Robinson+Cole

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Also admitted in Massachusetts

March 15, 2017

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

Re: **Notice of Exempt Modification – Facility Modification**
49 Wig Hill Road, Chester, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 142-foot level on an existing 150-foot tower at 49 Wig Hill Road in Chester, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 1998 (Docket No. 181). Cellco now intends to replace six (6) of its existing antennas three (3) model SBNHH-1D65B, 700 MHz antennas and three (3) model SBNHH-1D65B, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to install six (6) remote radio heads ("RRHs") and two (2) HYBRIFLEX™ fiber optic antenna cables. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cables.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Laura Gister, First Selectwoman of the Town of Chester; Judy Brown, Chester's Zoning Enforcement Officer; Bruce Rayner Est., the Property owner; and Crown, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing structure. Cellco's replacement antennas and RRHs will be installed on its existing platform at the 142-foot level on the tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for Cellco's modified facility is included in Attachment 2.

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

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

A copy of the Chester parcel map and property owner information is included in Attachment 4.

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Laura Gister, First Selectwoman
Judy Brown, Zoning Enforcement Officer
Bruce Rayner Est.
Crown
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

SBNHH-1D65B

Multiband Antenna, 698–896 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

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

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	66	69	66	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5.0	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°, dB	27	29	28	28	28	27
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6	0 ° | 14.5	0 ° | 17.4	0 ° | 17.8	0 ° | 18.1	0 ° | 18.2
	7 ° | 14.6	7 ° | 14.4	3 ° | 17.5	3 ° | 17.9	3 ° | 18.3	3 ° | 18.4
	14 ° | 14.2	14 ° | 13.6	7 ° | 17.4	7 ° | 17.9	7 ° | 18.2	7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	25	26	27	26	26	26
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

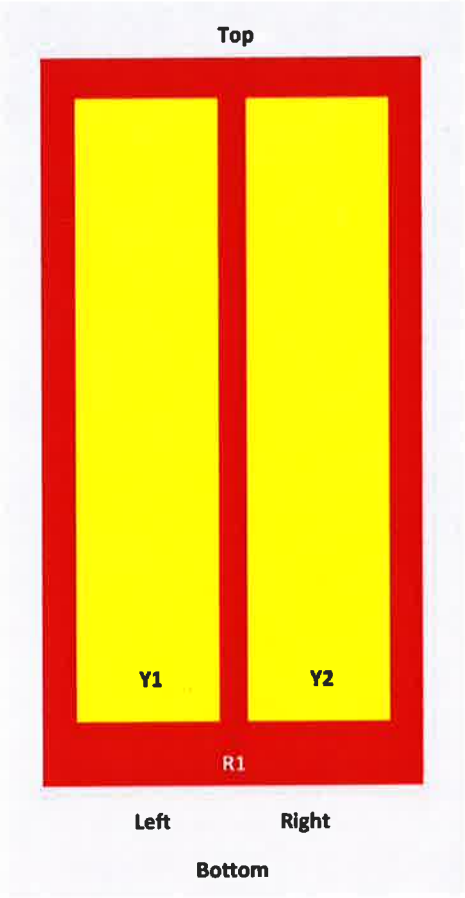
* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Array Layout

Product Specifications

SBNHH-1D65B

SBNHH 65



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

View from the front of the antenna

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

General Specifications

Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage

Mechanical Specifications

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

Product Specifications

SBNHH-1D65B

Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Radiator Material	Aluminum | Low loss circuit board
Radome Material	Fiberglass, UV resistant
Reflector Material	Aluminum
RF Connector Location	Bottom
Wind Loading, frontal	618.0 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Loading, lateral	197.0 N @ 150 km/h 44.3 lbf @ 150 km/h
Wind Loading, rear	728.0 N @ 150 km/h 163.7 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

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

Remote Electrical Tilt (RET) Information

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

Packed Dimensions

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

Regulatory Compliance/Certifications

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

Product Specifications

SBNHH-1D65B

Included Products

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

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

ALCATEL-LUCENT B13 RRH4X30-4R

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

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

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

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

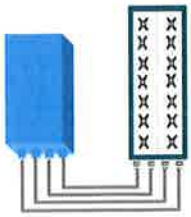
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the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

FEATURES

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

BENEFITS

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



4x30W with 4T4R
or
2x60W with 2T4R

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

Alcatel·Lucent

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) **Volume in L** **Weight in kg (lb) (w/o mounting HW)**	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range **DC power consumption**	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions **Wind load (@150km/h or 93mph)**	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

ALCATEL-LUCENT B66A RRH4X45

The Alcatel-Lucent B66a Remote Radio Head 4x45 is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering. Its operational range covers beyond that of B4 (AWS) and B10 (AWS+).

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

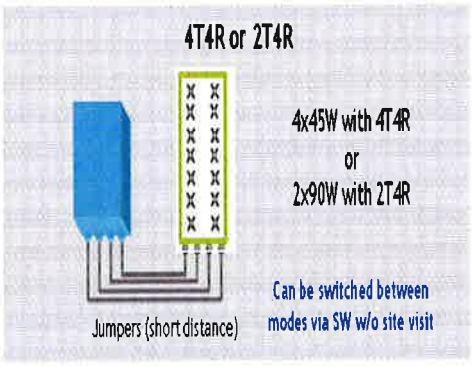
The Alcatel-Lucent B66a RRH4x45 product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x90W or 4x45W RF output power. It also supports 4-way Rx diversity at the 70 MHz instantaneous bandwidth.

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

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

FEATURES

- Supporting LTE in 2110 - 2180 MHz band/DL, 1710-1780MHz/UL (3GPP band 4, 10, and 66a)
- LTE 2Tx or 4Tx MIMO (SW selectable)
- Configuration: 2T2R/2T4R/4T4R
- Output power: Up to 2x90W or 4x45W (SW configurable)
- 70MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports



BENEFITS

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

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

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.

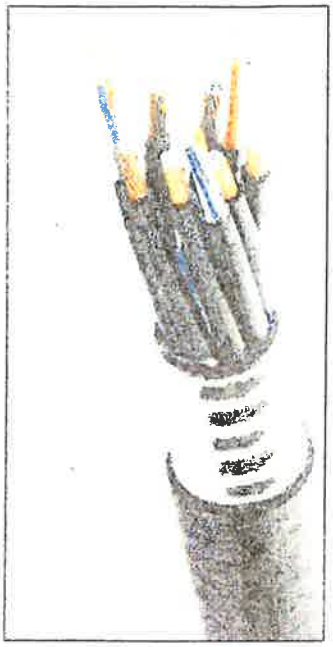


Figure 1: HYBRIFLEX Series

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)

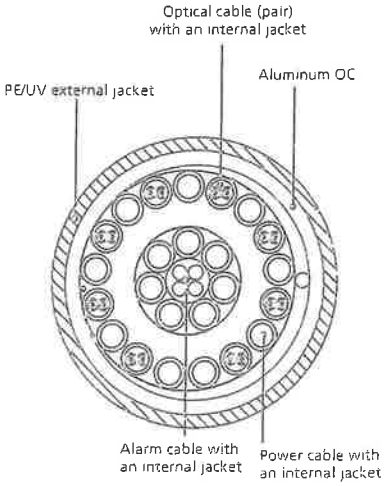


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Chester								
Tower Height: 150ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*T-Mobile	1	865	108	700	0.0299	0.4667	0.64%	
*T-Mobile	6	1706	108	2130	0.3538	1.0000	3.54%	
*Sprint	(sprint at 150')							
*VSECI	1	29	170	933.175	0.0004	0.6221	0.01%	
*VSECI	1	300	170	46.18	0.0040	0.2000	0.20%	
*VSECI	1	300	170	46.44	0.0040	0.2000	0.20%	
*AT&T	2	414	136	850	0.0176	0.5667	0.31%	
*AT&T	2	656	136	1900	0.0279	1.0000	0.28%	
*AT&T	2	1211	136	700	0.0515	0.4667	1.10%	
*AT&T	2	2973	136	1900	0.1265	1.0000	1.27%	
*AT&T	2	414	136	850	0.0176	0.5667	0.31%	
*AT&T	2	656	136	1900	0.0279	1.0000	0.28%	
Verizon PCS	**0**	**0**	**142**	**0.0000**	**1970**	**1.0000**	**0.00%**	
Verizon Cellular	**9**	**262**	**142**	**0.0420**	**869**	**0.5793**	**7.26%**	
Verizon AWS	**1**	**6907**	**142**	**0.1232**	**2145**	**1.0000**	**12.32%**	
Verizon 700	**1**	**1652**	**142**	**0.0295**	**746**	**0.4973**	**5.92%**	
								33.63%
* Source: Siting Council								

ATTACHMENT 3

PAUL J. FORD & COMPANY

Date: **November 01, 2016**

Charles McGuirt
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
704.405.6607

Paul J Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679
rferrante@pjfweb.com

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	119727
	Carrier Site Name:	Chester CT
Crown Castle Designation:	**Crown Castle BU Number:**	800515
	Crown Castle Site Name:	CT CHESTER CAC 800515
	Crown Castle JDE Job Number:	401575
	Crown Castle Work Order Number:	1319270
	Crown Castle Application Number:	365418 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37516-2933.002.7805
Site Data:	**49 Wig Hill Road, Chester, Middlesex County, CT** **Latitude *41° 24' 13.93"*, Longitude *-72° 28' 20.82"*** **150 Foot - Monopole Tower**	

Dear Charles McGuirt,

Paul J Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 965879, in accordance with application 365418, revision 0.

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

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 130 mph converted to a nominal 3-second gust wind speed of 101 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category B and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

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

Respectfully submitted by:

Ryan Ferrante, EI
Structural Designer

STATE OF CONNECTICUT
JUSTIN T. KLINE
No. 30301
LICENSED
PROFESSIONAL ENGINEER

11.2.16

tnxTower Report - version 7.0.5.1

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1) INTRODUCTION

This tower is a 150 ft Monopole tower designed by ENGINEERED ENDEAVORS, INC. in August of 1998. The tower was originally designed for a wind speed of 90 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 130 mph converted to a nominal 3-second gust wind speed of 101 mph per Section 1609.3 and Appendix N as required for use in the ANSI/TIA-222-G-2005 Standard, "Structural Standard for Antenna Supporting Structures and Antennas", with ANSI/TIA-222-G-1-2007 and ANSI/TIA-222-G-2-2009 Addenda per Exception #5 of Section 1609.1.1. Risk Category II, Exposure Category B and Topographic Category 1 with a maximum Topographic Factor, Kzt, of 1.0 were used in this analysis.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
139.0	142.0	3	alcatel lucent	B13 RRH 4X30	2	1-1/4	-
		3	alcatel lucent	B66A RRH4X45			
		6	antel	LPA-80080-4CF-EDIN-0 w/ Mount Pipe			
		6	commscope	SBNHH-1D65B w/ Mount Pipe			
		2	rfs celwave	DB-B1-6C-12AB-0Z			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
150.0	152.0	6	decibel	DB980H90E-M w/ Mount Pipe	6	1-5/8	1
	150.0	1	tower mounts	Platform Mount [LP 602-1]			
148.0	163.0	1	rfs celwave	PD1142-1	-	-	1
	162.0	1	dbspectra	DS4C06F36D-N	1	7/8	2
	159.0	1	decibel	DB636-A	4	7/8	1
		1	rfs celwave	PD1142-1			
	148.0	4	tower mounts	Side Arm Mount [SO 701-1]			
139.0	142.0	3	antel	BXA-171085-8BF-EDIN-2 w/ Mount Pipe	-	-	3
		3	antel	BXA-70063-6CF-2 w/ Mount Pipe			
		6	antel	LPA-80080-4CF-EDIN-0 w/ Mount Pipe			
	139.0	6	rfs celwave	FD9R6004/2C-3L	3	13/64	1
		1	tower mounts	Platform Mount [LP 602-1]	12	1-5/8	
134.0	134.0	6	ericsson	TME-RRUS-11	-	-	1
		1	tower mounts	Side Arm Mount [SO 102-3]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
132.0	142.0	1	decibel	DB810KE-YP	1 2 1 12	3/8 7/16 7/8 1-1/4	1
	132.0	1	andrew	DBXNH-6565B-R2M w/ Mount Pipe			
		2	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		8	powerwave technologies	LGP21901			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 602-1]			
		3	kathrein	782 10253	-	-	2
116.0	120.0	2	gps	GPS_A	2 12	1/2 1-1/4	1
	118.0	12	allgon	7120.16 w/ Mount Pipe			
	116.0	1	tower mounts	Platform Mount [LP 602-1]			
106.0	108.0	3	commscope	ATBT-BOTTOM-24V	6	1-5/8	1
		3	commscope	LNX-6515DS-VTM w/ Mount Pipe			
		3	ems wireless	RR65-18-02DP w/ Mount Pipe			
	106.0	1	tower mounts	Platform Mount [LP 602-1]			
96.0	96.0	3	rfs celwave	APXV18-206517LS w/ Mount Pipe	6	1-1/4	1
		1	tower mounts	Side Arm Mount [SO 104-3]			
75.0	75.0	1	gps	GPS_RESERVED	1	1/2	1
		1	tower mounts	Side Arm Mount [SO 701-1]			
70.0	70.0	1	kathrein	PR-950	1	WEP65	1
		1	tower mounts	Side Arm Mount [SO 104-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
GEOTECHNICAL REPORTS	Clarence Welti, 10/27/1998	2301672	CCISITES
POST-MODIFICATION INSPECTION	GPD, 2006185.04, 10/5/2006	1285403	CCISITES
TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	TEP, 081974, 7/31/2008	671930	CCISITES
TOWER MANUFACTURER DRAWINGS	EEI, 4123, 8/7/1998	671925	CCISITES
TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	GPD, 2005078.33, 2/24/2005	1037702	CCISITES

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) Monopole has been modified in conformance with the referenced modification drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	150 - 122.92	Pole	TP28.83x21x0.1875	1	-9.63	1072.37	38.8	Pass
L2	122.92 - 84.26	Pole	TP39.51x27.2493x0.375	2	-22.20	3320.64	43.0	Pass
L3	84.26 - 41.55	Pole	TP50.99x37.1855x0.4375	3	-36.36	4873.49	48.8	Pass
L4	41.55 - 0	Pole	TP62x48.1364x0.5	4	-58.95	6834.14	47.5	Pass
							Summary	
						Pole (L3)	48.8	Pass
						Rating =	48.8	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	45.8	Pass
1	Base Plate	0	33.2	Pass
1	Base Foundation Structural Steel	0	60.4	Pass
1	Base Foundation Soil Interaction	0	5.8	Pass

Structure Rating (max from all components) =	60.4%

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

4.1) Recommendations

The monopole and its foundation have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Middlesex County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 101.00 mph.
4) Structure Class II.
5) Exposure Category B.
6) Topographic Category 1.
7) Crest Height 0.00 ft.
8) Nominal ice thickness of 0.7500 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56.00 pcf.
11) A wind speed of 50.00 mph is used in combination with ice.
12) Temperature drop of 50.00 °F.
13) Deflections calculated using a wind speed of 60.00 mph.
14) A non-linear (P-delta) analysis was used.
15) Pressures are calculated at each section.
16) Stress ratio used in pole design is 1.
17) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

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	150.00-122.92	27.08	4.17	18	21.0000	28.8300	0.1875	0.7500	A572-65 (65 ksi)
L2	122.92-84.26	42.83	5.50	18	27.2493	39.5100	0.3750	1.5000	A572-65 (65 ksi)
L3	84.26-41.55	48.21	6.91	18	37.1855	50.9900	0.4375	1.7500	A572-65 (65 ksi)
L4	41.55-0.00	48.46		18	48.1364	62.0000	0.5000	2.0000	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	21.3240	12.3860	677.8263	7.3884	10.6680	63.5383	1356.5444	6.1942	3.3660	17.952
	29.2747	17.0459	1766.7635	10.1681	14.6456	120.6341	3535.8517	8.5246	4.7441	25.302
L2	28.8818	31.9871	2918.6754	9.5404	13.8426	210.8469	5841.1912	15.9966	4.1359	11.029
	40.1195	46.5804	9013.0474	13.8929	20.0711	449.0564	18037.9544	23.2946	6.2938	16.783
L3	39.3584	51.0293	8706.1285	13.0456	18.8903	460.8793	17423.7127	25.5195	5.7747	13.199
	51.7766	70.1985	22664.7192	17.9461	25.9029	874.9870	45359.2613	35.1059	8.2042	18.753
L4	50.8863	75.5990	21673.5922	16.9109	24.4533	886.3264	43375.7030	37.8067	7.5920	15.184
	62.9564	97.6005	46637.9792	21.8325	31.4960	1480.7588	93337.3258	48.8095	10.0320	20.064

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
LDF7-50A(1-5/8")	C	No	Inside Pole	150.00 - 0.00	6	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
**								
HJ5-50(7/8")	C	No	Inside Pole	148.00 - 0.00	4	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
						1" Ice	0.00	0.54
HJ5-50(7/8")	C	No	Inside Pole	148.00 - 0.00	1	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
						1" Ice	0.00	0.54
**								
HJ7-50A(1-5/8")	C	No	Inside Pole	139.00 - 0.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
CATEGORY 5e(13/64)	C	No	Inside Pole	139.00 - 0.00	3	No Ice	0.00	0.02
						1/2" Ice	0.00	0.02
						1" Ice	0.00	0.02
HB114-U6S12-xxx-LI(1-1/4")	C	No	Inside Pole	139.00 - 0.00	2	No Ice	0.00	1.70
						1/2" Ice	0.00	1.70
						1" Ice	0.00	1.70
**								
LCF114-50J(1-1/4")	C	No	Inside Pole	132.00 - 0.00	12	No Ice	0.00	0.70
						1/2" Ice	0.00	0.70
						1" Ice	0.00	0.70
LCF78-50A(7/8")	C	No	CaAa (Out Of Face)	132.00 - 0.00	1	No Ice	0.11	0.34
						1/2" Ice	0.21	1.31
						1" Ice	0.31	2.89
FB-L98B-002-75000(3/8")	C	No	Inside Pole	132.00 - 0.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
WR-VG122ST-BRDA(7/16")	C	No	Inside Pole	132.00 - 0.00	2	No Ice	0.00	0.14
						1/2" Ice	0.00	0.14
						1" Ice	0.00	0.14
**								
LDF4-50A(1/2")	C	No	Inside Pole	116.00 - 0.00	2	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
CR 1480 PE(1-1/4)	C	No	Inside Pole	116.00 - 0.00	12	No Ice	0.00	0.55
						1/2" Ice	0.00	0.55
						1" Ice	0.00	0.55
**								
AVA7-50(1-5/8")	C	No	Inside Pole	106.00 - 0.00	6	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
**								
LDF6-50A(1-1/4")	C	No	Inside Pole	96.00 - 0.00	6	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
						1" Ice	0.00	0.66
**								
FLC 12-50J(1/2")	C	No	CaAa (Out Of Face)	75.00 - 0.00	1	No Ice	0.06	0.17
						1/2" Ice	0.16	0.87
						1" Ice	0.26	2.17

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
**								
WEP65(ELLIPTICAL)	C	No	CaAa (Out Of Face)	70.00 - 0.00	1	No Ice	0.20	0.53
						1/2" Ice	0.30	2.08
						1" Ice	0.40	4.23

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	150.00-122.92	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	0.990	0.54
L2	122.92-84.26	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	4.214	1.62
L3	84.26-41.55	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	12.572	2.06
L4	41.55-0.00	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	15.623	2.02

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	150.00-122.92	A	1.728	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	4.128	0.60
L2	122.92-84.26	A	1.680	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	17.574	1.86
L3	84.26-41.55	A	1.599	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	47.731	2.71
L4	41.55-0.00	A	1.427	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	55.481	2.75

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.00-122.92	-0.0508	0.0293	-0.1781	0.1029
L2	122.92-84.26	-0.1344	0.0776	-0.4622	0.2668
L3	84.26-41.55	-0.3585	0.2070	-1.0690	0.6172
L4	41.55-0.00	-0.4457	0.2573	-1.2770	0.7373

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) DB980H90E-M w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	4.04 4.50 4.95	3.62 4.48 5.22	0.03 0.07 0.11

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
(2) DB980H90E-M w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	4.04 4.50 4.95	3.62 4.48 5.22	0.03 0.07 0.11
(2) DB980H90E-M w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	4.04 4.50 4.95	3.62 4.48 5.22	0.03 0.07 0.11
Platform Mount [LP 602-1]	C	None		0.00	150.00	No Ice 1/2" Ice 1" Ice	32.03 38.71 45.39	32.03 38.71 45.39	1.34 1.80 2.26
8-ft Ladder	C	From Leg	2.00 0.00 -2.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	7.07 9.73 11.19	7.07 9.73 11.19	0.04 0.07 0.08
(2) 5'x2 1/2" Pipe Mount	A	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.33 1.63 1.95	1.33 1.63 1.95	0.03 0.04 0.05
(2) 5'x2 1/2" Pipe Mount	B	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.33 1.63 1.95	1.33 1.63 1.95	0.03 0.04 0.05
(2) 5'x2 1/2" Pipe Mount	C	From Leg	4.00 0.00 0.00	0.00	150.00	No Ice 1/2" Ice 1" Ice	1.33 1.63 1.95	1.33 1.63 1.95	0.03 0.04 0.05
***									
PD1142-1	A	From Leg	4.00 0.00 11.00	30.00	148.00	No Ice 1/2" Ice 1" Ice	1.32 3.21 5.12	1.32 3.21 5.12	0.01 0.02 0.05
PD1142-1	C	From Leg	4.00 0.00 15.00	-30.00	148.00	No Ice 1/2" Ice 1" Ice	1.32 3.21 5.12	1.32 3.21 5.12	0.01 0.02 0.05
DB636-A	C	From Leg	4.00 0.00 11.00	60.00	148.00	No Ice 1/2" Ice 1" Ice	2.78 3.96 5.16	2.78 3.96 5.16	0.03 0.05 0.08
DS4C06F36D-N	B	From Leg	4.00 0.00 14.00	10.00	148.00	No Ice 1/2" Ice 1" Ice	5.50 7.37 9.25	5.50 7.37 9.25	0.07 0.11 0.16
Side Arm Mount [SO 701-1]	A	From Leg	1.50 0.00 0.00	30.00	148.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
Side Arm Mount [SO 701-1]	B	From Leg	1.50 0.00 0.00	10.00	148.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
Side Arm Mount [SO 701-1]	C	From Leg	1.50 0.00 0.00	-30.00	148.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
Side Arm Mount [SO 701-1]	C	From Leg	1.50 0.00 0.00	60.00	148.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 0.09
***									
(2) FD9R6004/2C-3L	A	From Leg	4.00 0.00 0.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) FD9R6004/2C-3L	B	From Leg	4.00 0.00 0.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) FD9R6004/2C-3L	C	From Leg	4.00 0.00 0.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	0.00 0.01 0.01
(2) LPA-80080-4CF-EDIN-0 w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.86 3.22 3.59	6.57 7.19 7.84	0.03 0.08 0.13
(2) LPA-80080-4CF-EDIN-0 w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.86 3.22 3.59	6.57 7.19 7.84	0.03 0.08 0.13
(2) LPA-80080-4CF-EDIN-0 w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.86 3.22 3.59	6.57 7.19 7.84	0.03 0.08 0.13

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
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	8.40 8.96 9.49	7.07 8.26 9.18	0.07 0.14 0.21
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	8.40 8.96 9.49	7.07 8.26 9.18	0.07 0.14 0.21
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	8.40 8.96 9.49	7.07 8.26 9.18	0.07 0.14 0.21
B13 RRH 4X30	A	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.32 1.48 1.64	0.06 0.07 0.09
B13 RRH 4X30	B	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.32 1.48 1.64	0.06 0.07 0.09
B13 RRH 4X30	C	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.32 1.48 1.64	0.06 0.07 0.09
B66A RRH4X45	A	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	0.07 0.09 0.11
B66A RRH4X45	B	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	0.07 0.09 0.11
B66A RRH4X45	C	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	0.07 0.09 0.11
(2) DB-B1-6C-12AB-0Z	A	From Leg	4.00 0.00 3.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	3.36 3.60 3.84	2.19 2.39 2.61	0.03 0.06 0.09
Platform Mount [LP 602-1]	C	None		0.00	139.00	No Ice 1/2" Ice 1" Ice	32.03 38.71 45.39	32.03 38.71 45.39	1.34 1.80 2.26
8-ft Ladder	C	From Leg	2.00 0.00 -2.00	0.00	139.00	No Ice 1/2" Ice 1" Ice	7.07 9.73 11.19	7.07 9.73 11.19	0.04 0.07 0.08
***									
(2) TME-RRUS-11	A	From Leg	1.00 0.00 0.00	0.00	134.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	0.05 0.07 0.09
(2) TME-RRUS-11	B	From Leg	1.00 0.00 0.00	0.00	134.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	0.05 0.07 0.09
(2) TME-RRUS-11	C	From Leg	1.00 0.00 0.00	0.00	134.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	0.05 0.07 0.09
Side Arm Mount [SO 102-3]	C	None		0.00	134.00	No Ice 1/2" Ice 1" Ice	3.00 3.48 3.96	3.00 3.48 3.96	0.08 0.11 0.14
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	132.00	No Ice 1/2" Ice 1" Ice	5.83 6.27 6.70	4.70 5.51 6.21	0.09 0.14 0.21
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	132.00	No Ice 1/2" Ice 1" Ice	5.83 6.27 6.70	4.70 5.51 6.21	0.09 0.14 0.21
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.00	132.00	No Ice 1/2" Ice 1" Ice	5.83 6.27 6.70	4.70 5.51 6.21	0.09 0.14 0.21
DBXNH-6565B-R2M w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.00	132.00	No Ice 1/2" Ice 1" Ice	8.51 9.07 9.61	7.16 8.36 9.29	0.08 0.15 0.23
AM-X-CD-16-65-00T-RET w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.00	132.00	No Ice 1/2" Ice 1" Ice	8.26 8.82 9.35	6.30 7.48 8.37	0.07 0.14 0.21

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
AM-X-CD-16-65-00T-RET	C	From Leg	4.00	0.00	132.00	No Ice	8.26	6.30	0.07
w/ Mount Pipe			0.00			1/2" Ice	8.82	7.48	0.14
			0.00			1" Ice	9.35	8.37	0.21
DB810KE-YP	A	From Leg	4.00	0.00	132.00	No Ice	4.37	4.37	0.04
			0.00			1/2" Ice	5.86	5.86	0.07
			10.00			1" Ice	7.37	7.37	0.11
(4) LGP21901	A	From Leg	4.00	0.00	132.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.01
(2) LGP21901	B	From Leg	4.00	0.00	132.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.01
(2) LGP21901	C	From Leg	4.00	0.00	132.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.01
(2) LGP21401	A	From Leg	4.00	0.00	132.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	B	From Leg	4.00	0.00	132.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
(2) LGP21401	C	From Leg	4.00	0.00	132.00	No Ice	1.10	0.35	0.01
			0.00			1/2" Ice	1.24	0.44	0.02
			0.00			1" Ice	1.38	0.54	0.03
DC6-48-60-18-8F	B	From Leg	4.00	0.00	132.00	No Ice	0.92	0.92	0.02
			0.00			1/2" Ice	1.46	1.46	0.04
			0.00			1" Ice	1.64	1.64	0.06
782 10253	A	From Leg	4.00	0.00	132.00	No Ice	0.11	0.06	0.00
			0.00			1/2" Ice	0.15	0.10	0.00
			0.00			1" Ice	0.20	0.14	0.01
782 10253	B	From Leg	4.00	0.00	132.00	No Ice	0.11	0.06	0.00
			0.00			1/2" Ice	0.15	0.10	0.00
			0.00			1" Ice	0.20	0.14	0.01
782 10253	C	From Leg	4.00	0.00	132.00	No Ice	0.11	0.06	0.00
			0.00			1/2" Ice	0.15	0.10	0.00
			0.00			1" Ice	0.20	0.14	0.01
Platform Mount [LP 602-1]	C	None		0.00	132.00	No Ice	32.03	32.03	1.34
						1/2" Ice	38.71	38.71	1.80
						1" Ice	45.39	45.39	2.26
8-ft Ladder	C	From Leg	2.00	0.00	132.00	No Ice	7.07	7.07	0.04
			0.00			1/2" Ice	9.73	9.73	0.07
			-2.00			1" Ice	11.19	11.19	0.08
5'x2 1/2" Pipe Mount	A	From Leg	4.00	0.00	132.00	No Ice	1.33	1.33	0.03
			0.00			1/2" Ice	1.63	1.63	0.04
			0.00			1" Ice	1.95	1.95	0.05
5'x2 1/2" Pipe Mount	B	From Leg	4.00	0.00	132.00	No Ice	1.33	1.33	0.03
			0.00			1/2" Ice	1.63	1.63	0.04
			0.00			1" Ice	1.95	1.95	0.05
5'x2 1/2" Pipe Mount	C	From Leg	4.00	0.00	132.00	No Ice	1.33	1.33	0.03
			0.00			1/2" Ice	1.63	1.63	0.04
			0.00			1" Ice	1.95	1.95	0.05
***									
(4) 7120.16 w/ Mount Pipe	A	From Leg	4.00	0.00	116.00	No Ice	3.52	5.95	0.03
			0.00			1/2" Ice	3.92	6.66	0.08
			2.00			1" Ice	4.32	7.33	0.13
(4) 7120.16 w/ Mount Pipe	B	From Leg	4.00	0.00	116.00	No Ice	3.52	5.95	0.03
			0.00			1/2" Ice	3.92	6.66	0.08
			2.00			1" Ice	4.32	7.33	0.13
(4) 7120.16 w/ Mount Pipe	C	From Leg	4.00	0.00	116.00	No Ice	3.52	5.95	0.03
			0.00			1/2" Ice	3.92	6.66	0.08
			2.00			1" Ice	4.32	7.33	0.13
(2) GPS_A	A	From Leg	4.00	0.00	116.00	No Ice	0.26	0.26	0.00
			0.00			1/2" Ice	0.32	0.32	0.00
			4.00			1" Ice	0.39	0.39	0.01
Platform Mount [LP 602-1]	C	None		0.00	116.00	No Ice	32.03	32.03	1.34

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
						1/2" Ice	38.71	38.71	1.80
						1" Ice	45.39	45.39	2.26
***									
RR65-18-02DP w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	4.59 5.02 5.44	3.32 4.09 4.78	0.03 0.07 0.12
RR65-18-02DP w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	4.59 5.02 5.44	3.32 4.09 4.78	0.03 0.07 0.12
RR65-18-02DP w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	4.59 5.02 5.44	3.32 4.09 4.78	0.03 0.07 0.12
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.08 0.17 0.27
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.08 0.17 0.27
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	11.68 12.40 13.14	9.84 11.37 12.91	0.08 0.17 0.27
ATBT-BOTTOM-24V	A	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	0.10 0.15 0.20	0.06 0.10 0.15	0.00 0.00 0.01
ATBT-BOTTOM-24V	B	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	0.10 0.15 0.20	0.06 0.10 0.15	0.00 0.00 0.01
ATBT-BOTTOM-24V	C	From Leg	4.00 0.00 2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	0.10 0.15 0.20	0.06 0.10 0.15	0.00 0.00 0.01
Platform Mount [LP 602-1]	C	None		0.00	106.00	No Ice 1/2" Ice 1" Ice	32.03 38.71 45.39	32.03 38.71 45.39	1.34 1.80 2.26
8-ft Ladder	C	From Leg	2.00 0.00 -2.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	7.07 9.73 11.19	7.07 9.73 11.19	0.04 0.07 0.08
(2) 5'x2 1/2" Pipe Mount	A	From Leg	4.00 0.00 0.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	1.33 1.63 1.95	1.33 1.63 1.95	0.03 0.04 0.05
(2) 5'x2 1/2" Pipe Mount	B	From Leg	4.00 0.00 0.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	1.33 1.63 1.95	1.33 1.63 1.95	0.03 0.04 0.05
(2) 5'x2 1/2" Pipe Mount	C	From Leg	4.00 0.00 0.00	0.00	106.00	No Ice 1/2" Ice 1" Ice	1.33 1.63 1.95	1.33 1.63 1.95	0.03 0.04 0.05
***									
APXV18-206517LS w/ Mount Pipe	A	From Leg	1.00 0.00 0.00	0.00	96.00	No Ice 1/2" Ice 1" Ice	5.29 5.84 6.36	4.67 5.82 6.69	0.05 0.10 0.15
APXV18-206517LS w/ Mount Pipe	B	From Leg	1.00 0.00 0.00	0.00	96.00	No Ice 1/2" Ice 1" Ice	5.29 5.84 6.36	4.67 5.82 6.69	0.05 0.10 0.15
APXV18-206517LS w/ Mount Pipe	C	From Leg	1.00 0.00 0.00	0.00	96.00	No Ice 1/2" Ice 1" Ice	5.29 5.84 6.36	4.67 5.82 6.69	0.05 0.10 0.15
Side Arm Mount [SO 104-3]	C	None		0.00	96.00	No Ice 1/2" Ice 1" Ice	3.30 4.13 4.96	3.30 4.13 4.96	0.29 0.32 0.35
***									
GPS_RESERVED	B	From Leg	2.00 0.00 0.00	0.00	75.00	No Ice 1/2" Ice 1" Ice	0.26 0.32 0.39	0.26 0.32 0.39	0.00 0.00 0.01
Side Arm Mount [SO 701-1]	B	From Leg	1.00 0.00 0.00	0.00	75.00	No Ice 1/2" Ice 1" Ice	0.85 1.14 1.43	1.67 2.34 3.01	0.07 0.08 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
***									
Side Arm Mount [SO 104-1]	B	From Leg	0.50 0.00 0.00	0.00	70.00	No Ice 1/2" Ice 1" Ice	1.51 1.82 2.13	0.67 0.93 1.19	0.10 0.14 0.18

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
PR-950	B	Grid	From Leg	1.00 0.00 0.00	0.00		70.00	5.67	No Ice 1/2" Ice 1" Ice	25.22 25.97 26.71	0.04 0.17 0.31

Tower Pressures - No Ice

G_H = 1.100

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 150.00-122.92	135.75	1.078	26.75	57.092	A	0.000	57.092	57.092	100.00	0.000	0.000
					B	0.000	57.092		100.00	0.000	0.000
					C	0.000	57.092		100.00	0.000	0.990
L2 122.92-84.26	102.80	0.996	24.67	111.150	A	0.000	111.150	111.150	100.00	0.000	0.000
					B	0.000	111.150		100.00	0.000	0.000
					C	0.000	111.150		100.00	0.000	4.214
L3 84.26-41.55	62.46	0.864	21.32	162.182	A	0.000	162.182	162.182	100.00	0.000	0.000
					B	0.000	162.182		100.00	0.000	0.000
					C	0.000	162.182		100.00	0.000	12.572
L4 41.55-0.00	20.09	0.7	17.45	197.090	A	0.000	197.090	197.090	100.00	0.000	0.000
					B	0.000	197.090		100.00	0.000	0.000
					C	0.000	197.090		100.00	0.000	15.623

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 150.00-122.92	135.75	1.078	6.56	1.7279	64.891	A	0.000	64.891	64.891	100.00	0.000	0.000
						B	0.000	64.891		100.00	0.000	0.000
						C	0.000	64.891		100.00	0.000	4.128
L2 122.92-84.26	102.80	0.996	6.05	1.6805	122.283	A	0.000	122.283	122.283	100.00	0.000	0.000
						B	0.000	122.283		100.00	0.000	0.000
						C	0.000	122.283		100.00	0.000	17.574
L3 84.26-41.55	62.46	0.864	5.22	1.5988	174.145	A	0.000	174.145	174.145	100.00	0.000	0.000
						B	0.000	174.145		100.00	0.000	0.000
						C	0.000	174.145		100.00	0.000	47.731
L4 41.55-0.00	20.09	0.7	4.28	1.4274	208.162	A	0.000	208.162	208.162	100.00	0.000	0.000
						B	0.000	208.162		100.00	0.000	0.000
						C	0.000	208.162		100.00	0.000	55.481

Tower Pressure - Service

G_H = 1.100

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 150.00-122.92	135.75	1.078	8.45	57.092	A	0.000	57.092	57.092	100.00	0.000	0.000
					B	0.000	57.092		100.00	0.000	0.000
					C	0.000	57.092		100.00	0.000	0.990
L2 122.92-84.26	102.80	0.996	7.79	111.150	A	0.000	111.150	111.150	100.00	0.000	0.000
					B	0.000	111.150		100.00	0.000	0.000
					C	0.000	111.150		100.00	0.000	4.214
L3 84.26-41.55	62.46	0.864	6.73	162.182	A	0.000	162.182	162.182	100.00	0.000	0.000
					B	0.000	162.182		100.00	0.000	0.000
					C	0.000	162.182		100.00	0.000	12.572
L4 41.55-0.00	20.09	0.7	5.51	197.090	A	0.000	197.090	197.090	100.00	0.000	0.000
					B	0.000	197.090		100.00	0.000	0.000
					C	0.000	197.090		100.00	0.000	15.623

Load Combinations

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

Comb. No.	Description
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	150 - 122.92	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-26.07	0.68	1.21
			Max. Mx	20	-9.63	228.25	0.08
			Max. My	2	-9.63	0.11	229.11
			Max. Vy	20	-16.74	228.25	0.08
			Max. Vx	14	16.80	0.20	-228.89
			Max. Torque	13			-2.25
L2	122.92 - 84.26	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-50.02	1.28	1.08
			Max. Mx	20	-22.21	1079.77	-0.10
			Max. My	2	-22.20	0.21	1082.72
			Max. Vy	20	-28.02	1079.77	-0.10
			Max. Vx	14	28.08	0.45	-1082.64
			Max. Torque	13			-3.47
L3	84.26 - 41.55	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-69.03	0.29	-0.65
			Max. Mx	8	-36.36	-2332.36	-1.36
			Max. My	14	-36.36	-1.76	-2335.55
			Max. Vy	20	-32.59	2332.24	0.06
			Max. Vx	14	32.51	-1.76	-2335.55
			Max. Torque	12			-3.68
L4	41.55 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-97.30	2.05	-1.67
			Max. Mx	20	-58.95	4019.04	1.36
			Max. My	14	-58.95	-5.92	-4018.52
			Max. Vy	20	-36.98	4019.04	1.36
			Max. Vx	14	36.90	-5.92	-4018.52
			Max. Torque	13			-4.63

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	97.30	-0.00	-0.00
	Max. H_x	21	44.23	36.95	0.03
	Max. H_z	3	44.23	0.06	36.86
	Max. M_x	2	4016.91	0.06	36.86
	Max. M_z	8	4018.93	-36.95	-0.06
	Max. Torsion	25	4.54	18.50	32.03
	Min. Vert	15	44.23	-0.09	-36.87
	Min. H_x	9	44.23	-36.95	-0.06
	Min. H_z	14	58.97	-0.09	-36.87
	Min. M_x	14	-4018.52	-0.09	-36.87
	Min. M_z	20	-4019.04	36.95	0.03
	Min. Torsion	13	-4.63	-18.53	-32.02

Tower Mast Reaction Summary

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 Only	49.14	-0.00	0.00	0.31	0.04	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	58.97	-0.06	-36.86	-4016.91	3.97	-3.82
0.9 Dead+1.6 Wind 0 deg - No Ice	44.23	-0.06	-36.86	-3988.89	3.94	-3.82
1.2 Dead+1.6 Wind 30 deg - No Ice	58.97	18.39	-31.80	-3470.04	-2003.53	-2.18
0.9 Dead+1.6 Wind 30 deg - No Ice	44.23	18.39	-31.80	-3445.78	-1989.50	-2.17
1.2 Dead+1.6 Wind 60 deg - No Ice	58.97	31.93	-18.36	-2003.58	-3475.61	0.60
0.9 Dead+1.6 Wind 60 deg - No Ice	44.23	31.93	-18.36	-1989.62	-3451.28	0.60
1.2 Dead+1.6 Wind 90 deg - No Ice	58.97	36.95	0.06	4.30	-4018.93	3.07
0.9 Dead+1.6 Wind 90 deg - No Ice	44.23	36.95	0.06	4.19	-3990.92	3.08
1.2 Dead+1.6 Wind 120 deg - No Ice	58.97	32.07	18.54	2016.83	-3485.35	4.45
0.9 Dead+1.6 Wind 120 deg - No Ice	44.23	32.07	18.54	2002.63	-3460.98	4.45
1.2 Dead+1.6 Wind 150 deg - No Ice	58.97	18.53	32.02	3486.42	-2013.00	4.63
0.9 Dead+1.6 Wind 150 deg - No Ice	44.23	18.53	32.02	3461.91	-1998.94	4.63
1.2 Dead+1.6 Wind 180 deg - No Ice	58.97	0.09	36.87	4018.52	-5.92	3.84
0.9 Dead+1.6 Wind 180 deg - No Ice	44.23	0.09	36.87	3990.16	-5.91	3.84
1.2 Dead+1.6 Wind 210 deg - No Ice	58.97	-18.30	31.85	3474.35	1997.47	2.17
0.9 Dead+1.6 Wind 210 deg - No Ice	44.23	-18.30	31.84	3449.89	1983.44	2.17
1.2 Dead+1.6 Wind 240 deg - No Ice	58.97	-31.90	18.38	2005.67	3473.96	-0.62
0.9 Dead+1.6 Wind 240 deg - No Ice	44.23	-31.90	18.38	1991.51	3449.60	-0.63
1.2 Dead+1.6 Wind 270 deg - No Ice	58.97	-36.95	-0.03	-1.36	4019.04	-3.15
0.9 Dead+1.6 Wind 270 deg - No Ice	44.23	-36.95	-0.03	-1.45	3991.00	-3.16
1.2 Dead+1.6 Wind 300 deg - No Ice	58.97	-32.02	-18.51	-2014.05	3481.89	-4.44
0.9 Dead+1.6 Wind 300 deg - No Ice	44.23	-32.02	-18.51	-2000.04	3457.51	-4.44
1.2 Dead+1.6 Wind 330 deg - No Ice	58.97	-18.50	-32.03	-3486.79	2011.18	-4.54
0.9 Dead+1.6 Wind 330 deg - No Ice	44.23	-18.50	-32.03	-3462.48	1997.10	-4.54
1.2 Dead+1.0 Ice+1.0 Temp	97.30	0.00	0.00	1.67	2.05	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	97.30	-0.21	-10.93	-1196.09	17.38	-2.09
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	97.30	5.40	-9.36	-1028.60	-592.15	-1.12
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	97.30	9.41	-5.41	-593.36	-1030.51	0.04
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	97.30	10.88	0.00	1.87	-1191.77	1.15
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	97.30	9.45	5.46	600.34	-1033.58	1.81
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	97.30	5.45	9.43	1036.74	-594.97	1.99
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	97.30	0.02	10.86	1194.54	0.55	1.77
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	97.30	-5.40	9.37	1032.09	596.24	1.12
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	97.30	-9.56	5.28	587.38	1045.89	0.28
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	97.30	-10.96	-0.13	-7.55	1201.67	-0.81
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	97.30	-9.52	-5.50	-599.96	1043.05	-1.81
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	97.30	-5.59	-9.44	-1033.69	609.90	-2.32
Dead+Wind 0 deg - Service	49.14	-0.01	-7.27	-789.16	0.82	-0.36
Dead+Wind 30 deg - Service	49.14	3.63	-6.27	-681.67	-393.69	-0.20
Dead+Wind 60 deg - Service	49.14	6.30	-3.62	-393.49	-682.98	0.12
Dead+Wind 90 deg - Service	49.14	7.29	0.01	1.09	-789.81	0.38
Dead+Wind 120 deg - Service	49.14	6.33	3.66	396.58	-684.89	0.48
Dead+Wind 150 deg - Service	49.14	3.66	6.32	685.38	-395.55	0.46
Dead+Wind 180 deg - Service	49.14	0.02	7.28	789.96	-1.13	0.36
Dead+Wind 210 deg - Service	49.14	-3.61	6.28	683.00	392.56	0.20
Dead+Wind 240 deg - Service	49.14	-6.29	3.63	394.38	682.72	-0.12
Dead+Wind 270 deg - Service	49.14	-7.29	-0.01	-0.03	789.90	-0.39
Dead+Wind 300 deg - Service	49.14	-6.32	-3.65	-395.55	684.28	-0.48
Dead+Wind 330 deg - Service	49.14	-3.65	-6.32	-684.97	395.26	-0.44

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-49.14	0.00	0.00	49.14	-0.00	0.000%
2	-0.06	-58.97	-36.86	0.06	58.97	36.86	0.001%
3	-0.06	-44.23	-36.86	0.06	44.23	36.86	0.001%
4	18.39	-58.97	-31.80	-18.39	58.97	31.80	0.000%
5	18.39	-44.23	-31.80	-18.39	44.23	31.80	0.000%
6	31.93	-58.97	-18.36	-31.93	58.97	18.36	0.000%
7	31.93	-44.23	-18.36	-31.93	44.23	18.36	0.000%
8	36.95	-58.97	0.06	-36.95	58.97	-0.06	0.003%
9	36.95	-44.23	0.06	-36.95	44.23	-0.06	0.003%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
10	32.07	-58.97	18.54	-32.07	58.97	-18.54	0.000%
11	32.07	-44.23	18.54	-32.07	44.23	-18.54	0.000%
12	18.53	-58.97	32.02	-18.53	58.97	-32.02	0.000%
13	18.53	-44.23	32.02	-18.53	44.23	-32.02	0.000%
14	0.09	-58.97	36.87	-0.09	58.97	-36.87	0.001%
15	0.09	-44.23	36.87	-0.09	44.23	-36.87	0.003%
16	-18.30	-58.97	31.85	18.30	58.97	-31.85	0.000%
17	-18.30	-44.23	31.85	18.30	44.23	-31.84	0.000%
18	-31.90	-58.97	18.38	31.90	58.97	-18.38	0.000%
19	-31.90	-44.23	18.38	31.90	44.23	-18.38	0.000%
20	-36.95	-58.97	-0.03	36.95	58.97	0.03	0.003%
21	-36.95	-44.23	-0.03	36.95	44.23	0.03	0.003%
22	-32.02	-58.97	-18.51	32.02	58.97	18.51	0.000%
23	-32.02	-44.23	-18.51	32.02	44.23	18.51	0.000%
24	-18.50	-58.97	-32.03	18.50	58.97	32.03	0.000%
25	-18.50	-44.23	-32.03	18.50	44.23	32.03	0.000%
26	0.00	-97.30	0.00	-0.00	97.30	-0.00	0.000%
27	-0.21	-97.30	-10.93	0.21	97.30	10.93	0.001%
28	5.40	-97.30	-9.36	-5.40	97.30	9.36	0.001%
29	9.41	-97.30	-5.41	-9.41	97.30	5.41	0.001%
30	10.88	-97.30	0.00	-10.88	97.30	-0.00	0.001%
31	9.45	-97.30	5.46	-9.45	97.30	-5.46	0.001%
32	5.45	-97.30	9.43	-5.45	97.30	-9.43	0.001%
33	0.02	-97.30	10.86	-0.02	97.30	-10.86	0.001%
34	-5.40	-97.30	9.37	5.40	97.30	-9.37	0.001%
35	-9.56	-97.30	5.28	9.56	97.30	-5.28	0.001%
36	-10.96	-97.30	-0.13	10.96	97.30	0.13	0.001%
37	-9.52	-97.30	-5.50	9.52	97.30	5.50	0.001%
38	-5.59	-97.30	-9.44	5.59	97.30	9.44	0.001%
39	-0.01	-49.14	-7.27	0.01	49.14	7.27	0.002%
40	3.63	-49.14	-6.27	-3.63	49.14	6.27	0.002%
41	6.30	-49.14	-3.62	-6.30	49.14	3.62	0.002%
42	7.29	-49.14	0.01	-7.29	49.14	-0.01	0.002%
43	6.33	-49.14	3.66	-6.33	49.14	-3.66	0.002%
44	3.66	-49.14	6.32	-3.66	49.14	-6.32	0.002%
45	0.02	-49.14	7.28	-0.02	49.14	-7.28	0.002%
46	-3.61	-49.14	6.28	3.61	49.14	-6.28	0.002%
47	-6.30	-49.14	3.63	6.29	49.14	-3.63	0.002%
48	-7.29	-49.14	-0.01	7.29	49.14	0.01	0.002%
49	-6.32	-49.14	-3.65	6.32	49.14	3.65	0.002%
50	-3.65	-49.14	-6.32	3.65	49.14	6.32	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	13	0.00000001	0.00006818
3	Yes	13	0.00000001	0.00005600
4	Yes	15	0.00000001	0.00005759
5	Yes	14	0.00000001	0.00013472
6	Yes	15	0.00000001	0.00006000
7	Yes	14	0.00000001	0.00014046
8	Yes	12	0.00005536	0.00011990
9	Yes	12	0.00003821	0.00010155
10	Yes	15	0.00000001	0.00006394
11	Yes	14	0.00000001	0.00014990
12	Yes	15	0.00000001	0.00005633
13	Yes	14	0.00000001	0.00013159
14	Yes	13	0.00000001	0.00006691
15	Yes	12	0.00003821	0.00014899
16	Yes	15	0.00000001	0.00006243
17	Yes	14	0.00000001	0.00014633
18	Yes	15	0.00000001	0.00005971
19	Yes	14	0.00000001	0.00013975
20	Yes	12	0.00005536	0.00011943
21	Yes	12	0.00003821	0.00010118
22	Yes	15	0.00000001	0.00005677

23	Yes	14	0.00000001	0.00013263
24	Yes	15	0.00000001	0.00006468
25	Yes	15	0.00000001	0.00004973
26	Yes	6	0.00000001	0.00000001
27	Yes	13	0.00000001	0.00008812
28	Yes	13	0.00000001	0.00010607
29	Yes	13	0.00000001	0.00010739
30	Yes	13	0.00000001	0.00008637
31	Yes	13	0.00000001	0.00010913
32	Yes	13	0.00000001	0.00010617
33	Yes	13	0.00000001	0.00008755
34	Yes	13	0.00000001	0.00010900
35	Yes	13	0.00000001	0.00010692
36	Yes	13	0.00000001	0.00008682
37	Yes	13	0.00000001	0.00010723
38	Yes	13	0.00000001	0.00011130
39	Yes	11	0.00000001	0.00005944
40	Yes	11	0.00000001	0.00004618
41	Yes	11	0.00000001	0.00004861
42	Yes	11	0.00000001	0.00005778
43	Yes	11	0.00000001	0.00005497
44	Yes	11	0.00000001	0.00004610
45	Yes	11	0.00000001	0.00005947
46	Yes	11	0.00000001	0.00005262
47	Yes	11	0.00000001	0.00004812
48	Yes	11	0.00000001	0.00005785
49	Yes	11	0.00000001	0.00004598
50	Yes	11	0.00000001	0.00005647

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 122.92	13.37	45	0.83	0.00
L2	127.09 - 84.26	9.53	44	0.74	0.00
L3	89.76 - 41.55	4.57	44	0.51	0.00
L4	48.46 - 0	1.27	44	0.24	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	(2) DB980H90E-M w/ Mount Pipe	45	13.37	0.83	0.00	42267
148.00	PD1142-1	44	13.02	0.82	0.00	42267
139.00	(2) FD9R6004/2C-3L	44	11.49	0.79	0.00	19212
134.00	(2) TME-RRUS-11	44	10.65	0.77	0.00	13208
132.00	(2) 7770.00 w/ Mount Pipe	44	10.32	0.76	0.00	11741
116.00	(4) 7120.16 w/ Mount Pipe	44	7.87	0.68	0.00	9153
106.00	RR65-18-02DP w/ Mount Pipe	44	6.50	0.62	0.00	9090
96.00	APXV18-206517LS w/ Mount Pipe	44	5.27	0.55	0.00	9024
75.00	GPS_RESERVED	44	3.11	0.41	0.00	8638
70.00	PR-950	44	2.69	0.38	0.00	8529

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 122.92	68.03	14	4.23	0.03
L2	127.09 - 84.26	48.52	12	3.76	0.01
L3	89.76 - 41.55	23.24	12	2.58	0.01
L4	48.46 - 0	6.46	10	1.24	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.00	(2) DB980H90E-M w/ Mount Pipe	14	68.03	4.23	0.03	8413
148.00	PD1142-1	14	66.27	4.19	0.02	8413
139.00	(2) FD9R6004/2C-3L	12	58.45	4.02	0.02	3823
134.00	(2) TME-RRUS-11	12	54.20	3.92	0.02	2627
132.00	(2) 7770.00 w/ Mount Pipe	12	52.53	3.87	0.01	2335
116.00	(4) 7120.16 w/ Mount Pipe	12	40.04	3.45	0.01	1814
106.00	RR65-18-02DP w/ Mount Pipe	12	33.10	3.14	0.01	1797
96.00	APXV18-206517LS w/ Mount Pipe	12	26.82	2.80	0.01	1780
75.00	GPS_RESERVED	12	15.85	2.08	0.00	1700
70.00	PR-950	12	13.69	1.91	0.00	1678

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	150 - 122.92 (1)	TP28.83x21x0.1875	27.08	0.00	0.0	16.3283	-9.63	1072.37	0.009
L2	122.92 - 84.26 (2)	TP39.51x27.2493x0.375	42.83	0.00	0.0	44.7064	-22.20	3320.64	0.007
L3	84.26 - 41.55 (3)	TP50.99x37.1855x0.4375	48.21	0.00	0.0	67.4509	-36.36	4873.49	0.007
L4	41.55 - 0 (4)	TP62x48.1364x0.5	48.46	0.00	0.0	97.6005	-58.95	6834.14	0.009

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	150 - 122.92 (1)	TP28.83x21x0.1875	229.12	605.63	0.378	0.00	605.63	0.000
L2	122.92 - 84.26 (2)	TP39.51x27.2493x0.375	1082.72	2559.36	0.423	0.00	2559.36	0.000
L3	84.26 - 41.55 (3)	TP50.99x37.1855x0.4375	2336.94	4862.29	0.481	0.00	4862.29	0.000
L4	41.55 - 0 (4)	TP62x48.1364x0.5	4026.82	8640.42	0.466	0.00	8640.42	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	150 - 122.92 (1)	TP28.83x21x0.1875	16.80	536.18	0.031	2.25	1212.75	0.002
L2	122.92 - 84.26 (2)	TP39.51x27.2493x0.375	28.08	1660.32	0.017	3.34	5124.98	0.001
L3	84.26 - 41.55 (3)	TP50.99x37.1855x0.4375	32.64	2436.74	0.013	3.36	9736.50	0.000
L4	41.55 - 0 (4)	TP62x48.1364x0.5	37.07	3417.07	0.011	4.45	17302.00	0.000

Pole Interaction Design Data

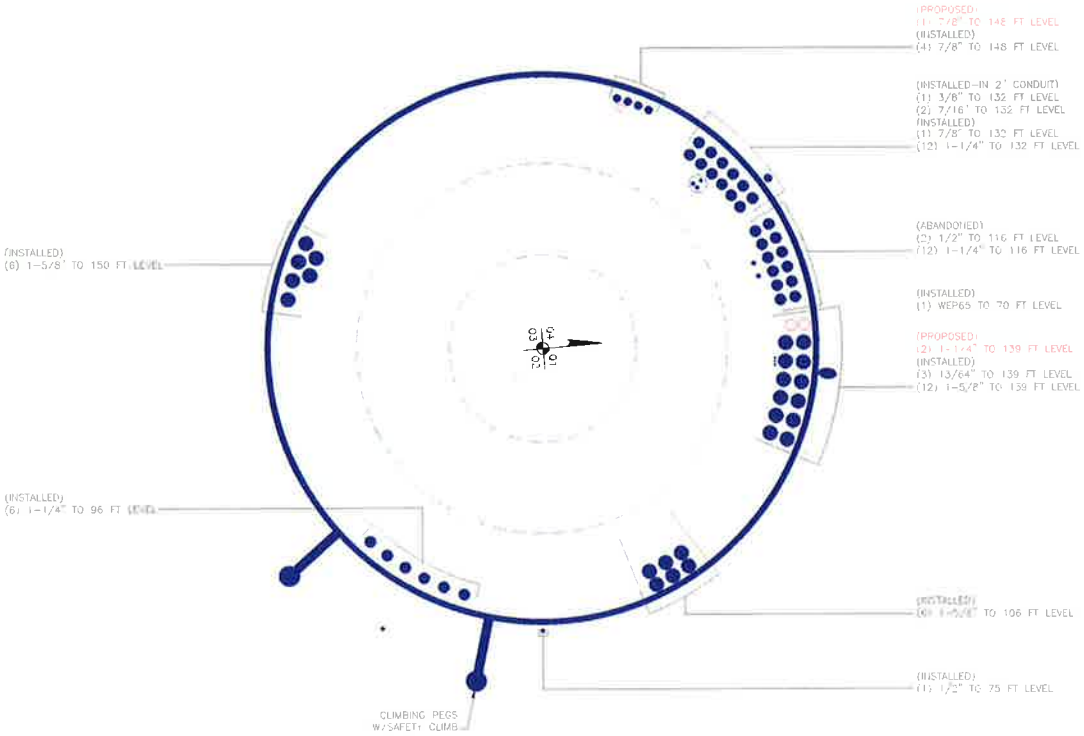
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 122.92 (1)	0.009	0.378	0.000	0.031	0.002	0.388 ✔	1.000	4.8.2 ✔
L2	122.92 - 84.26 (2)	0.007	0.423	0.000	0.017	0.001	0.430 ✔	1.000	4.8.2 ✔
L3	84.26 - 41.55 (3)	0.007	0.481	0.000	0.013	0.000	0.488 ✔	1.000	4.8.2 ✔
L4	41.55 - 0 (4)	0.009	0.466	0.000	0.011	0.000	0.475 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	150 - 122.92	Pole	TP28.83x21x0.1875	1	-9.63	1072.37	38.8	Pass
L2	122.92 - 84.26	Pole	TP39.51x27.2493x0.375	2	-22.20	3320.64	43.0	Pass
L3	84.26 - 41.55	Pole	TP50.99x37.1855x0.4375	3	-36.36	4873.49	48.8	Pass
L4	41.55 - 0	Pole	TP62x48.1364x0.5	4	-58.95	6834.14	47.5	Pass
							Summary	
						Pole (L3)	48.8	Pass
						RATING =	**48.8**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	1	2	3	4
Length (ft)	27.08	42.83	48.21	48.46
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.3750	0.4375	0.5000
Socket Length (ft)	4.17	5.50	6.91	
Top Dia (in)	21.0000	27.2493	37.1855	48.1364
Bot Dia (in)	28.8300	39.5100	50.9900	62.0000
Grade	A572-65			
Weight (K)	1.4	5.7	9.9	14.3

31.3

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB980H90E-M w/ Mount Pipe	150	AM-X-CD-16-65-00T-RET w/ Mount Pipe	132
(2) DB980H90E-M w/ Mount Pipe	150	DB810KE-YP	132
(2) DB980H90E-M w/ Mount Pipe	150	(4) LGP21901	132
Platform Mount [LP 602-1]	150	(2) LGP21901	132
8-ft Ladder	150	(2) LGP21901	132
(2) 5'x2 1/2" Pipe Mount	150	(2) LGP21401	132
(2) 5'x2 1/2" Pipe Mount	150	(2) LGP21401	132
(2) 5'x2 1/2" Pipe Mount	150	(2) LGP21401	132
PD1142-1	148	DC6-48-60-18-8F	132
PD1142-1	148	782 10253	132
DB636-A	148	782 10253	132
DS4C06F36D-N	148	782 10253	132
Side Arm Mount [SO 701-1]	148	Platform Mount [LP 602-1]	132
Side Arm Mount [SO 701-1]	148	8-ft Ladder	132
Side Arm Mount [SO 701-1]	148	5'x2 1/2" Pipe Mount	132
Side Arm Mount [SO 701-1]	148	5'x2 1/2" Pipe Mount	132
(2) FD9R6004/2C-3L	139	5'x2 1/2" Pipe Mount	132
(2) FD9R6004/2C-3L	139	(4) 7120.16 w/ Mount Pipe	116
(2) FD9R6004/2C-3L	139	(4) 7120.16 w/ Mount Pipe	116
(2) LPA-80080-4CF-EDIN-0 w/ Mount Pipe	139	(4) 7120.16 w/ Mount Pipe	116
(2) LPA-80080-4CF-EDIN-0 w/ Mount Pipe	139	(2) GPS_A	116
(2) LPA-80080-4CF-EDIN-0 w/ Mount Pipe	139	Platform Mount [LP 602-1]	116
(2) SBNHH-1D65B w/ Mount Pipe	139	RR65-18-02DP w/ Mount Pipe	106
(2) SBNHH-1D65B w/ Mount Pipe	139	RR65-18-02DP w/ Mount Pipe	106
(2) SBNHH-1D65B w/ Mount Pipe	139	RR65-18-02DP w/ Mount Pipe	106
B13 RRH 4X30	139	LNX-6515DS-VTM w/ Mount Pipe	106
B13 RRH 4X30	139	LNX-6515DS-VTM w/ Mount Pipe	106
B13 RRH 4X30	139	LNX-6515DS-VTM w/ Mount Pipe	106
B66A RRH4X45	139	ATBT-BOTTOM-24V	106
B66A RRH4X45	139	ATBT-BOTTOM-24V	106
B66A RRH4X45	139	ATBT-BOTTOM-24V	106
(2) DB-B1-6C-12AB-0Z	139	Platform Mount [LP 602-1]	106
Platform Mount [LP 602-1]	139	8-ft Ladder	106
8-ft Ladder	139	(2) 5'x2 1/2" Pipe Mount	106
(2) TME-RRUS-11	134	(2) 5'x2 1/2" Pipe Mount	106
(2) TME-RRUS-11	134	(2) 5'x2 1/2" Pipe Mount	106
(2) TME-RRUS-11	134	APXV18-206517LS w/ Mount Pipe	96
Side Arm Mount [SO 102-3]	134	APXV18-206517LS w/ Mount Pipe	96
(2) 7770.00 w/ Mount Pipe	132	APXV18-206517LS w/ Mount Pipe	96
(2) 7770.00 w/ Mount Pipe	132	Side Arm Mount [SO 104-3]	96
(2) 7770.00 w/ Mount Pipe	132	GPS_RESERVED	75
DBXNH-6565B-R2M w/ Mount Pipe	132	Side Arm Mount [SO 701-1]	75
AM-X-CD-16-65-00T-RET w/ Mount Pipe	132	Side Arm Mount [SO 104-1]	70
		PR-950	70

MATERIAL STRENGTH

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

ALL REACTIONS ARE FACTORED

AXIAL 97 K

SHEAR 11 K

MOMENT 1203 k-ft

TORQUE 2 kip-ft
50.00 mph WIND - 0.7500 in ICE

AXIAL 59 K

SHEAR 37 K

MOMENT 4027 kip-ft

TORQUE 5 kip-ft
REACTIONS - 101.00 mph WIND

TOWER DESIGN NOTES

1. Tower is located in Middlesex County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 101.00 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.00 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.00 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 48.8%

Paul J Ford and Company
250 E. Broad Street Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: 150 Ft. Monopole / Chester, CT			
Project: PJF 37516-2933.002 / BU 800515			
Client: Crown Castle	Drawn by: Ryan Ferrante	App'd:	
Code: TIA-222-G	Date: 11/01/16	Scale: N	
Path:		Dwg No.	

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev G

Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#:	
Site Name:	
App #:	
Pole Manufacturer:	*Other*

Anchor Rod Data		
Qty:	24	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	71	in

Plate Data		
Diam:	77	in
Thick:	2.25	in
Grade:	60	ksi
Single-Rod B-eff:	8.20	in

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Groove	
Groove Depth:	0.5	in **
Groove Angle:	45	degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:	0.5	in
Width:	6	in
Height:	16	in
Thick:	1	in
Notch:	1	in
Grade:	65	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	62	in
Thick:	0.5	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Reactions		
Mu:	4027	ft-kips
Axial, Pu:	59	kips
Shear, Vu:	37	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

If No stiffeners, Criteria: AISC LRFD <-Only Applcable to Unstiffened Cases

Anchor Rod Results

		Stiffened
Max Rod (Cu+ Vu/ή):	119.0 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	45.8% Pass	

Base Plate Results Flexural Check

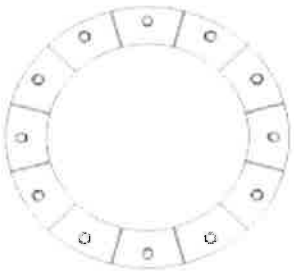
		Stiffened
Base Plate Stress:	17.9 ksi	AISC LRFD
Allowable Plate Stress:	54.0 ksi	φ*Fy
Base Plate Stress Ratio:	33.2% Pass	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	26.8% Pass
Vertical Weld:	25.3% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	6.9% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2	26.4% Pass
Plate Comp. (AISC Bracket):	28.0% Pass

Pole Results

Pole Punching Shear Check:	8.4% Pass



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

PJF Job No. **37516-2933.002** Project Name: **BU 800515** Engineer: RMF

Factored Foundation Loads:

	LC1	LC2	
Factored Axial Load (+Comp, -Ten) =	59	44.25	kips
Factored Horiz. Load at Top of Pier =	37	37	kips
Factored OTM at Top of Pier =	4027	4027	kips

LRFD Resistance and Load Factors:

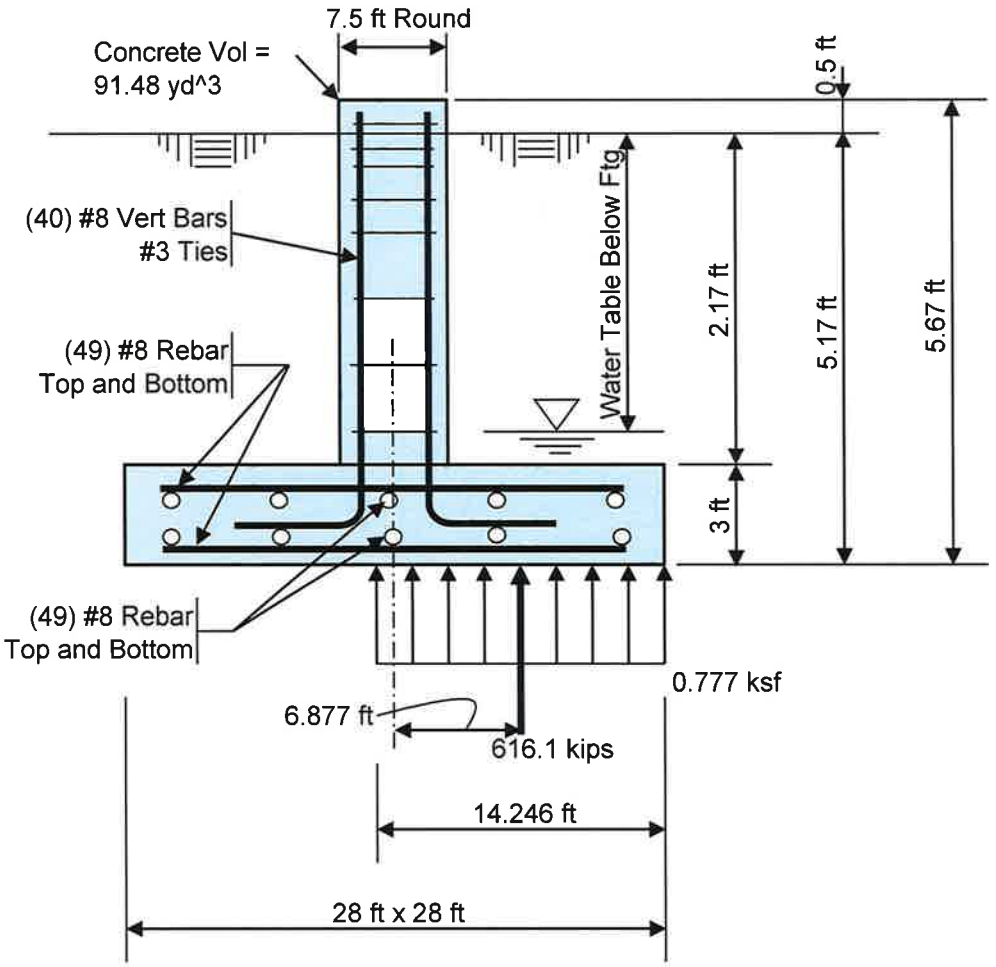
	Φ	Dead Load Factors	
Soil Bearing =	0.75		
Soil Weight =	0.75	1.2	0.9
Concrete Weight =	0.75	1.2	0.9

Soil Properties:

Depth to Water Table = 99 ft

Uplift Cone from Top of footing

Layer Thk ft	Soil Density pcf	Cohesion ksf	Friction Angle degrees	Ult Bearing ksf	Depth ft
10.5	165	0	30	20	10.50



Dimensions:

Pier Shape =	Round	
Pier Width =	7.5	ft Diameter
Pier Height above Grade =	0.5	ft
Depth to Bottom of Footing =	5.17	ft
Footing Thickness =	3	ft
Footing Width, B =	28	ft
Footing Length, L =	28	ft

Concrete:

Concrete Strength =	3	ksi
Rebar Strength =	60	ksi

Total Pad Reinf Stl =	77.42 in^2 >= 21.77 in^2 = Min Stl, OK
Total Pier Reinf Stl =	31.60 **in^2 < 31.81 in^2 = Min Stl**
Footing Thickness =	3.00 ft >= 1.74 ft = Min Ftg Thk, OK

Summary Results:

	Required		Available		
Maximum Net Soil Bearing =	0.872	ksf	15.000	ksf	Stress Ratio = 5.8% in Soil Bearing
Uplift =	0.0	kips	495.9	kips	Stress Ratio = 0.0% in Uplift
Punching Shear Stress =	0.047	ksi	0.164	ksi	Stress Ratio = 28.7% in Punching Shear
Bending Shear Stress =	209.4	kips	800.6	kips	Stress Ratio = 26.2% in Bending Shear
Bending Moment =	1475	k-ft	4815.6	k-ft	Stress Ratio = 30.6% in Bending Moment
Conc Pier Reinforcing Steel =	4125.8	k-ft	5571.6	k-ft	Stress Ratio = 74.1% in Pier Rebar

ATTACHMENT 4

Town of Chester, Connecticut

Selected Parcel: WIG HILL RD ID: 8-127-1

Printed 2/9/2017 from http://www.mainstreetmaps.com/ct/chester/public.asp

100 m
200 ft
N

MainStreetGIS
MainStreetGIS, LLC
www.mainstreetgis.com

Property Details

Number of records found: 1

One record is displayed for each address found at the selected property. Multiple addresses may occur in the case of condominiums.

WIG HILL RD
ID: **8-127-1** Book: Page:

Property ID: **8-127-1**
Block:
Location Address:
Location: **WIG HILL RD**
Legal Reference: **163/ 71**
Page:
Owner: **RAYNER BRUCE A EST**
Mailing Address Line 1: **1556 SAYBROOK RD #193**
Mailing Address Line 3:
Mailing Address City: **HADDAM**
Mailing Address Zip: **06438**
Parcel Parcel ID:
Sale Date: **3/16/2015**
Property Class:
Neighborhood:
Land Use Description:
State Code Description:
Year Built:
Total Value: **689580**
Land Value:
Land Area (SQ FT):
Stories:
Bedrooms:
Living Area:
Building Area Effective:
Fireplace:
Half Baths:
Heat Fuel:
Basement Type:
Basement Finished Area:
Roof Type:
Sewer:
Physical Depreciation:
Economic Depreciation:
Assessor's ID: **8/127-1**
Account:
State ID:

Map: **8**
Lot: **127-1**
Location Street: **WIG HILL RD**
Unit:
Book:
Land Area: **5.43**
Co-Owner: **HAZEL C NEGRELLI EXECUTRIX**
Mailing Address Line 2:
Mailing Address Line 4:
Mailing Address State: **CT**
Mailing Address Country:
Location Address:
Sale Price: **0**
Zoning (Verify on GIS Map):
Land Use Code:
State Code:
Building Style:
Appraised Value: **985120**
Building Value:
Other Value:
Land Area (AC):
Rooms:
Kitchens:
Building Area Grosss:
Exterior:
Baths:
Heat Type:
Air Conditioning:
Basement Area:
Attic:
Roof Material:
Utility:
Functional Depreciation:
Easement:
Permit ID:
Grantor: