.000
	12 - 11		2770.66	47.466	39.000	1.217	0.00	0.000	39.000	0.000
	11 - 10		2793.80	47.458	39.000	1.217	0.00	0.000	39.000	0.000
	10 - 9		2817.00	47.450	39.000	1.217	0.00	0.000	39.000	0.000
	9 - 8		2840.25	47.441	39.000	1.216	0.00	0.000	39.000	0.000
	8 - 7		2863.56	47.431	39.000	1.216	0.00	0.000	39.000	0.000
	7 - 6		2886.92	47.421	39.000	1.216	0.00	0.000	39.000	0.000
	6 - 5		2910.33	47.410	39.000	1.216	0.00	0.000	39.000	0.000
	5 - 4		2933.80	47.399	39.000	1.215	0.00	0.000	39.000	0.000
	4 - 3		2957.32	47.387	39.000	1.215	0.00	0.000	39.000	0.000
	3 - 2		3004.54	47.362	38.955	1.216	0.00	0.000	38.955	0.000
	2 - 1		3028.22	47.348	38.887	1.218	0.00	0.000	38.887	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	180 - 178.513	TP21.38x14.4x0.1875	0.06	0.007	26.000	0.001	0.00	0.000	26.000	0.000
	178.513 - 177.026		0.25	0.029	26.000	0.002	0.00	0.000	26.000	0.000
	177.026 - 175.539		0.86	0.095	26.000	0.007	0.72	0.125	26.000	0.005
	175.539 - 174.053		1.02	0.110	26.000	0.008	0.95	0.157	26.000	0.006
	174.053 -		1.08	0.114	26.000	0.009	0.95	0.151	26.000	0.006

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	172.566									
	172.566 - 171.079		1.15	0.119	26.000	0.009	0.95	0.145	26.000	0.006
	171.079 - 169.592		1.23	0.125	26.000	0.010	1.23	0.179	26.000	0.007
	169.592 - 168.105		1.30	0.130	26.000	0.010	1.23	0.172	26.000	0.007
	168.105 - 166.618		6.32	0.617	26.000	0.047	1.23	0.166	26.000	0.006
	166.618 - 165.132		6.39	0.612	26.000	0.047	0.35	0.046	26.000	0.002
	165.132 - 163.645		6.50	0.610	26.000	0.047	0.18	0.023	26.000	0.001
	163.645 - 162.158		6.57	0.606	26.000	0.047	0.18	0.022	26.000	0.001
	162.158 - 160.671		6.65	0.602	26.000	0.046	0.18	0.021	26.000	0.001
	160.671 - 159.184		7.14	0.635	26.000	0.049	0.18	0.021	26.000	0.001
	159.184 - 157.697		7.22	0.631	26.000	0.048	0.18	0.020	26.000	0.001
	157.697 - 156.211		9.36	0.804	26.000	0.062	0.23	0.024	26.000	0.001
	156.211 - 154.724		9.44	0.797	26.000	0.061	0.23	0.023	26.000	0.001
	154.724 - 153.237		9.51	0.790	26.000	0.061	0.23	0.022	26.000	0.001
	153.237 - 151.75		9.59	0.783	26.000	0.060	0.23	0.022	26.000	0.001
	151.75 - 149		7.40	0.587	26.000	0.045	0.10	0.009	26.000	0.000
L2	151.75 - 149	TP25.91x20.3858x0.25	6.00	0.364	26.000	0.028	0.13	0.009	26.000	0.000
	149 - 147.855		14.00	0.840	26.000	0.065	0.23	0.015	26.000	0.001
	147.855 - 146.711		14.86	0.881	26.000	0.068	0.02	0.001	26.000	0.000
	146.711 - 145.566		14.93	0.874	26.000	0.067	0.02	0.001	26.000	0.000
	145.566 - 144.421		14.99	0.867	26.000	0.067	0.02	0.001	26.000	0.000
	144.421 - 143.276		15.06	0.861	26.000	0.066	0.02	0.001	26.000	0.000
	143.276 - 142.132		15.12	0.854	26.000	0.066	0.02	0.001	26.000	0.000
	142.132 - 140.987		15.19	0.848	26.000	0.065	0.02	0.001	26.000	0.000
	140.987 - 139.842		15.25	0.842	26.000	0.065	0.02	0.001	26.000	0.000
	139.842 - 138.697		15.32	0.837	26.000	0.064	0.02	0.001	26.000	0.000
	138.697 - 137.553		15.38	0.831	26.000	0.064	0.02	0.001	26.000	0.000
	137.553 - 136.408		15.45	0.825	26.000	0.063	0.02	0.001	26.000	0.000
	136.408 - 135.263		15.52	0.820	26.000	0.063	0.02	0.001	26.000	0.000
	135.263 - 134.118		15.58	0.814	26.000	0.063	0.02	0.001	26.000	0.000
	134.118 - 132.974		15.77	0.815	26.000	0.063	0.55	0.028	26.000	0.001
	132.974 - 131.829		15.83	0.810	26.000	0.062	0.55	0.027	26.000	0.001

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	131.829 - 130.684		15.90	0.805	26.000	0.062	0.55	0.026	26.000	0.001
	130.684 - 129.539		15.97	0.800	26.000	0.062	0.55	0.026	26.000	0.001
	129.539 - 128.395		16.04	0.796	26.000	0.061	0.55	0.025	26.000	0.001
	128.395 - 127.25		16.10	0.791	26.000	0.061	0.55	0.025	26.000	0.001
L3	127.25 - 125.934	TP32.44x25.91x0.3	16.18	0.656	26.000	0.050	0.55	0.020	26.000	0.001
	125.934 - 124.618		16.26	0.652	26.000	0.050	0.55	0.020	26.000	0.001
	124.618 - 123.303		16.34	0.648	26.000	0.050	0.55	0.019	26.000	0.001
	123.303 - 121.987		16.42	0.644	26.000	0.049	0.55	0.019	26.000	0.001
	121.987 - 120.671		16.50	0.640	26.000	0.049	0.55	0.019	26.000	0.001
	120.671 - 119.355		16.58	0.636	26.000	0.049	0.55	0.018	26.000	0.001
	119.355 - 118.039		16.66	0.632	26.000	0.049	0.55	0.018	26.000	0.001
	118.039 - 116.724		16.74	0.628	26.000	0.048	0.55	0.017	26.000	0.001
	116.724 - 115.408		16.82	0.625	26.000	0.048	0.55	0.017	26.000	0.001
	115.408 - 114.092		16.91	0.621	26.000	0.048	0.55	0.017	26.000	0.001
	114.092 - 112.776		16.99	0.618	26.000	0.048	0.55	0.016	26.000	0.001
	112.776 - 111.461		17.07	0.615	26.000	0.047	0.55	0.016	26.000	0.001
	111.461 - 110.145		17.15	0.611	26.000	0.047	0.55	0.016	26.000	0.001
	110.145 - 108.829		17.24	0.608	26.000	0.047	0.55	0.015	26.000	0.001
	108.829 - 107.513		17.32	0.605	26.000	0.047	0.54	0.015	26.000	0.001
	107.513 - 106.197		17.41	0.602	26.000	0.046	0.54	0.015	26.000	0.001
	106.197 - 104.882		17.49	0.599	26.000	0.046	0.54	0.014	26.000	0.001
	104.882 - 103.566		17.58	0.596	26.000	0.046	0.54	0.014	26.000	0.001
	103.566 - 102.25		17.66	0.594	26.000	0.046	0.54	0.014	26.000	0.001
	102.25 - 98.25		8.78	0.287	26.000	0.022	0.26	0.006	26.000	0.000
L4	102.25 - 98.25	TP43.1x30.9393x0.34	9.22	0.271	26.000	0.021	0.28	0.006	26.000	0.000
	98.25 - 95.8056		18.16	0.525	26.000	0.040	0.54	0.012	26.000	0.000
	95.8056 - 93.3611		18.31	0.520	26.000	0.040	0.54	0.011	26.000	0.000
	93.3611 - 90.9167		18.47	0.516	26.000	0.040	0.54	0.011	26.000	0.000
	90.9167 - 88.4722		18.62	0.512	26.000	0.039	0.54	0.011	26.000	0.000
	88.4722 - 86.0278		18.78	0.507	26.000	0.039	0.54	0.010	26.000	0.000
	86.0278 - 83.5833		18.93	0.503	26.000	0.039	0.54	0.010	26.000	0.000

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	83.5833 - 81.1389		19.08	0.500	26.000	0.038	0.54	0.010	26.000	0.000
	81.1389 - 78.6944		19.24	0.496	26.000	0.038	0.54	0.009	26.000	0.000
	78.6944 - 76.25		19.39	0.492	26.000	0.038	0.54	0.009	26.000	0.000
	76.25 - 73.8056		19.55	0.489	26.000	0.038	0.54	0.009	26.000	0.000
	73.8056 - 71.3611		19.70	0.485	26.000	0.037	0.54	0.008	26.000	0.000
	71.3611 - 68.9167		19.85	0.482	26.000	0.037	0.54	0.008	26.000	0.000
	68.9167 - 66.4722		20.01	0.479	26.000	0.037	0.54	0.008	26.000	0.000
	66.4722 - 64.0278		20.16	0.476	26.000	0.037	0.54	0.008	26.000	0.000
	64.0278 - 61.5833		20.31	0.472	26.000	0.036	0.54	0.007	26.000	0.000
	61.5833 - 59.1389		20.47	0.469	26.000	0.036	0.54	0.007	26.000	0.000
	59.1389 - 56.6944		20.62	0.467	26.000	0.036	0.54	0.007	26.000	0.000
	56.6944 - 54.25		20.77	0.464	26.000	0.036	0.54	0.007	26.000	0.000
	54.25 - 48.75		10.96	0.238	26.000	0.018	0.28	0.003	26.000	0.000
L5	54.25 - 48.75	TP48.95x41.1698x0.34	10.25	0.233	26.000	0.017	0.26	0.003	26.000	0.000
	48.75 - 47.2895		21.27	0.468	26.000	0.036	0.54	0.007	26.000	0.000
	47.2895 - 45.8289		21.35	0.466	26.000	0.036	0.54	0.007	26.000	0.000
	45.8289 - 44.3684		21.42	0.464	26.000	0.035	0.54	0.006	26.000	0.000
	44.3684 - 42.9079		21.49	0.462	26.000	0.035	0.54	0.006	26.000	0.000
	42.9079 - 41.4474		21.57	0.460	26.000	0.035	0.54	0.006	26.000	0.000
	41.4474 - 39.9868		21.64	0.458	26.000	0.035	0.54	0.006	26.000	0.000
	39.9868 - 38.5263		21.72	0.456	26.000	0.035	0.54	0.006	26.000	0.000
	38.5263 - 37.0658		21.80	0.454	26.000	0.035	0.54	0.006	26.000	0.000
	37.0658 - 35.6053		21.87	0.452	26.000	0.034	0.54	0.006	26.000	0.000
	35.6053 - 34.1447		21.95	0.450	26.000	0.034	0.54	0.006	26.000	0.000
	34.1447 - 32.6842		22.02	0.448	26.000	0.034	0.54	0.006	26.000	0.000
	32.6842 - 31.2237		22.10	0.446	26.000	0.034	0.54	0.006	26.000	0.000
	31.2237 - 29.7632		22.18	0.445	26.000	0.034	0.54	0.006	26.000	0.000
	29.7632 - 28.3026		22.25	0.443	26.000	0.034	0.54	0.005	26.000	0.000
	28.3026 - 26.8421		22.33	0.441	26.000	0.034	0.54	0.005	26.000	0.000
	26.8421 - 25.3816		22.41	0.440	26.000	0.034	0.54	0.005	26.000	0.000
	25.3816 - 23.9211		22.49	0.438	26.000	0.033	0.54	0.005	26.000	0.000

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
	23.9211 - 22.4605		22.57	0.436	26.000	0.033	0.54	0.005	26.000	0.000
	22.4605 - 21		22.65	0.435	26.000	0.033	0.54	0.005	26.000	0.000
L6	21 - 20	TP53.23x48.95x0.35	22.69	0.418	26.000	0.032	0.54	0.005	26.000	0.000
	20 - 19		22.75	0.419	26.000	0.032	0.54	0.005	26.000	0.000
	19 - 18		22.80	0.419	26.000	0.032	0.54	0.005	26.000	0.000
	18 - 17		22.86	0.418	26.000	0.032	0.54	0.005	26.000	0.000
	17 - 16		22.91	0.417	26.000	0.032	0.54	0.005	26.000	0.000
	16 - 15		22.96	0.416	26.000	0.032	0.54	0.005	26.000	0.000
	15 - 14		23.02	0.415	26.000	0.032	0.54	0.005	26.000	0.000
	14 - 13		23.07	0.415	26.000	0.032	0.54	0.005	26.000	0.000
	13 - 12		23.13	0.414	26.000	0.032	0.54	0.005	26.000	0.000
	12 - 11		23.18	0.413	26.000	0.032	0.54	0.005	26.000	0.000
	11 - 10		23.24	0.412	26.000	0.032	0.54	0.004	26.000	0.000
	10 - 9		23.29	0.411	26.000	0.032	0.54	0.004	26.000	0.000
	9 - 8		23.34	0.411	26.000	0.031	0.54	0.004	26.000	0.000
	8 - 7		23.40	0.410	26.000	0.031	0.54	0.004	26.000	0.000
	7 - 6		23.45	0.409	26.000	0.031	0.54	0.004	26.000	0.000
	6 - 5		23.51	0.408	26.000	0.031	0.54	0.004	26.000	0.000
	5 - 4		23.56	0.408	26.000	0.031	0.54	0.004	26.000	0.000
	4 - 3		23.62	0.407	26.000	0.031	0.54	0.004	26.000	0.000
	3 - 2		23.67	0.405	26.000	0.031	0.54	0.004	26.000	0.000
	2 - 1		23.73	0.404	26.000	0.031	0.54	0.004	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 178.513	0.000	0.000	0.000	0.001	0.000	0.001 ✔	1.333	H1-3+VT ✔
	178.513 - 177.026	0.000	0.005	0.000	0.002	0.000	0.005 ✔	1.333	H1-3+VT ✔
	177.026 - 175.539	0.001	0.021	0.000	0.007	0.005	0.022 ✔	1.333	H1-3+VT ✔
	175.539 - 174.053	0.001	0.033	0.000	0.008	0.006	0.034 ✔	1.333	H1-3+VT ✔
	174.053 - 172.566	0.001	0.044	0.000	0.009	0.006	0.045 ✔	1.333	H1-3+VT ✔
	172.566 - 171.079	0.001	0.056	0.000	0.009	0.006	0.057 ✔	1.333	H1-3+VT ✔
	171.079 - 169.592	0.001	0.067	0.000	0.010	0.007	0.068 ✔	1.333	H1-3+VT ✔
	169.592 - 168.105	0.001	0.078	0.000	0.010	0.007	0.080 ✔	1.333	H1-3+VT ✔
	168.105 - 166.618	0.005	0.138	0.000	0.047	0.006	0.144 ✔	1.333	H1-3+VT ✔
	166.618 - 165.132	0.005	0.197	0.000	0.047	0.002	0.203 ✔	1.333	H1-3+VT ✔
	165.132 - 163.645	0.005	0.253	0.000	0.047	0.001	0.258 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	163.645 - 162.158	0.005	0.305	0.000	0.047	0.001	0.311 ✔	1.333	H1-3+VT ✔
	162.158 - 160.671	0.005	0.354	0.000	0.046	0.001	0.360 ✔	1.333	H1-3+VT ✔
	160.671 - 159.184	0.005	0.402	0.000	0.049	0.001	0.408 ✔	1.333	H1-3+VT ✔
	159.184 - 157.697	0.005	0.449	0.000	0.048	0.001	0.454 ✔	1.333	H1-3+VT ✔
	157.697 - 156.211	0.008	0.505	0.000	0.062	0.001	0.514 ✔	1.333	H1-3+VT ✔
	156.211 - 154.724	0.008	0.562	0.000	0.061	0.001	0.571 ✔	1.333	H1-3+VT ✔
	154.724 - 153.237	0.008	0.615	0.000	0.061	0.001	0.624 ✔	1.333	H1-3+VT ✔
	153.237 - 151.75	0.008	0.666	0.000	0.060	0.001	0.675 ✔	1.333	H1-3+VT ✔
	151.75 - 149	0.003	0.345	0.000	0.045	0.000	0.349 ✔	1.333	H1-3+VT ✔
L2	151.75 - 149	0.004	0.332	0.000	0.028	0.000	0.336 ✔	1.333	H1-3+VT ✔
	149 - 147.855	0.007	0.642	0.000	0.065	0.001	0.651 ✔	1.333	H1-3+VT ✔
	147.855 - 146.711	0.009	0.684	0.000	0.068	0.000	0.694 ✔	1.333	H1-3+VT ✔
	146.711 - 145.566	0.009	0.725	0.000	0.067	0.000	0.736 ✔	1.333	H1-3+VT ✔
	145.566 - 144.421	0.009	0.765	0.000	0.067	0.000	0.775 ✔	1.333	H1-3+VT ✔
	144.421 - 143.276	0.009	0.803	0.000	0.066	0.000	0.813 ✔	1.333	H1-3+VT ✔
	143.276 - 142.132	0.009	0.839	0.000	0.066	0.000	0.849 ✔	1.333	H1-3+VT ✔
	142.132 - 140.987	0.009	0.874	0.000	0.065	0.000	0.884 ✔	1.333	H1-3+VT ✔
	140.987 - 139.842	0.009	0.907	0.000	0.065	0.000	0.917 ✔	1.333	H1-3+VT ✔
	139.842 - 138.697	0.010	0.938	0.000	0.064	0.000	0.949 ✔	1.333	H1-3+VT ✔
	138.697 - 137.553	0.010	0.968	0.000	0.064	0.000	0.979 ✔	1.333	H1-3+VT ✔
	137.553 - 136.408	0.010	0.997	0.000	0.063	0.000	1.008 ✔	1.333	H1-3+VT ✔
	136.408 - 135.263	0.010	1.024	0.000	0.063	0.000	1.035 ✔	1.333	H1-3+VT ✔
	135.263 - 134.118	0.010	1.051	0.000	0.063	0.000	1.061 ✔	1.333	H1-3+VT ✔
	134.118 - 132.974	0.010	1.076	0.000	0.063	0.001	1.087 ✔	1.333	H1-3+VT ✔
	132.974 - 131.829	0.010	1.100	0.000	0.062	0.001	1.111 ✔	1.333	H1-3+VT ✔
	131.829 - 130.684	0.010	1.124	0.000	0.062	0.001	1.135 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	130.684 - 129.539	0.010	1.146	0.000	0.062	0.001	1.157 ✔	1.333	H1-3+VT ✔
	129.539 - 128.395	0.010	1.167	0.000	0.061	0.001	1.179 ✔	1.333	H1-3+VT ✔
	128.395 - 127.25	0.010	1.188	0.000	0.061	0.001	1.199 ✔	1.333	H1-3+VT ✔
L3	127.25 - 125.934	0.009	1.015	0.000	0.050	0.001	1.024 ✔	1.333	H1-3+VT ✔
	125.934 - 124.618	0.009	1.032	0.000	0.050	0.001	1.042 ✔	1.333	H1-3+VT ✔
	124.618 - 123.303	0.009	1.049	0.000	0.050	0.001	1.059 ✔	1.333	H1-3+VT ✔
	123.303 - 121.987	0.009	1.066	0.000	0.049	0.001	1.075 ✔	1.333	H1-3+VT ✔
	121.987 - 120.671	0.009	1.081	0.000	0.049	0.001	1.091 ✔	1.333	H1-3+VT ✔
	120.671 - 119.355	0.009	1.096	0.000	0.049	0.001	1.105 ✔	1.333	H1-3+VT ✔
	119.355 - 118.039	0.009	1.110	0.000	0.049	0.001	1.120 ✔	1.333	H1-3+VT ✔
	118.039 - 116.724	0.009	1.123	0.000	0.048	0.001	1.133 ✔	1.333	H1-3+VT ✔
	116.724 - 115.408	0.009	1.136	0.000	0.048	0.001	1.146 ✔	1.333	H1-3+VT ✔
	115.408 - 114.092	0.009	1.148	0.000	0.048	0.001	1.158 ✔	1.333	H1-3+VT ✔
	114.092 - 112.776	0.009	1.160	0.000	0.048	0.001	1.170 ✔	1.333	H1-3+VT ✔
	112.776 - 111.461	0.010	1.171	0.000	0.047	0.001	1.181 ✔	1.333	H1-3+VT ✔
	111.461 - 110.145	0.010	1.181	0.000	0.047	0.001	1.191 ✔	1.333	H1-3+VT ✔
	110.145 - 108.829	0.010	1.191	0.000	0.047	0.001	1.201 ✔	1.333	H1-3+VT ✔
	108.829 - 107.513	0.010	1.201	0.000	0.047	0.001	1.211 ✔	1.333	H1-3+VT ✔
	107.513 - 106.197	0.010	1.210	0.000	0.046	0.001	1.220 ✔	1.333	H1-3+VT ✔
	106.197 - 104.882	0.010	1.218	0.000	0.046	0.001	1.229 ✔	1.333	H1-3+VT ✔
	104.882 - 103.566	0.010	1.227	0.000	0.046	0.001	1.237 ✔	1.333	H1-3+VT ✔
	103.566 - 102.25	0.010	1.234	0.000	0.046	0.001	1.245 ✔	1.333	H1-3+VT ✔
	102.25 - 98.25	0.005	0.608	0.000	0.022	0.000	0.613 ✔	1.333	H1-3+VT ✔
L4	102.25 - 98.25	0.005	0.596	0.000	0.021	0.000	0.601 ✔	1.333	H1-3+VT ✔
	98.25 - 95.8056	0.010	1.165	0.000	0.040	0.000	1.175 ✔	1.333	H1-3+VT ✔
	95.8056 - 93.3611	0.010	1.174	0.000	0.040	0.000	1.184 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	93.3611 - 90.9167	0.010	1.182	0.000	0.040	0.000	1.192 ✔	1.333	H1-3+VT ✔
	90.9167 - 88.4722	0.010	1.189	0.000	0.039	0.000	1.200 ✔	1.333	H1-3+VT ✔
	88.4722 - 86.0278	0.010	1.196	0.000	0.039	0.000	1.206 ✔	1.333	H1-3+VT ✔
	86.0278 - 83.5833	0.010	1.202	0.000	0.039	0.000	1.212 ✔	1.333	H1-3+VT ✔
	83.5833 - 81.1389	0.011	1.207	0.000	0.038	0.000	1.218 ✔	1.333	H1-3+VT ✔
	81.1389 - 78.6944	0.011	1.212	0.000	0.038	0.000	1.223 ✔	1.333	H1-3+VT ✔
	78.6944 - 76.25	0.011	1.216	0.000	0.038	0.000	1.227 ✔	1.333	H1-3+VT ✔
	76.25 - 73.8056	0.011	1.220	0.000	0.038	0.000	1.231 ✔	1.333	H1-3+VT ✔
	73.8056 - 71.3611	0.011	1.223	0.000	0.037	0.000	1.234 ✔	1.333	H1-3+VT ✔
	71.3611 - 68.9167	0.011	1.226	0.000	0.037	0.000	1.237 ✔	1.333	H1-3+VT ✔
	68.9167 - 66.4722	0.011	1.228	0.000	0.037	0.000	1.240 ✔	1.333	H1-3+VT ✔
	66.4722 - 64.0278	0.011	1.230	0.000	0.037	0.000	1.242 ✔	1.333	H1-3+VT ✔
	64.0278 - 61.5833	0.012	1.232	0.000	0.036	0.000	1.244 ✔	1.333	H1-3+VT ✔
	61.5833 - 59.1389	0.012	1.233	0.000	0.036	0.000	1.245 ✔	1.333	H1-3+VT ✔
	59.1389 - 56.6944	0.012	1.235	0.000	0.036	0.000	1.247 ✔	1.333	H1-3+VT ✔
	56.6944 - 54.25	0.012	1.236	0.000	0.036	0.000	1.248 ✔	1.333	H1-3+VT ✔
	54.25 - 48.75	0.006	0.633	0.000	0.018	0.000	0.640 ✔	1.333	H1-3+VT ✔
L5	54.25 - 48.75	0.006	0.623	0.000	0.017	0.000	0.630 ✔	1.333	H1-3+VT ✔
	48.75 - 47.2895	0.013	1.275	0.000	0.036	0.000	1.288 ✔	1.333	H1-3+VT ✔
	47.2895 - 45.8289	0.013	1.275	0.000	0.036	0.000	1.288 ✔	1.333	H1-3+VT ✔
	45.8289 - 44.3684	0.013	1.274	0.000	0.035	0.000	1.287 ✔	1.333	H1-3+VT ✔
	44.3684 - 42.9079	0.013	1.273	0.000	0.035	0.000	1.286 ✔	1.333	H1-3+VT ✔
	42.9079 - 41.4474	0.013	1.272	0.000	0.035	0.000	1.286 ✔	1.333	H1-3+VT ✔
	41.4474 - 39.9868	0.013	1.271	0.000	0.035	0.000	1.285 ✔	1.333	H1-3+VT ✔
	39.9868 - 38.5263	0.013	1.270	0.000	0.035	0.000	1.284 ✔	1.333	H1-3+VT ✔
	38.5263 - 37.0658	0.013	1.269	0.000	0.035	0.000	1.283 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	37.0658 - 35.6053	0.013	1.268	0.000	0.034	0.000	1.282 ✔	1.333	H1-3+VT ✔
	35.6053 - 34.1447	0.014	1.267	0.000	0.034	0.000	1.281 ✔	1.333	H1-3+VT ✔
	34.1447 - 32.6842	0.014	1.266	0.000	0.034	0.000	1.280 ✔	1.333	H1-3+VT ✔
	32.6842 - 31.2237	0.014	1.264	0.000	0.034	0.000	1.278 ✔	1.333	H1-3+VT ✔
	31.2237 - 29.7632	0.014	1.263	0.000	0.034	0.000	1.277 ✔	1.333	H1-3+VT ✔
	29.7632 - 28.3026	0.014	1.262	0.000	0.034	0.000	1.276 ✔	1.333	H1-3+VT ✔
	28.3026 - 26.8421	0.014	1.260	0.000	0.034	0.000	1.275 ✔	1.333	H1-3+VT ✔
	26.8421 - 25.3816	0.014	1.259	0.000	0.034	0.000	1.273 ✔	1.333	H1-3+VT ✔
	25.3816 - 23.9211	0.014	1.258	0.000	0.033	0.000	1.272 ✔	1.333	H1-3+VT ✔
	23.9211 - 22.4605	0.014	1.256	0.000	0.033	0.000	1.271 ✔	1.333	H1-3+VT ✔
	22.4605 - 21	0.014	1.255	0.000	0.033	0.000	1.269 ✔	1.333	H1-3+VT ✔
L6	21 - 20	0.014	1.218	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	20 - 19	0.014	1.218	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	19 - 18	0.014	1.218	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	18 - 17	0.014	1.218	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	17 - 16	0.014	1.218	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	16 - 15	0.014	1.218	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	15 - 14	0.014	1.218	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	14 - 13	0.014	1.217	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	13 - 12	0.014	1.217	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	12 - 11	0.014	1.217	0.000	0.032	0.000	1.232 ✔	1.333	H1-3+VT ✔
	11 - 10	0.014	1.217	0.000	0.032	0.000	1.231 ✔	1.333	H1-3+VT ✔
	10 - 9	0.014	1.217	0.000	0.032	0.000	1.231 ✔	1.333	H1-3+VT ✔
	9 - 8	0.014	1.216	0.000	0.031	0.000	1.231 ✔	1.333	H1-3+VT ✔
	8 - 7	0.015	1.216	0.000	0.031	0.000	1.231 ✔	1.333	H1-3+VT ✔
	7 - 6	0.015	1.216	0.000	0.031	0.000	1.231 ✔	1.333	H1-3+VT ✔

Section No.	Elevation ft	Ratio P / P_a	Ratio f_{bx} / F_{bx}	Ratio f_{by} / F_{by}	Ratio f_v / F_v	Ratio f_{vt} / F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	6 - 5	0.015	1.216	0.000	0.031	0.000	1.230 ✔	1.333	H1-3+VT ✔
	5 - 4	0.015	1.215	0.000	0.031	0.000	1.230 ✔	1.333	H1-3+VT ✔
	4 - 3	0.015	1.215	0.000	0.031	0.000	1.230 ✔	1.333	H1-3+VT ✔
	3 - 2	0.015	1.216	0.000	0.031	0.000	1.231 ✔	1.333	H1-3+VT ✔
	2 - 1	0.015	1.218	0.000	0.031	0.000	1.233 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P / K	$SF*P_{allow}$ / K	% Capacity	Pass Fail
L1	180 - 149	Pole	TP21.38x14.4x0.1875	1	-3.92	636.51	50.6	Pass
L2	149 - 127.25	Pole	TP25.91x20.3858x0.25	2	-8.12	1058.52	90.0	Pass
L3	127.25 - 98.25	Pole	TP32.44x25.91x0.3	3	-11.72	1546.41	93.4	Pass
L4	98.25 - 48.75	Pole	TP43.1x30.9393x0.34	4	-20.99	2328.79	93.6	Pass
L5	48.75 - 21	Pole	TP48.95x41.1698x0.34	5	-22.96	2362.85	96.7	Pass
L6	21 - 1	Pole	TP53.23x48.95x0.35	6	-34.03	3045.08	92.5	Pass
							Summary	
						Pole (L5)	96.7	Pass
						Base Plate	78.9	Pass
						RATING =	**96.7**	**Pass**

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Subject:	Foundation Analysis
Location:	180-ft Monopole Enfield, CT
Rev. 1: 8/28/15	Prepared by: T.J.L. Checked by: C.F.C. Job No. 15001.066

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 3028 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$Shear := 24 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$Axial := 34 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 180 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 6.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 7.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 2.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 23.0 \cdot ft$	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts =	$L_{st} := 84 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12.0 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 60.0 \cdot in$	(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)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 3000 \cdot psf$	(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)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 36$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 5.5 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.5 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.0 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 36$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.0 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 36$	(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:

Pier Reinforcement Bar Area =

$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$$

Pad Top Reinforcement Bar Area =

$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =

$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$$

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 =

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

Adjusted Soil Unit Weight =

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

Passive Pressure =

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

$$P_{pt} := K_p\cdot\gamma_s\cdot\left(D_f - T_f\right) + c\cdot 2\cdot\sqrt{K_p} = 1.769\cdot\text{ksf}$$

$$P_{top} := \text{if}\left[n < \left(D_f - T_f\right), P_{pt}, P_{pn}\right] = 1.769\cdot\text{ksf}$$

$$P_{bot} := K_p\cdot\gamma_s\cdot D_f + c\cdot 2\cdot\sqrt{K_p} = 2.653\cdot\text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 2.211\cdot\text{ksf}$$

$$T_p := \text{if}\left[n < \left(D_f - T_f\right), T_f, \left(D_f - n\right)\right] = 2$$

$$A_p := W_f\cdot T_p = 46$$

Ultimate Shear =

$$S_u := P_{ave}\cdot A_p = 101.693\cdot\text{kip}$$

Weight of Concrete Pad =

$$WT_c := \left[\left(W_f^{\,2}\cdot T_f\right) + d_p^{\,2}\cdot L_p\right]\cdot\gamma_c = 191.775\cdot\text{kip}$$

Weight of Soil Above Footing =

$$WT_{s1} := \left[\left(W_f^{\,2} - d_p^{\,2}\right)\cdot\begin{cases}\left(L_p - L_{pag} - n\right) & \text{if } \left(L_p - L_{pag} - n\right) \geq 0 \\ 0 & \text{if } \left(L_p - L_{pag} - n\right) \leq 0\end{cases}\right]\cdot\gamma_s = 240\cdot\text{kip}$$

Weight of Soil Wedge at Back Face =

$$WT_{s2} := \left(\frac{D_f^{\,2}\cdot\tan\left(\Phi_s\right)}{2}\cdot W_f\right)\cdot\gamma_s = 34.906\cdot\text{kip}$$

Weight of Soil Wedge at back face Corners =

$$WT_{s3} := 2\cdot\left[\left(D_f\right)^3\cdot\frac{\tan\left(\Phi_s\right)}{3}\right]\cdot\gamma_s = 12.141\cdot\text{kips}$$

Total Weight =

$$WT_{tot} := WT_c + WT_{s1} + \text{Axial} = 465.775\cdot\text{kip}$$

Resisting Moment =

$$M_r := \left(WT_{tot}\right)\cdot\frac{W_f}{2} + S_u\cdot\frac{T_f}{3} + \left[\left(WT_{s2} + WT_{s3}\right)\cdot\left(W_f + \frac{D_f\tan\left(\Phi_s\right)}{3}\right)\right] = 6570\cdot\text{kip}\cdot\text{ft}$$

Overturning Moment =

$$M_{ot} := \text{OM} + \text{Shear}\cdot\left(L_p + T_f\right) = 3184\cdot\text{kip}\cdot\text{ft}$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 2.06$$

Factor of Safety Required =

$$FS_{req} := 2$$

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

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{\mu \cdot WT_{tot}}{FS_{req}} = 104.799 \cdot kips$

$Shear\_Check := if(S_p > Shear, "Okay", "No Good")$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^2 = 529$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 2027.83 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.451 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.69 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 5.983$

Distance to Kern = $X_k := \frac{W_f}{6} = 3.833$

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

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 6.836$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)} = 2.895 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.895 \cdot ksf$

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

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor =

$\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad =

$P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.225 \times 10^4 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > LF \cdot Axial, "Okay", "No Good")$

Bearing_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)

$d := T_f - Cvr_{pad} - d_{bbot} = 20 \cdot in$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := LF \cdot \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

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

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

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 =

$b_o := \left(d_p + d\right) \cdot \pi = 27.2$

Area Included Inside Perimeter =

$A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 59$

Area Outside of Perimeter =

$A_{out} := A_{mat} - A_{bo} = 470$

Guess Value = $v_u := 1ksf$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := Find(v_u) = 10.3 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 393.5 \cdot kips$

Required Shear Strength = $V_{req} := LF \cdot V_u = 524.5 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1405.1 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$q_b := q_{adj} - d_1 \cdot Slope = 1.24 \cdot ksf$

Maximum Bending at Face of Pier = $M_u := LF \cdot \left[\left(q_{adj} - q_b \right) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 2298.6 \cdot kip \cdot ft$

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

(ACI-200810.2.7.3)

$R_n := \frac{M_u}{\phi_m \cdot W_f \cdot d^2} = 277.6 \cdot psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0048$

$\rho_{min} := \rho = 0.00483$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 26.678 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 28.3 \cdot in^2$$

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

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := \rho_{sh} \cdot \left(W_f \cdot \frac{d}{2}\right) = 5 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 28.3 \cdot in^2$$

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

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 6.69 \cdot in$$

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 =

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 23.7 \cdot in$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 93 \cdot in$$

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^{\,2}}{4} = 5541.77 \cdot in^2$$

$$A_{smin} := 0.0033 \cdot A_p = 18.29 \cdot in^2$$

$$A_{sprov} := NB_{pier} \cdot A_{bpier} = 28.27 \cdot in^2$$

$$Steel\_Area\_Check := if\left(A_{sprov} > A_{smin}, "Okay", "No Good"\right)$$

Steel_Area_Check = "Okay"

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 6.33 \cdot in$$

Diameter of Reinforcement Cage =

$$Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 73 \cdot in$$

Maximum Moment in Pier =

$$M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] \cdot LF = 50355.4 \cdot in \cdot kips$$

Pier Check evaluated from outside program and results are listed below;

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) := \left(d_p \cdot 12 \;\; NB_{pier} \;\; BS_{pier} \;\; \frac{Axial \cdot 1.333}{kips} \;\; \frac{M_p}{in \cdot kips}\right)$$

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = \left(84 \;\; 36 \;\; 8 \;\; 45.322 \;\; 5.036 \times 10^4\right)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := (0 \;\; 0 \;\; 0 \;\; 0)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := \phi P'_n\left(D, N, n, P_u, M_{xu}\right)^T$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = \left(50.202 \;\; 5.578 \times 10^4 \;\; -60 \;\; 5.132 \times 10^3\right)$$

$$Axial\_Load\_Check := if\left(\phi P_n \geq P_u, "Okay", "No Good"\right)$$

Axial_Load_Check = "Okay"

$$Bending\_Check := if\left(\phi M_{xn} \geq M_{xu}, "Okay", "No Good"\right)$$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 48.5 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 21 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3.165 \cdot in$

Transverse Reinforcement =

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

$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 22.48 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 13.282 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 18.974 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 18 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 18.974 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

Tie Size and Spacing in Column:

Minimum Tie Size =

$Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 3$

Used #4 Ties

Seismic Factor =

$z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 16 \cdot in$

$s_{lim2} := 48 \cdot d_{Tie} \cdot z = 24 \cdot in$

$s_{lim3} := D_f \cdot z = 72 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing =

$$s_{tie} := \min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 16 \cdot in$$

Number of Ties Required =

$$n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 3.844$$

Check Anchor Steel Embedment:

Depth Available =

$D_{ab} := L_{st} - A_{BP} = 6 \cdot ft$

Length of Anchor Bolt =

$$L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 10.87 \cdot ft$$

$Depth\_Check := if(D_{ab} \ge L_{anchor}, "Okay", "No Good")$

Depth_Check = "No Good"

Note: Anchor plate is provided

TOWER REINFORCEMENT DESIGN

SOMERS WEST
37 BACON ROAD
ENFIELD, CT 06082

VICINITY MAP

NORTH

PROJECT SUMMARY

SITE ADDRESS:	37 BACON ROAD ENFIELD, CT 06082
PROJECT COORDINATES:	LAT: 42°-00'-57.26N LON: 72°-31'-43.60W ELEV: ±175' AMSL
VERIZON SITE REF.:	SOMERS WEST
VERIZON CONTACT:	ALEKSEY TYURIN 860.803.8213
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

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REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	9/14/15	EA	CFC	ISSUED FOR CONSTRUCTION
0	8/28/15	EA	CFC	ISSUED FOR CONSTRUCTION

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VERIZON WIRELESS
SOMERS WEST

DATE: 8/28/15
SCALE: AS SHOWN
JOB NO. 15001.066

TITLE SHEET

SHEET NO.
T-1
Sheet No. 1 of 6

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) = 80 MPH (FASTEST MILE)

   WIND LOAD: (2005 CT STATE BUILDING CODE APPENDIX K)
   BASIC WIND SPEED (V) = 95 MPH (3-SECOND GUST)
   EQUIVALENT TO (V) = 77.5 MPH (FASTEST MILE)

   TIA/EIA-222-F-1996 WIND SPEED CONTROLS

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., FOR VERIZON WIRELESS, REVISION #2, DATED 9/14/15.

2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM THE ORIGINAL TOWER DESIGN DOCUMENTS PREPARED BY SABRE COMMUNICATIONS PROJECT #04-07104, DATED JULY 23, 2003.

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

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

5. THE TOWER STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER REINFORCEMENTS ARE COMPLETE. 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.

5. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH TOWER OWNER.

6. 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.

7. 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.

8. 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.

9. 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.

10. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.

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.

REV	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	8/28/15	T.A.	CFC	ISSUED FOR CONSTRUCTION
1	9/14/15	T.A.	CFC	ISSUED FOR CONSTRUCTION

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VERIZON WIRELESS

SOMERS WEST

DATE: 8/28/15
SCALE: AS SHOWN
JOB NO. 15001.066

DESIGN BASIS & GENERAL NOTES

SHEET NO. N-1

Sheet No. 2 of 8

STRUCTURAL STEEL

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

2. MATERIAL SPECIFICATIONS

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
   C. STRUCTURAL STEEL (TOWER REINF. PLATES---ASTM A572_GR50 (50 KSI)
   D. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   E. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   F. 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.
   E. BLIND BOLTS---AS1252 PROPERTY CLASS 8.8 (FU=120 KSI).

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
1	8/14/15	T.L.	CFC	ISSUED FOR CONSTRUCTION
0	8/28/15	T.L.	CFC	ISSUED FOR CONSTRUCTION

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DATE:	8/28/15
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JOB NO.	15001.066

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	–	CONCRETE TESTING	X	PHOTOGRAPHS
–	FABRICATION INSPECTION	X	STEEL INSPECTION		
–	FABRICATOR CERTIFIED WELDER INSPECTION	–	POST INSTALLED ANCHOR ROD VERIFICATION		
X	MATERIAL CERTIFICATIONS	–	BASE PLATE GROUT VERIFICATION		
		–	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON–SITE COLD GALVANIZING VERIFICATION		
		–	GUY WIRE TENSION REPORT		
		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

NO.	DATE	BY	DESCRIPTION
1	9/14/15	T.K.	ISSUED FOR CONSTRUCTION
0	8/28/15	T.K.	ISSUED FOR CONSTRUCTION

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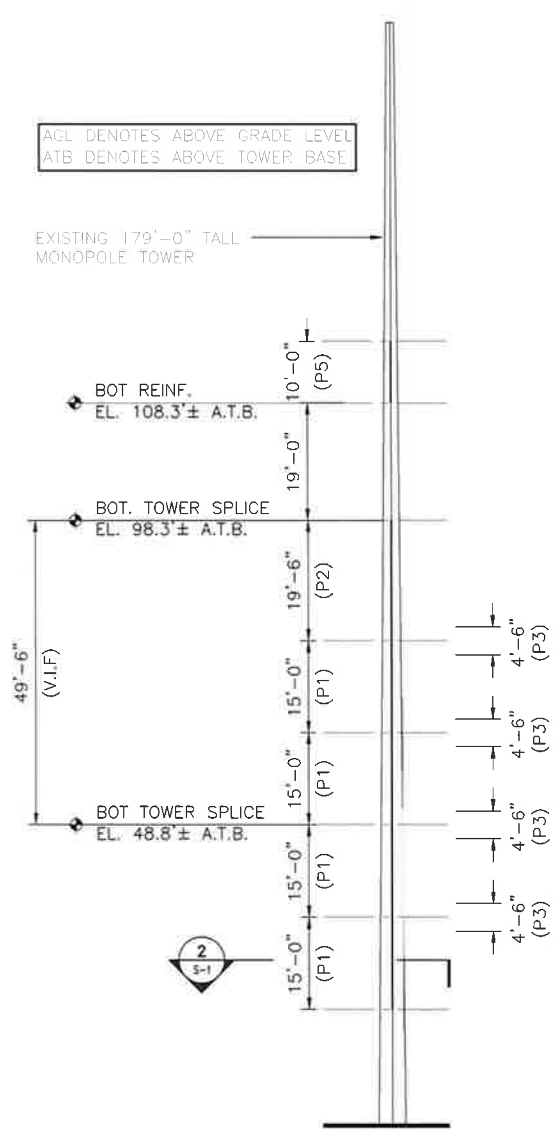
VERIZON WIRELESS
SOMERS WEST

DATE: 8/28/15
SCALE: AS SHOWN
JOB NO: 15001.066

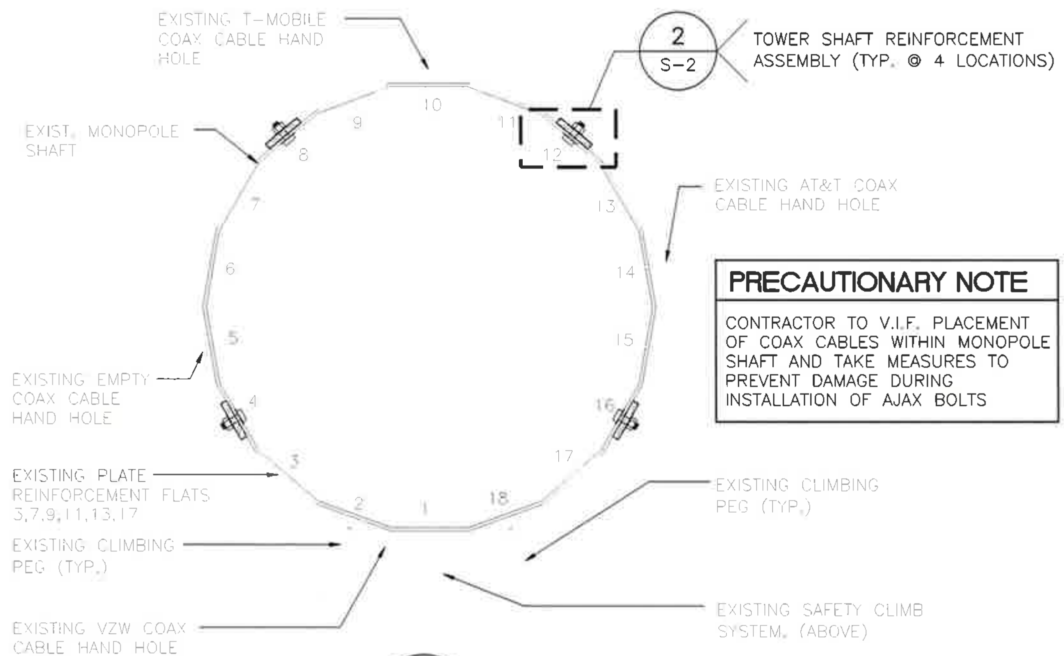
MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 4 of 5



1 S-1 TOWER ELEVATION - PROPOSED

SCALE: 1" = 20'-0"

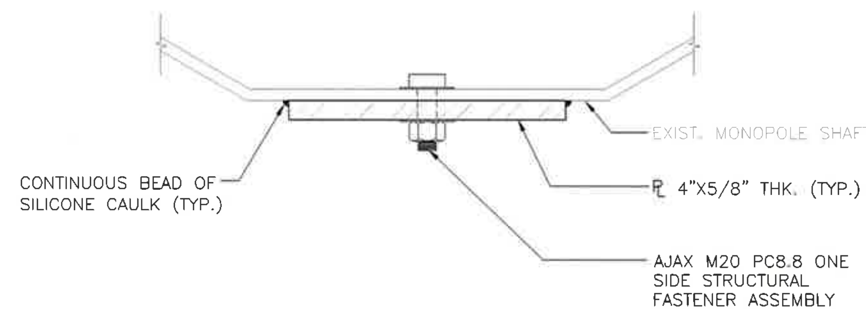


PRECAUTIONARY NOTE

CONTRACTOR TO V.I.F. PLACEMENT OF COAX CABLES WITHIN MONOPOLE SHAFT AND TAKE MEASURES TO PREVENT DAMAGE DURING INSTALLATION OF AJAX BOLTS

2 S-1 REINFORCEMENT PLAN

SCALE: 1" = 1'-0"



3 S-1 REINFORCEMENT DETAIL

SCALE: 3" = 1'-0"

REV	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
1	9/14/15	T.A.	CFC	ISSUED FOR CONSTRUCTION
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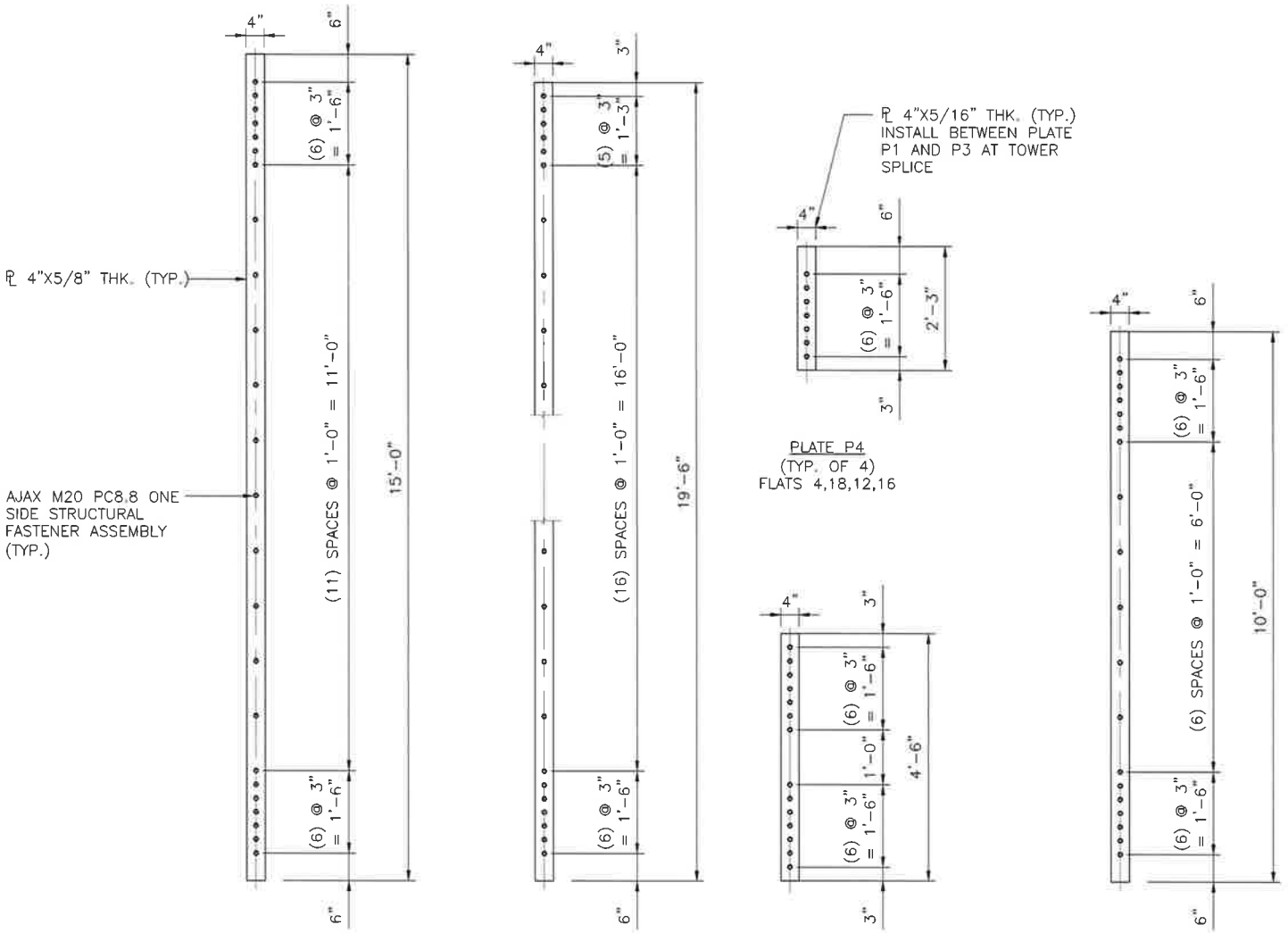
TOWER REINFORCEMENT DETAILS

SHEET NO. S-1

Sheet No. 5 of 6



1 / S-2 **PLATE DETAILS**

SCALE: 1/2" = 1'-0"

NO.	DATE	BY	DESCRIPTION
1	9/14/15	TA	CFC ISSUED FOR CONSTRUCTION
0	8/28/15	TA	CFC ISSUED FOR CONSTRUCTION

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VERIZON WIRELESS

SOMERS WEST

DATE:	8/28/15
SCALE:	AS SHOWN
JOB NO.	15001.066

PLATE DETAILS

SHEET NO.
S-2

SITE NAME	SOMERS WEST CT		ECP - CELL #	8	16
LATITUDE	42-00-57.37 N		LONGITUDE	72-31-43.46 W	
700 tilt change plus RET antenna swap outs and 40W to 60W RRH upgrades. The 60W 4 port 700 RRH will be connected to the low band ports on the AWS and PCS antenna. Please note the electrical tilt for 700 are on the SBNHH antennas			SAVE BUTTON		
			STRUCTURE TYPE	MONOPOLE	
700 Mhz - LTE Current Config	**ALPHA**		**BETA**	**GAMMA**	
EQUIPMENT TYPE	eNodeB		eNodeB	eNodeB	
ANTENNA TYPE	BXA-70063-6CF-2		BXA-70063-6CF-2	BXA-70063-6CF-2	
QTY OF ANTENNAS PER FACE	leave as placeholder		leave as placeholder	leave as placeholder	
ORIENTATION (DEG)	30		150	270	
DOWN TILT (MECH/DEG)	2		0	2	
RAD CTR (FT AGL)	150		150	150	
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
MCPA BRICKS (QTY)					
RRH - QTY/MODEL					
SECTOR DISTRIBUTION BOX					
MAIN DISTRIBUTION BOX					
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)	30		150	270	
DOWN TILT (MECH/DEG)	5 elect		3 elect	4 elect	
RAD CTR (FT AGL)	150		150	150	
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
MCPA BRICKS (QTY)					
RRH - QTY/MODEL	1	ALU RH_2X60-700U	1	ALU RH_2X60-700U	1 ALU RH_2X60-700U
SECTOR DISTRIBUTION BOX					
MAIN DISTRIBUTION BOX					
850 Celluar - Current Config	**ALPHA**		**BETA**	**GAMMA**	
EQUIPMENT TYPE	Cellular Modcell 4.0		Cellular Modcell 4.0	Cellular Modcell 4.0	
ANTENNA TYPE	LPA-80080-4CF		LPA-80080-4CF-5	LPA-80080-4CF-5	
QTY OF ANTENNAS PER FACE	2		2	2	
ORIENTATION (DEG)	30		150	270	
DOWN TILT (MECH/DEG)	0		0	0	
RAD CTR (FT AGL)	150		150	150	
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL	2	FD9R6004/2C-3L	2 FD9R6004/2C-3L	2 FD9R6004/2C-3L	
DIPLEX WITH LTE CABLE					
MCPA BRICKS (QTY)					
850 Celluar - Future Config	**ALPHA**		**BETA**	**GAMMA**	
EQUIPMENT TYPE	Cellular Modcell 4.0		Cellular Modcell 4.0	Cellular Modcell 4.0	
ANTENNA TYPE	LPA-80080-4CF		LPA-80080-4CF-5	LPA-80080-4CF-5	
QTY OF ANTENNAS PER FACE	2		2	2	
ORIENTATION (DEG)	30		150	270	
DOWN TILT (MECH/DEG)	0		0	0	
RAD CTR (FT AGL)	150		150	150	
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL	0	FD9R6004/2C-3L	0 FD9R6004/2C-3L	0 FD9R6004/2C-3L	
DIPLEX WITH LTE CABLE					
MCPA BRICKS (QTY)					
1900 PCS - Current Config	**ALPHA**		**BETA**	**GAMMA**	
EQUIPMENT TYPE	PCS Modcell 4.0		PCS Modcell 4.0	PCS Modcell 4.0	
ANTENNA TYPE	BXA-171085-8BF-2		BXA-171085-8BF-2	BXA-171085-8BF-2	
QTY OF ANTENNAS PER FACE	1		1	1	
ORIENTATION (DEG)	30		150	270	
DOWN TILT (MECH/DEG)	0		0	0	
RAD CTR (FT AGL)	150		150	150	
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
DIPLEX WITH CELLULAR CABLE	DIPLEX with Cellular Cable		DIPLEX with Cellular Cable	DIPLEX with Cellular Cable	
MCPA BRICKS (QTY)					
1900 PCS - Future Config	**ALPHA**		**BETA**	**GAMMA**	
EQUIPMENT TYPE	PCS Modcell 4.0		PCS Modcell 4.0	PCS Modcell 4.0	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B	SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	1		1	1	
ORIENTATION (DEG)	30		150	270	
DOWN TILT (MECH/DEG)	2 elect		2 elect	2 elect	
RAD CTR (FT AGL)	150		150	150	
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
DIPLEX WITH CELLULAR CABLE	remove diplexing		remove diplexing	remove diplexing	
RRH - QTY/MODEL	1	ALU RH_2X60-PCS	1 ALU RH_2X60-PCS	1 ALU RH_2X60-PCS	
SECTOR DISTRIBUTION BOX					
MAIN DISTRIBUTION BOX					

AWS - LTE ANTENNA ADD	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	2100 MHz BBU		2100 MHz BBU		2100 MHz BBU	
ANTENNA TYPE	BXA-171063-12CF-EDIN-5		BXA-171063-12CF-EDIN-5		BXA-171063-12CF-EDIN-5	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	5		5		5	
RAD CTR (FT AGL)	150		150		150	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS	1	ALU RH_2X40-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX	1		DB-T1-6Z-8AB-0Z			

AWS - LTE ANTENNA ADD	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	2100 MHz BBU		2100 MHz BBU		2100 MHz BBU	
ANTENNA TYPE	SBNHH-1D65B		SBNHH-1D65B		SBNHH-1D65B	
QTY OF ANTENNAS PER FACE	same as 700 antenna		same as 700 antenna		same as 700 antenna	
ORIENTATION (DEG)	30		150		270	
DOWN TILT (MECH/DEG)	3 elect		3 elect		3 elect	
RAD CTR (FT AGL)	150		150		150	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
RRH - QTY/MODEL	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS	1	ALU RH_2X60-AWS
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX	1		DB-T1-6Z-8AB-0Z			

NUMBER OF CABLE'S NEEDED						ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES			12	MAINLINE (FT)			190
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS			36	TOP JUMPER (FT)			12
Equipment Cable Ordering		MAIN CABLE	12	+	0	TOP JUMPER #	24	+	12
FIBER LINE SIZE	1 5/8"	TOTAL # OF FIBER LINES			2	FIBER LINE MODEL #			HB158-1-08U8-S8J18
JUMPER SIZE	5/8"	TOTAL # OF TOP JUMPERS			6	TOP JUMPER MODEL #			HB058-1-08U1-S1J18
Fiber Cable Ordering		FIBER CABLE	1	+	1	TOP JUMPER #	3	+	3

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F-Band	700 Mhz C - B	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975	TX - 746-757	PCS (Watts)	16
RX - 824-835,845-846.5 MHz	RX - 1890-1895	RX - 776-787	LTE (Watts)	40

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

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By : Mark Brauer	Robert Hesselbach	MB	4/16/2015

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.

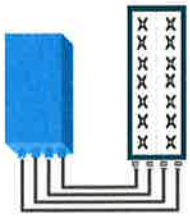
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

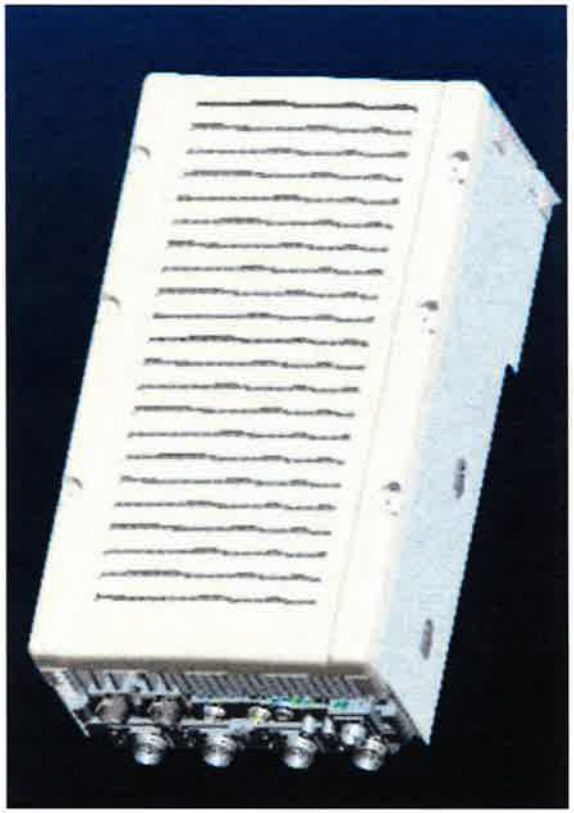
TECHNICAL SPECIFICATIONS

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
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

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

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

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

SUPERIOR RF PERFORMANCE

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

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

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

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

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

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

OPTIMIZED TCO

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

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

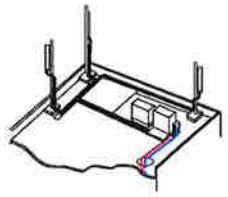
EASY INSTALLATION

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

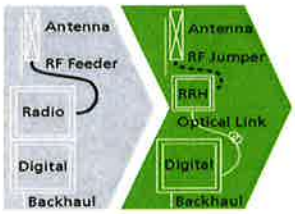
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

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

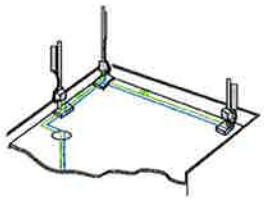
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

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

BENEFITS

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

TECHNICAL SPECIFICATIONS

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

Dimensions and weights

36.7"x10.6"x5.8"

- HxWxD : ~~510x265x106mm~~ (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

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

RF Characteristics

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

Connectivity

- Two CPRI optical ports for 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 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

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

Safety and Regulatory Data

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

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AT THE SPEED OF IDEAS™

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.