Robinson+Cole

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Also admitted in Massachusetts

February 20, 2019

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**
580 Chapel Street, Thomaston, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 152-foot level of the existing 175-foot tower at 580 Chapel Street in Thomaston, Connecticut (the "Property"). The tower is owned by Crown Castle ("Crown"). The Council approved Cellco's use of this tower in 2003. Cellco now intends to modify its facility by replacing six (6) of its antennas with six (6) model NNHH-65B-R4 antennas, at the 152-foot level on the tower. Cellco also intends to install six (6) remote radio heads ("RRHs") and one (1) HYBRIFLEX™ fiber optic 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 Thomaston First Selectman, Edmond V. Mone; Jeremy Leifert, Thomaston's Land Use Administrator/Zoning Enforcement Officer; and Crown, the tower owner. The Town of Thomaston is the owner of the Property.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and RRHs will be installed on a new antenna platform at the same 152-foot level of the 175-foot tower.

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

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

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

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

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

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

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

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Edmond V. Mone, Thomaston First Selectman
Jeremy Leifert, Thomaston Land Use Administrator/Zoning Enforcement Officer
Crown Castle
Tim Parks

ATTACHMENT 1

NNHH-65B-R4

8-port sector antenna, 4x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 4x RETs

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	14.6	15.0	17.0	17.3	17.5	17.9
Beamwidth, Horizontal, degrees	66	64	58	61	63	59
Beamwidth, Vertical, degrees	11.9	10.3	7.4	6.9	6.4	5.7
Beam Tilt, degrees	2–14	2–14	2–12	2–12	2–12	2–12
USLS (First Lobe), dB	17	19	14	19	16	18
Front-to-Back Ratio at 180°, dB	30	31	35	38	37	34
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	25	25	25	25	25	25
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	-150	-150	-150	-150	-150	-150
Input Power per Port at 50°C, maximum, watts	300	300	250	250	250	200
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	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	14.2	14.7	16.4	16.9	17.0	17.5
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.5	±0.9	±0.4	±0.5	±0.5
Gain by Beam Tilt, average, dBi	2 ° | 14.2 8 ° | 14.2 14 ° | 13.9	2 ° | 14.7 8 ° | 14.8 14 ° | 14.3	2 ° | 16.5 7 ° | 16.6 12 ° | 16.1	2 ° | 16.7 7 ° | 17.0 12 ° | 16.7	2 ° | 16.8 7 ° | 17.1 12 ° | 16.7	2 ° | 17.2 7 ° | 17.8 12 ° | 17.3
Beamwidth, Horizontal Tolerance, degrees	±3.3	±3.1	±6.4	±3	±3.5	±5.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.8	±0.8	±0.4	±0.7	±0.2
USLS, beampeak to 20° above beampeak, dB	17	19	14	17	15	17
Front-to-Back Total Power at 180° ± 30°, dB	21	21	30	31	27	27
CPR at Boresight, dB	21	22	16	17	18	17
CPR at Sector, dB	9	6	9	9	8	12

* 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.

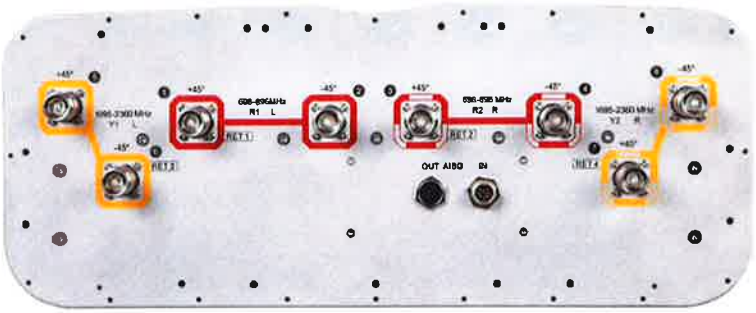
Array Layout

NNHH-65B-R4

Array	Freq (MHz)	Conns	RET (MRET)	AISG RET UID
R1	698-896	1-2	1	CPxxxxxxxxxxxxxxxmm.1
R2	698-896	3-4	2	CPxxxxxxxxxxxxxxxmm.2
Y1	1695-2360	5-6	3	CPxxxxxxxxxxxxxxxmm.3
Y2	1695-2360	7-8	4	CPxxxxxxxxxxxxxxxmm.4

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

Port Configuration



General Specifications

Operating Frequency Band 1695 – 2360 MHz | 698 – 896 MHz

NNHH-65B-R4

Antenna Type	Sector
Band	Multiband
Performance Note	Outdoor usage
Total Input Power, maximum	900 W @ 50 °C

Mechanical Specifications

RF Connector Quantity, total	8
RF Connector Quantity, low band	4
RF Connector Quantity, high band	4
RF Connector Interface	4.3-10 Female
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	685.0 N @ 150 km/h 154.0 lbf @ 150 km/h
Wind Loading, lateral	232.0 N @ 150 km/h 52.2 lbf @ 150 km/h
Wind Loading, maximum	889.0 N @ 150 km/h 199.9 lbf @ 150 km/h
Wind Speed, maximum	241 km/h | 150 mph

Dimensions

Length	1828.0 mm | 72.0 in
Width	498.0 mm | 19.6 in
Depth	197.0 mm | 7.8 in
Net Weight, without mounting kit	35.1 kg | 77.4 lb

Remote Electrical Tilt (RET) Information

Input Voltage	10–30 Vdc
Internal RET	High band (2) | Low band (2)
Power Consumption, idle state, maximum	1 W
Power Consumption, normal conditions, maximum	8 W
Protocol	3GPP/AISG 2.0 (Multi-RET)
RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male

NNHH-65B-R4

Packed Dimensions

Length	2010.0 mm | 79.1 in
Width	608.0 mm | 23.9 in
Depth	352.0 mm | 13.9 in
Shipping Weight	49.0 kg | 108.0 lb

Regulatory Compliance/Certifications

Agency	**Classification**
RoHS 2011/65/EU	Compliant by Exemption
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
China RoHS SJ/T 11364-2014	Above Maximum Concentration Value (MCV)

Included Products

BSAMNT-3 — 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

SAMSUNG

Dual-Band Radio Unit
AWS/PCS (B66/B2)
RFV01U-D1A

Samsung's RFV01U-D1A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D1A RU targets dual-band support across Band 66 (AWS) and Band 2 (PCS), making it an ideal product for broad coverage footprints across multiple common mid-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation
- Built-in Broadcast Auxiliary Services (BAS) filter ensures compliant AWS operation without impacting footprint

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B66: DL(2,110-2,180MHz)/UL(1,710-1,780MHz)
B2: DL(1,930-1,990MHz)/UL(1,850-1,910MHz)
Instantaneous Bandwidth:
70MHz(B66) + 60MHz(B2)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 255mm (36.8L)
Weight: 38.3kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

SAMSUNG

Dual-Band Radio Unit
700/850MHz (B13/B5)
RFV01U-D2A

Samsung's RFV01U-D2A is a compact remote Radio Unit (RU) designed for deployments that require flexibility in installation and rapid onlining, without compromising on coverage, capacity or operational expenses.

The RFV01U-D2A RU targets dual-band support across Band 13 (700MHz) and Band 5 (850MHz), making it an ideal product for broad coverage footprints across multiple common low-end, long-range frequencies.

The RU handles all Radio Frequency (RF) processing in a single, compact unit, and is designed to interface via CPRI with Samsung's CDU baseband offerings, in both distributed- and central-RAN configurations.

In addition to its minimal footprint and ease of installation, the RU is also designed to reduce cost of ownership through its integrated spectrum analyzer, which allows for remote RF monitoring, greatly reducing the need for on-site maintenance visits.

Features and Benefits

- Dual-band support for broad frequency coverage
- Minimal footprint reduces site costs
- Rapid, easy installation
- Flexibly deployable in any location
- Remote RF monitoring capability
- Convection cooled, silent operation

Key Technical Specifications

Duplex Type: FDD
Operating Frequencies:
B13: DL(746-756MHz)/UL(777-787MHz)
B5: DL(869-894MHz)/UL(824-849MHz)
Instantaneous Bandwidth: 10MHz(B13) + 25MHz(B5)
RF Chain: 4T4R/2T4R/2T2R
Output Power: Total 320W
DU-RU Interface: CPRI (10Gbps)
Dimensions: 380 x 380 x 207mm (29.9L)
Weight: 31.9kg
Input Power: -48V DC
Operating Temp.: -40 - 55°(w/o solar load)
Cooling: Natural convection

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 CELLFLEX² 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)

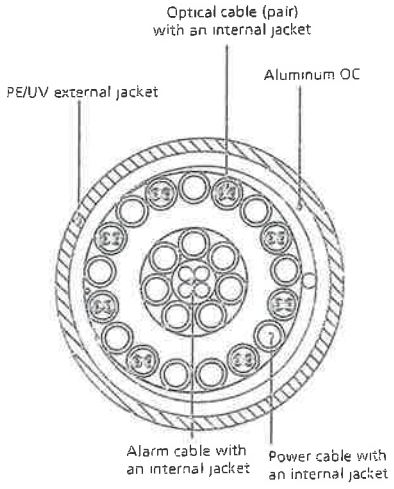


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Thomaston Center								
Tower Height: 175Ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Litch. Co. FD	1	300	177	33.7	0.0037	0.2000	0.18%	
*CT State Police	1	100	177	45.86	0.0012	0.2000	0.06%	
*Sprint	1	438	162	850	0.0065	0.5667	0.11%	
*Sprint	2	438	162	850	0.0129	0.5667	0.23%	
*Sprint	5	623	162	1900	0.0460	1.0000	0.46%	
*Sprint	2	1556	162	1900	0.0460	1.0000	0.46%	
*Sprint	8	778	162	2500	0.0920	1.0000	0.92%	
*T-Mobile	6	584	172	1900	0.0457	1.0000	0.46%	
*T-Mobile	1	445	172	700	0.0058	0.4667	0.12%	
*Pocket (now MetroPCS)	3	631	115	2130	0.0573	1.0000	0.57%	
*AT&T-UMTS	1	1094	139	850	0.0222	0.5667	0.39%	
*AT&T-UMTS	2	7114	139	2100	0.2893	1.0000	2.89%	
*AT&T-UMTS	2	6168	139	1900	0.2508	1.0000	2.51%	
*AT&T-LTE	2	2959	139	763	0.1203	0.5087	2.37%	
*AT&T-LTE	2	2819	139	737	0.1146	0.4913	2.33%	
*AT&T-LTE	2	3954	139	2300	0.1608	1.0000	1.61%	
*AT&T-GSM	2	3607	139	850	0.1467	0.5667	2.59%	
VZW PCS	**1**	**4500**	**152**	**0.0700**	**1970**	**1.0000**	**7.00%**	
VZW Cellular LTE	**1**	**2850**	**152**	**0.0444**	**869**	**0.5793**	**7.66%**	
VZW Cellular	**3**	**1176**	**152**	**0.0183**	**876**	**0.5793**	**3.16%**	
VZW AWS	**1**	**4550**	**152**	**0.0708**	**2145**	**1.0000**	**7.08%**	
VZW 700	**1**	**2370**	**152**	**0.0369**	**746**	**0.4973**	**7.42%**	
								50.59%
* Source: Siting Council								

ATTACHMENT 3

Date: **January 08, 2019**

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

BLACK & VEATCH
Building a world of difference.
Black & Veatch Corp.
6800 W 115th St. Suite 2292
Overland Park, KS 66211
(913) 458-8145

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	PSLC 468984
	Carrier Site Name:	THOMASTON C CT
Crown Castle Designation:	**Crown Castle BU Number:**	823530
	Crown Castle Site Name:	CT364/Chapel St. Monopole
	Crown Castle JDE Job Number:	533083
	Crown Castle Work Order Number:	1678479
	Crown Castle Order Number:	460116 Rev. 0
Engineering Firm Designation:	**Black & Veatch Corp. Project Number:**	400087
Site Data:	**580 Chapel Street, Thomaston, Litchfield County, CT** **Latitude *41° 39' 48.48"*, Longitude *-73° 4' 27.41"*** **175 Foot - Monopole Tower**	

Dear Charles Trask,

Black & Veatch Corp. is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

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: Proposed Equipment Configuration **Sufficient Capacity**

This analysis utilizes an ultimate 3-second gust wind speed of 120 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Structural analysis prepared by: Sirada Jaritreab / Chariya Wannaklut

Respectfully submitted by:

Riley, Joshua J Jan 8 2019 10:07 AM

Joshua J. Riley, P.E.
Professional Engineer

01/08/2019

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 175 ft Monopole tower designed by Pirod Manufactures, Inc.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	120 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	1.500 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
152.0	152.0	1	unknown	Heavy 12' UPNY Boom [SM 801-3]	6 1	1-5/8 1-3/8
		2	antel	LPA-80080/4CF w/ Mount Pipe		
		4	antel	LPA-80080/4CF w/ Mount Pipe		
		6	commscope	NNHH-65B-R4 w/ Mount Pipe		
		1	raycap	RVZDC-6600-PF-48		
		3	samsung telecommunications	RFV01U-D1A		
		3	samsung telecommunications	RFV01U-D2A		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
172.0	175.0	2	andrew	VHLP2.6	12 3	1-5/8 7/8
	172.0	1	andrew	ATJB200-A01-007		
		2	andrew	ETW190VS12UB		
		1	cci tower mounts	Platform Mount [LP 701-1]		
		3	commscope	ATBT-BOTTOM-24V		
		3	commscope	LNX-6515DS-VTM w/ Mount Pipe		
		3	ems wireless	RR90-17-02DP w/ Mount Pipe		
	168.0	1	bird technologies group	OA20-67-DIN		
		1	lone star electronics	LS-230C		
168.0	171.0	1	lone star electronics	LS-230C	6	7/8
	168.0	1	cci tower mounts	Side Arm Mount [SO 701-1]		
162.0	162.0	3	alcatel lucent	800MHz 2X50W RRH W/FILTER	4	1-1/4

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		3	alcatel lucent	PCS 1900MHz 2x40W		
		3	alcatel lucent	TD-RRH8x20-25		
		1	cci tower mounts	Platform Mount [LP 712-1]		
		3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe		
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe		
142.0	143.0	1	cci antennas	HPA65R-BU4A w/ Mount Pipe	12 6 2 1	1-5/8 3/4 3/8 2"conduit
		2	cci antennas	HPA65R-BU6A w/ Mount Pipe		
		3	ericsson	RADIO 4415 B30		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 4478 B14		
		3	ericsson	RRUS 8843 B2/B66A		
		2	kathrein	80010964 w/ Mount Pipe		
		4	kathrein	80010965 w/ Mount Pipe		
		3	powerwave technologies	7770.00 w/ Mount Pipe		
		6	powerwave technologies	LGP21401		
	142.0	1	cci tower mounts	Miscellaneous [NA 507-1]		
		1	crown mounts	Platform Mount [LP 303-1]		
		3	raycap	DC6-48-60-18-8F		
115.0	115.0	3	rfs celwave	APXV18-206517S-C w/ Mount Pipe	6	1-5/8
50.0	50.0	1	cci tower mounts	Side Arm Mount [SO 701-1]	1	½
		1	pctel	GPS-TMG-HR-26NCM		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH Engineering, Inc.	3462674	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Pirod, Inc.	3464631	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Pirod, Inc.	3462695	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.5.0), 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) Base plate design methodology of the manufacturer has been reviewed and found to be an acceptable means of designing to resist the full capacity of the bolts and shaft.
5) The wind loading Exposure Category and Topographic Category for this site have been analyzed and determined by the tower owner. Black & Veatch does not assume any responsibility for its accuracy.
6) This analysis was performed under the assumption that all information provided to Black & Veatch is current and correct. This is to include site data, existing/proposed appurtenance loading, tower/foundation details, and geotechnical data. The existing/proposed loading on the structure is based on CAD level drawings and carrier orders provided by the owner. If any of this information is not current and correct, this report should be considered obsolete and further analysis will be required.

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

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary) (Monopole Tower)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	175 - 164.25	Pole	TP26x22x0.25	1	-4.16	1202.11	4.3	Pass
L2	164.25 - 129.67	Pole	TP34.0625x24.4135x0.3125	2	-17.96	1996.21	30.8	Pass
L3	129.67 - 96	Pole	TP41.75x32.452x0.375	3	-26.09	2940.31	42.6	Pass
L4	96 - 63.17	Pole	TP49.0625x39.8421x0.375	4	-35.70	3460.73	53.7	Pass
L5	63.17 - 31.17	Pole	TP56.125x46.9602x0.375	5	-46.70	3964.26	61.5	Pass
L6	31.17 - 0	Pole	TP62.9375x53.8475x0.375	6	-61.31	4574.01	68.6	Pass
							Summary	
						Pole (L6)	68.6	Pass
						Rating =	68.6	Pass

Table 5 - Tower Component Stresses vs. Capacity (Monopole Tower) – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	61.9	Pass
1,2	Base Plate		*	Pass
1	Base Foundation	0	66.0	Pass
	Base Foundation Soil Interaction		62.1	Pass

Structure Rating (max from all components) =	68.6%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed. Rating per TIA-222-H Section 15.5.
2) Base plates are assumed to have the same capacity as their respective splice bolts or shaft.

4.1) Recommendations

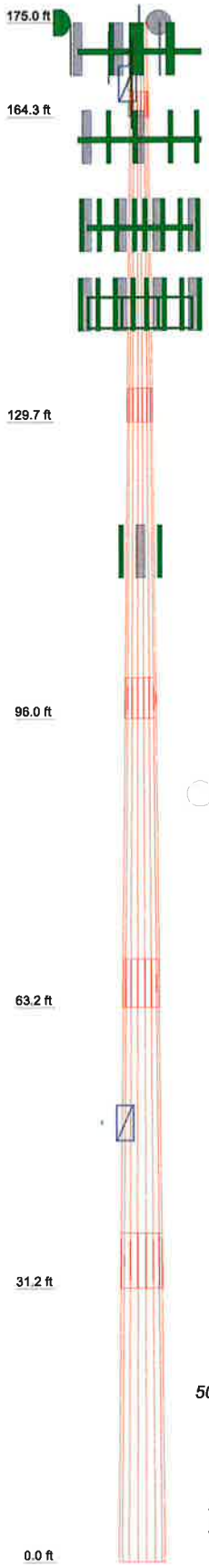
The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	1	2	3	4	5	6
Length (ft)	10.75	37.50	37.50	37.50	37.50	37.42
Number of Sides	18	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.3750	0.3750	0.3750
Socket Length (ft)	2.92	3.83	4.67	5.50	6.25	
Top Dia (in)	22.0000	24.4135	32.4520	39.8421	46.9602	53.8475
Bot Dia (in)	26.0000	34.0625	41.7500	49.0625	56.1250	62.9375
Grade	A572-65					
Weight (K)	0.7	3.7	5.6	6.7	7.8	8.8

33.2



MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Litchfield County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 120 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TIA-222-H Annex S
9. TOWER RATING: 68.6%

ALL REACTIONS ARE FACTORED

AXIAL 97 K

SHEAR 9 K *MOMENT 1163 kip-ft*

TORQUE 2 kip-ft
50 mph WIND - 1.5000 in ICE

AXIAL 61 K

SHEAR 32 K *MOMENT 4127 kip-ft*

TORQUE 7 kip-ft
REACTIONS - 120 mph WIND

BLACK & VEATCH
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Black & Veatch Corp.
6800 W 115th St. Suite 2292
Overland Park, KS 66211
Phone: (913) 458-8145
FAX: (913) 458-8136

Job: *CT364/Chapel St. Monopole (BU# 8235*			
Project: *400087 (823530.1678479)*			
Client: Crown Castle	Drawn by: Sirada Jaritreab	App'd:	
Code: TIA-222-H	Date: 01/08/19	Scale: NTS	
Path:		Dwg No. E-1	

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-H standard.
The following design criteria apply:

1) Tower is located in Litchfield County, Connecticut.
2) Tower base elevation above sea level: 543.00 ft.
3) Basic wind speed of 120 mph.
4) Risk Category II.
5) Exposure Category B.
6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
7) Topographic Category: 1.
8) Crest Height: 0.00 ft.
9) Nominal ice thickness of 1.5000 in.
10) Ice thickness is considered to increase with height.
11) Ice density of 56 pcf.
12) A wind speed of 50 mph is used in combination with ice.
13) Temperature drop of 50 °F.
14) Deflections calculated using a wind speed of 60 mph.
15) TIA-222-H Annex S.
16) A non-linear (P-delta) analysis was used.
17) Pressures are calculated at each section.
18) Stress ratio used in pole design is 1.05.
19) Tower analysis based on target reliabilities in accordance with Annex S.
20) Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
21) 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-H Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-H 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	Ignore KL/ry For 60 Deg. Angle Legs	Pole Without Linear Attachments
		Pole With Shroud Or No Appurtenances
		Outside and Inside Corner Radii Are Known

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

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	175.00-164.25	10.75	2.92	18	22.0000	26.0000	0.2500	1.0000	A572-65 (65 ksi)
L2	164.25-129.67	37.50	3.83	18	24.4135	34.0625	0.3125	1.2500	A572-65 (65 ksi)
L3	129.67-96.00	37.50	4.67	18	32.4520	41.7500	0.3750	1.5000	A572-65 (65 ksi)
L4	96.00-63.17	37.50	5.50	18	39.8421	49.0625	0.3750	1.5000	A572-65 (65 ksi)
L5	63.17-31.17	37.50	6.25	18	46.9602	56.1250	0.3750	1.5000	A572-65 (65 ksi)
L6	31.17-0.00	37.42		18	53.8475	62.9375	0.3750	1.5000	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	22.3008	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	26.3625	20.4326	1711.6544	9.1412	13.2080	129.5922	3425.5610	10.2183	4.1360	16.544
L2	25.5048	23.9052	1754.2802	8.5559	12.4021	141.4508	3510.8687	11.9549	3.7468	11.99
	34.5398	33.4758	4817.4335	11.9812	17.3038	278.4040	9641.2058	16.7411	5.4450	17.424
L3	33.8591	38.1797	4963.1506	11.3873	16.4856	301.0593	9932.8318	19.0935	5.0516	13.471
	42.3362	49.2466	10650.9822	14.6881	21.2090	502.1916	21315.9793	24.6280	6.6880	17.835
L4	41.5648	46.9757	9244.4481	14.0108	20.2398	456.7464	18501.0602	23.4923	6.3522	16.939
	49.7615	57.9503	17355.1378	17.2841	24.9238	696.3293	34733.1119	28.9807	7.9750	21.267
L5	48.9917	55.4480	15202.6322	16.5377	23.8558	637.2728	30425.2683	27.7293	7.6050	20.28
	56.9330	66.3564	26056.1506	19.7913	28.5115	913.8821	52146.5865	33.1845	9.2180	24.581
L6	56.1620	63.6457	22991.5268	18.9827	27.3545	840.5012	46013.3064	31.8289	8.8172	23.512
	63.8506	74.4650	36822.8946	22.2097	31.9722	1151.7142	73694.2417	37.2396	10.4170	27.779

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 175.00-164.25				1	1	1			
L2 164.25-129.67				1	1	1			
L3 129.67-96.00				1	1	1			
L4 96.00-63.17				1	1	1			
L5 63.17-31.17				1	1	1			
L6 31.17-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	B	No	Surface Ar (CaAa)	175.00 - 10.00	1	1	-0.410 -0.400	0.3750		0.22
***										
MLCH 12X6 AWG(1-3/8)	A	No	Surface Ar (CaAa)	152.00 - 8.00	1	1	-0.280 -0.250	1.4300		1.72
***										
LDF7-50A(1-5/8)	C	No	Surface Ar (CaAa)	115.00 - 8.00	6	6	-0.280 -0.050	1.9800		0.82
***										
LDF4-50A(1/2)	C	No	Surface Ar (CaAa)	50.00 - 8.00	1	1	-0.360 -0.350	0.6250		0.15
***										

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
***									
AVA5-50(7/8")	C	No	No	Inside Pole	172.00 - 0.00	3	No Ice	0.00	0.30
							1/2" Ice	0.00	0.30
							1" Ice	0.00	0.30
							2" Ice	0.00	0.30
LDF7-50A(1-5/8")	C	No	No	Inside Pole	172.00 - 0.00	12	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
***									
LDF5-50A(7/8")	C	No	No	Inside Pole	168.00 - 0.00	6	No Ice	0.00	0.33
							1/2" Ice	0.00	0.33
							1" Ice	0.00	0.33
							2" Ice	0.00	0.33
***									
HB114-1-08U4-M5J(1-1/4)	C	No	No	Inside Pole	162.00 - 0.00	3	No Ice	0.00	1.08
							1/2" Ice	0.00	1.08
							1" Ice	0.00	1.08
							2" Ice	0.00	1.08
HB114-21U3M12-XXXF(1-1/4)	C	No	No	Inside Pole	162.00 - 0.00	1	No Ice	0.00	1.22
							1/2" Ice	0.00	1.22
							1" Ice	0.00	1.22
							2" Ice	0.00	1.22
LDF7-50A(1-5/8)	C	No	No	Inside Pole	152.00 - 0.00	6	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
***									
2" innerduct conduit	C	No	No	Inside Pole	142.00 - 0.00	2	No Ice	0.00	0.20
							1/2" Ice	0.00	0.20
							1" Ice	0.00	0.20
							2" Ice	0.00	0.20
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	142.00 - 0.00	4	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
FB-L98B-034-XXX(3/8)	C	No	No	Inside Pole	142.00 - 0.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	142.00 - 0.00	2	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
FB-L98-002-XXX(3/8)	C	No	No	Inside Pole	142.00 - 0.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
AVA7-50(1-5/8)	C	No	No	Inside Pole	142.00 - 0.00	12	1" Ice	0.00	0.06
							2" Ice	0.00	0.06
							No Ice	0.00	0.70
							1/2" Ice	0.00	0.70
							1" Ice	0.00	0.70
							2" Ice	0.00	0.70
***									

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	175.00-164.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.403	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.09
L2	164.25-129.67	A	0.000	0.000	3.193	0.000	0.04
		B	0.000	0.000	1.297	0.000	0.01
		C	0.000	0.000	0.000	0.000	0.85
L3	129.67-96.00	A	0.000	0.000	4.815	0.000	0.06
		B	0.000	0.000	1.263	0.000	0.01
		C	0.000	0.000	22.572	0.000	1.26
L4	96.00-63.17	A	0.000	0.000	4.695	0.000	0.06
		B	0.000	0.000	1.231	0.000	0.01
		C	0.000	0.000	39.002	0.000	1.29
L5	63.17-31.17	A	0.000	0.000	4.576	0.000	0.06
		B	0.000	0.000	1.200	0.000	0.01
		C	0.000	0.000	39.193	0.000	1.27
L6	31.17-0.00	A	0.000	0.000	3.313	0.000	0.04
		B	0.000	0.000	0.794	0.000	0.00
		C	0.000	0.000	28.974	0.000	1.19

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	175.00-164.25	A	1.502	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	3.632	0.000	0.04
		C		0.000	0.000	0.000	0.000	0.09
L2	164.25-129.67	A	1.480	0.000	0.000	9.900	0.000	0.16
		B		0.000	0.000	11.682	0.000	0.13
		C		0.000	0.000	0.000	0.000	0.85
L3	129.67-96.00	A	1.441	0.000	0.000	14.779	0.000	0.24
		B		0.000	0.000	11.227	0.000	0.12
		C		0.000	0.000	35.243	0.000	1.62
L4	96.00-63.17	A	1.392	0.000	0.000	14.158	0.000	0.22
		B		0.000	0.000	10.694	0.000	0.11
		C		0.000	0.000	60.581	0.000	1.91
L5	63.17-31.17	A	1.321	0.000	0.000	13.484	0.000	0.21
		B		0.000	0.000	10.108	0.000	0.10
		C		0.000	0.000	65.074	0.000	1.91
L6	31.17-0.00	A	1.180	0.000	0.000	9.436	0.000	0.14
		B		0.000	0.000	6.388	0.000	0.06
		C		0.000	0.000	49.633	0.000	1.66

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	175.00-164.25	0.0595	-0.2952	0.2650	-1.3141
L2	164.25-129.67	-0.7127	-0.2576	-0.9335	-1.2272
L3	129.67-96.00	0.6473	3.9257	0.0047	2.3019
L4	96.00-63.17	1.5210	6.1599	0.7614	4.2001
L5	63.17-31.17	1.7167	6.5222	1.2153	4.8054
L6	31.17-0.00	1.4650	5.3845	1.2219	4.3065

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	1	Safety Line 3/8	164.25 - 175.00	1.0000	1.0000
L1	11	MLCH 12X6 AWG(1-3/8)	164.25 - 152.00	1.0000	1.0000
L2	1	Safety Line 3/8	129.67 - 164.25	1.0000	1.0000
L2	11	MLCH 12X6 AWG(1-3/8)	129.67 - 152.00	1.0000	1.0000
L2	22	LDF7-50A(1-5/8)	129.67 - 115.00	1.0000	1.0000
L3	1	Safety Line 3/8	96.00 - 129.67	1.0000	1.0000
L3	11	MLCH 12X6 AWG(1-3/8)	96.00 - 129.67	1.0000	1.0000
L3	22	LDF7-50A(1-5/8)	96.00 - 115.00	1.0000	1.0000
L4	1	Safety Line 3/8	63.17 - 96.00	1.0000	1.0000
L4	11	MLCH 12X6 AWG(1-3/8)	63.17 - 96.00	1.0000	1.0000
L4	22	LDF7-50A(1-5/8)	63.17 - 96.00	1.0000	1.0000
L4	24	LDF4-50A(1/2)	63.17 - 50.00	1.0000	1.0000
L5	1	Safety Line 3/8	31.17 - 63.17	1.0000	1.0000
L5	11	MLCH 12X6 AWG(1-3/8)	31.17 - 63.17	1.0000	1.0000
L5	22	LDF7-50A(1-5/8)	31.17 - 63.17	1.0000	1.0000
L5	24	LDF4-50A(1/2)	31.17 - 50.00	1.0000	1.0000

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
Lightning Rod 5/8"x6'	A	From Leg	0.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.38 0.99 1.62 2.46	0.38 0.99 1.62 2.46	0.01 0.01 0.02 0.05
172 Platform Mount [LP 701-1]	C	None		0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	59.15 71.12 83.09 107.03	59.15 71.12 83.09 107.03	2.75 3.42 4.10 5.45
4'x2" Mount Pipe	A	From Leg	4.00 2.33 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.87 1.11 1.36 1.90	0.87 1.11 1.36 1.90	0.01 0.02 0.03 0.06
4'x2" Mount Pipe	C	From Leg	4.00 7.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.87 1.11 1.36 1.90	0.87 1.11 1.36 1.90	0.01 0.02 0.03 0.06
RR90-17-02DP w/ Mount Pipe	A	From Leg	4.00 -7.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.59 5.02 5.44 6.30	3.32 4.09 4.78 6.23	0.03 0.07 0.12 0.22
RR90-17-02DP w/ Mount Pipe	C	From Leg	4.00 -2.33 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.59 5.02 5.44 6.30	3.32 4.09 4.78 6.23	0.03 0.07 0.12 0.22
RR90-17-02DP w/ Mount Pipe	C	From Face	4.00 -3.50 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.59 5.02 5.44 6.30	3.32 4.09 4.78 6.23	0.03 0.07 0.12 0.22
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	4.00 -2.33 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.71 12.43 13.16 14.54	9.86 11.39 12.94 15.29	0.08 0.17 0.27 0.51
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	4.00 -7.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.71 12.43 13.16 14.54	9.86 11.39 12.94 15.29	0.08 0.17 0.27 0.51
LNX-6515DS-VTM w/ Mount Pipe	C	From Face	4.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.71 12.43 13.16 14.54	9.86 11.39 12.94 15.29	0.08 0.17 0.27 0.51
OA20-67-DIN	C	From Leg	4.00 -7.00 -4.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.00 3.03 4.06 6.12	2.00 3.03 4.06 6.12	0.01 0.02 0.03 0.06
LS-230C	C	From Leg	4.00 -7.00 -4.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.61 2.34 2.80 3.68	1.61 2.34 2.80 3.68	0.01 0.02 0.04 0.09
ATBT-BOTTOM-24V	A	From Leg	4.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice	0.10 0.15 0.20 0.32	0.06 0.10 0.15 0.26	0.00 0.00 0.01 0.01

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" Ice			
ATBT-BOTTOM-24V	C	From Leg	4.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.10 0.15 0.20 0.32	0.06 0.10 0.15 0.26	0.00 0.00 0.01 0.01
ATBT-BOTTOM-24V	C	From Face	4.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.10 0.15 0.20 0.32	0.06 0.10 0.15 0.26	0.00 0.00 0.01 0.01
ETW190VS12UB	C	From Leg	4.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.57 0.67 0.77 1.00	0.32 0.40 0.48 0.68	0.01 0.02 0.03 0.04
ETW190VS12UB	C	From Face	4.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.57 0.67 0.77 1.00	0.32 0.40 0.48 0.68	0.01 0.02 0.03 0.04
ATJB200-A01-007	A	From Leg	4.00 0.00 0.00	0.0000	172.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.38 0.46 0.54 0.74	0.13 0.18 0.24 0.39	0.00 0.01 0.01 0.02
168 Side Arm Mount [SO 701-1]	A	From Face	0.50 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.85 1.14 1.43 2.01	1.67 2.34 3.01 4.35	0.07 0.08 0.09 0.12
LS-230C	A	From Face	3.00 0.00 3.00	0.0000	168.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.61 2.34 2.80 3.68	1.61 2.34 2.80 3.68	0.01 0.02 0.04 0.09
162 Platform Mount [LP 712-1]	C	None		0.0000	162.00	No Ice 1/2" Ice 1" Ice 2" Ice	24.53 29.94 35.35 46.17	24.53 29.94 35.35 46.17	1.34 1.65 1.96 2.58
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	3.00 -6.00 0.00	0.0000	162.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	3.00 -6.00 0.00	0.0000	162.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	3.00 -6.00 0.00	0.0000	162.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.58 7.03 7.47 8.38	4.96 5.75 6.47 7.94	0.08 0.13 0.19 0.34
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	3.00 0.00 0.00	0.0000	162.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.26 8.82 9.35 10.42	6.95 8.13 9.02 10.84	0.08 0.15 0.23 0.41
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	3.00 0.00	0.0000	162.00	No Ice 1/2"	8.26 8.82	6.95 8.13	0.08 0.15

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			Ice	9.35	9.02	0.23
						1" Ice	10.42	10.84	0.41
						2" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	3.00	0.0000	162.00	No Ice	8.26	6.95	0.08
			0.00			1/2"	8.82	8.13	0.15
			0.00			Ice	9.35	9.02	0.23
						1" Ice	10.42	10.84	0.41
						2" Ice			
TD-RRH8x20-25	A	From Leg	3.00	0.0000	162.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			0.00			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
TD-RRH8x20-25	B	From Leg	3.00	0.0000	162.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			0.00			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
TD-RRH8x20-25	C	From Leg	3.00	0.0000	162.00	No Ice	4.05	1.53	0.07
			0.00			1/2"	4.30	1.71	0.10
			0.00			Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
800MHz 2X50W RRH W/FILTER	A	From Leg	0.50	0.0000	162.00	No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
						1" Ice	2.83	2.68	0.17
						2" Ice			
800MHz 2X50W RRH W/FILTER	B	From Leg	0.50	0.0000	162.00	No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
						1" Ice	2.83	2.68	0.17
						2" Ice			
800MHz 2X50W RRH W/FILTER	C	From Leg	0.50	0.0000	162.00	No Ice	2.06	1.93	0.06
			0.00			1/2"	2.24	2.11	0.09
			0.00			Ice	2.43	2.29	0.11
						1" Ice	2.83	2.68	0.17
						2" Ice			
PCS 1900MHz 2x40W	A	From Leg	0.50	0.0000	162.00	No Ice	2.35	1.28	0.04
			0.00			1/2"	2.55	1.43	0.06
			0.00			Ice	2.75	1.60	0.08
						1" Ice	3.18	1.95	0.14
						2" Ice			
PCS 1900MHz 2x40W	B	From Leg	0.50	0.0000	162.00	No Ice	2.35	1.28	0.04
			0.00			1/2"	2.55	1.43	0.06
			0.00			Ice	2.75	1.60	0.08
						1" Ice	3.18	1.95	0.14
						2" Ice			
PCS 1900MHz 2x40W	C	From Leg	0.50	0.0000	162.00	No Ice	2.35	1.28	0.04
			0.00			1/2"	2.55	1.43	0.06
			0.00			Ice	2.75	1.60	0.08
						1" Ice	3.18	1.95	0.14
						2" Ice			
152 Heavy 12' UPNY Boom [SM 801-3]	C	None		0.0000	152.00	No Ice	20.40	20.40	0.88
						1/2"	26.30	26.30	1.25
						Ice	32.20	32.20	1.63
						1" Ice	44.00	44.00	2.39
						2" Ice			
(2) 12'x2" Horizontal Pipe	A	From Leg	3.00	0.0000	152.00	No Ice	2.85	0.01	0.04
			0.00			1/2"	4.08	0.05	0.07
			0.00			Ice	5.32	0.08	0.09
						1" Ice	7.60	0.16	0.18
						2" Ice			
(2) 12'x2" Horizontal Pipe	B	From Leg	3.00	0.0000	152.00	No Ice	2.85	0.01	0.04

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 0.00			1/2" Ice 1" Ice 2" Ice	4.08 5.32 7.60	0.05 0.08 0.16	0.07 0.09 0.18
(2) 12'x2" Horizontal Pipe	C	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.85 4.08 5.32 7.60	0.01 0.05 0.08 0.16	0.04 0.07 0.09 0.18
NNHH-65B-R4 w/ Mount Pipe	A	From Leg	3.00 -6.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.51 13.11 13.67 14.82	7.41 8.60 9.50 11.33	0.10 0.19 0.29 0.52
NNHH-65B-R4 w/ Mount Pipe	A	From Leg	3.00 -2.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.51 13.11 13.67 14.82	7.41 8.60 9.50 11.33	0.10 0.19 0.29 0.52
NNHH-65B-R4 w/ Mount Pipe	B	From Leg	3.00 -6.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.51 13.11 13.67 14.82	7.41 8.60 9.50 11.33	0.10 0.19 0.29 0.52
NNHH-65B-R4 w/ Mount Pipe	B	From Leg	3.00 -2.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.51 13.11 13.67 14.82	7.41 8.60 9.50 11.33	0.10 0.19 0.29 0.52
NNHH-65B-R4 w/ Mount Pipe	C	From Leg	3.00 2.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.51 13.11 13.67 14.82	7.41 8.60 9.50 11.33	0.10 0.19 0.29 0.52
NNHH-65B-R4 w/ Mount Pipe	C	From Leg	3.00 6.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	12.51 13.11 13.67 14.82	7.41 8.60 9.50 11.33	0.10 0.19 0.29 0.52
LPA-80080/4CF w/ Mount Pipe	A	From Leg	3.00 2.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
LPA-80080/4CF w/ Mount Pipe	A	From Leg	3.00 6.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
LPA-80080/4CF w/ Mount Pipe	B	From Leg	3.00 2.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
LPA-80080/4CF w/ Mount Pipe	B	From Leg	3.00 6.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
LPA-80080/4CF w/ Mount Pipe	C	From Leg	3.00 -6.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.86 3.22 3.59 4.34	6.57 7.19 7.84 9.17	0.03 0.08 0.13 0.25
LPA-80080/4CF w/ Mount	C	From Leg	3.00	0.0000	152.00	No Ice	2.86	6.57	0.03

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
Pipe			-2.00 0.00			1/2" Ice 1" Ice 2" Ice	3.22 3.59 4.34	7.19 7.84 9.17	0.08 0.13 0.25
RFV01U-D1A	A	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.25 1.39 1.54 1.86	0.08 0.10 0.12 0.18
RFV01U-D1A	B	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.25 1.39 1.54 1.86	0.08 0.10 0.12 0.18
RFV01U-D1A	C	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.25 1.39 1.54 1.86	0.08 0.10 0.12 0.18
RFV01U-D2A	A	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.01 1.14 1.28 1.59	0.07 0.09 0.11 0.15
RFV01U-D2A	B	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.01 1.14 1.28 1.59	0.07 0.09 0.11 0.15
RFV01U-D2A	C	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.01 1.14 1.28 1.59	0.07 0.09 0.11 0.15
RVZDC-6600-PF-48	B	From Leg	3.00 0.00 0.00	0.0000	152.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.06 4.32 4.58 5.14	3.10 3.34 3.58 4.09	0.03 0.07 0.11 0.20
142 Platform Mount [LP 303-1]	C	None		0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.66 18.87 23.08 31.50	14.66 18.87 23.08 31.50	1.25 1.48 1.71 2.18
Miscellaneous [NA 507-1]	C	None		0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.80 6.70 8.60 12.40	4.80 6.70 8.60 12.40	0.25 0.29 0.34 0.44
HPA65R-BU6A w/ Mount Pipe	A	From Leg	3.00 -2.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.09 8.64 9.16 10.22	7.19 8.36 9.24 11.05	0.07 0.14 0.21 0.39
HPA65R-BU6A w/ Mount Pipe	C	From Leg	3.00 -2.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.09 8.64 9.16 10.22	7.19 8.36 9.24 11.05	0.07 0.14 0.21 0.39
HPA65R-BU4A w/ Mount Pipe	B	From Leg	3.00 -2.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.20 5.58 5.97 6.79	4.66 5.27 5.89 7.18	0.05 0.10 0.15 0.28

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
80010965 w/ Mount Pipe	A	From Leg	3.00 2.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.05 14.69 15.30 16.53	7.63 8.90 9.96 11.92	0.13 0.22 0.33 0.57
80010965 w/ Mount Pipe	A	From Leg	3.00 6.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.05 14.69 15.30 16.53	7.63 8.90 9.96 11.92	0.13 0.22 0.33 0.57
80010965 w/ Mount Pipe	C	From Leg	3.00 2.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.05 14.69 15.30 16.53	7.63 8.90 9.96 11.92	0.13 0.22 0.33 0.57
80010965 w/ Mount Pipe	C	From Leg	3.00 6.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	14.05 14.69 15.30 16.53	7.63 8.90 9.96 11.92	0.13 0.22 0.33 0.57
80010964 w/ Mount Pipe	B	From Leg	3.00 2.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	10.23 10.74 11.24 12.25	5.51 6.37 7.12 8.64	0.11 0.18 0.26 0.45
80010964 w/ Mount Pipe	B	From Leg	3.00 6.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	10.23 10.74 11.24 12.25	5.51 6.37 7.12 8.64	0.11 0.18 0.26 0.45
7770.00 w/ Mount Pipe	A	From Leg	3.00 -6.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	B	From Leg	3.00 -6.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
7770.00 w/ Mount Pipe	C	From Leg	3.00 -6.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.75 6.18 6.61 7.49	4.25 5.01 5.71 7.16	0.06 0.10 0.16 0.29
RRUS 4478 B14	A	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.84 2.01 2.19 2.57	1.06 1.20 1.34 1.66	0.06 0.08 0.09 0.14
RRUS 4478 B14	B	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.84 2.01 2.19 2.57	1.06 1.20 1.34 1.66	0.06 0.08 0.09 0.14
RRUS 4478 B14	C	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.84 2.01 2.19 2.57	1.06 1.20 1.34 1.66	0.06 0.08 0.09 0.14
RADIO 4415 B30	A	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.33	0.64 0.75 0.87 1.13	0.04 0.05 0.07 0.11

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
RADIO 4415 B30	B	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.33	0.64 0.75 0.87 1.13	0.04 0.05 0.07 0.11
RADIO 4415 B30	C	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.33	0.64 0.75 0.87 1.13	0.04 0.05 0.07 0.11
RRUS 4449 B5/B12	A	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	B	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 4449 B5/B12	C	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.97 2.14 2.33 2.72	1.41 1.56 1.73 2.07	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	A	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	1.35 1.50 1.65 1.99	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	B	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	1.35 1.50 1.65 1.99	0.07 0.09 0.11 0.16
RRUS 8843 B2/B66A	C	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.64 1.80 1.97 2.32	1.35 1.50 1.65 1.99	0.07 0.09 0.11 0.16
DC6-48-60-18-8F	A	From Leg	1.00 0.00 0.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.92 1.46 1.64 2.04	0.92 1.46 1.64 2.04	0.02 0.04 0.06 0.11
DC6-48-60-18-8F	B	From Leg	1.00 0.00 0.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.92 1.46 1.64 2.04	0.92 1.46 1.64 2.04	0.02 0.04 0.06 0.11
DC6-48-60-18-8F	C	From Face	1.00 0.00 0.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.92 1.46 1.64 2.04	0.92 1.46 1.64 2.04	0.02 0.04 0.06 0.11
(2) LGP21401	A	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
(2) LGP21401	B	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05

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) LGP21401	C	From Leg	3.00 0.00 1.00	0.0000	142.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.35 0.44 0.54 0.77	0.01 0.02 0.03 0.05
115									
APXV18-206517S-C w/ Mount Pipe	A	From Leg	1.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.40 5.96 6.48 7.55	4.70 5.86 6.73 8.51	0.05 0.10 0.15 0.28
APXV18-206517S-C w/ Mount Pipe	B	From Leg	1.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.40 5.96 6.48 7.55	4.70 5.86 6.73 8.51	0.05 0.10 0.15 0.28
APXV18-206517S-C w/ Mount Pipe	C	From Leg	1.00 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.40 5.96 6.48 7.55	4.70 5.86 6.73 8.51	0.05 0.10 0.15 0.28
50									
Side Arm Mount [SO 701-1]	A	From Face	0.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.85 1.14 1.43 2.01	1.67 2.34 3.01 4.35	0.07 0.08 0.09 0.12
GPS-TMG-HR-26NCM	A	From Face	3.00 0.00 0.00	0.0000	50.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.13 0.18 0.24 0.37	0.13 0.18 0.24 0.37	0.00 0.00 0.01 0.01

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
VHLP2.6	A	Paraboloid w/Shroud (HP)	From Leg	4.00 2.33 3.00	-6.0000		172.00	2.92	No Ice 1/2" Ice 1" Ice 2" Ice	6.68 7.07 7.46 8.23	0.05 0.08 0.12 0.19
VHLP2.6	C	Paraboloid w/Shroud (HP)	From Leg	4.00 7.00 3.00	-80.0000		172.00	2.92	No Ice 1/2" Ice 1" Ice 2" Ice	6.68 7.07 7.46 8.23	0.05 0.08 0.12 0.19
***											

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice

Comb. No.	Description
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 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
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	175 - 164.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-9.02	4.29	-3.35
			Max. Mx	20	-4.21	27.69	0.99
			Max. My	14	-4.16	0.56	-29.96
			Max. Vy	20	-5.51	27.69	0.99
			Max. Vx	2	-5.98	1.22	28.98
			Max. Torque	23			5.59
L2	164.25 - 129.67	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-38.79	6.53	0.64
			Max. Mx	20	-18.04	476.67	5.80
			Max. My	2	-17.96	2.41	495.00
			Max. Vy	20	-20.65	476.67	5.80

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	2	-21.19	2.41	495.00
			Max. Torque	2			6.71
L3	129.67 - 96	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-50.30	7.07	0.17
			Max. Mx	20	-26.15	1208.44	8.52
			Max. My	2	-26.09	2.10	1244.17
			Max. Vy	20	-23.97	1208.44	8.52
			Max. Vx	2	-24.51	2.10	1244.17
			Max. Torque	2			6.70
L4	96 - 63.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-63.26	7.54	-1.01
			Max. Mx	20	-35.74	2020.92	10.96
			Max. My	2	-35.70	1.70	2073.39
			Max. Vy	20	-26.74	2020.92	10.96
			Max. Vx	2	-27.27	1.70	2073.39
			Max. Torque	2			6.69
L5	63.17 - 31.17	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-77.91	8.04	-2.32
			Max. Mx	20	-46.73	2897.39	13.15
			Max. My	2	-46.70	1.29	2965.97
			Max. Vy	20	-29.23	2897.39	13.15
			Max. Vx	2	-29.76	1.29	2965.97
			Max. Torque	2			6.78
L6	31.17 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-96.57	8.27	-3.88
			Max. Mx	20	-61.31	4039.36	15.37
			Max. My	2	-61.31	0.30	4127.06
			Max. Vy	20	-31.73	4039.36	15.37
			Max. Vx	2	-32.24	0.30	4127.06
			Max. Torque	2			6.78

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	33	96.57	-0.00	-8.88
	Max. H_x	20	61.33	31.70	0.07
	Max. H_z	2	61.33	-0.03	32.21
	Max. M_x	2	4127.06	-0.03	32.21
	Max. M_z	8	4033.14	-31.70	0.01
	Max. Torsion	2	6.78	-0.03	32.21
	Min. Vert	11	46.00	-27.35	-16.19
	Min. H_x	9	46.00	-31.70	0.01
	Min. H_z	14	61.33	0.04	-32.21
	Min. M_x	14	-4126.53	0.04	-32.21
	Min. M_z	20	-4039.36	31.70	0.07
	Min. Torsion	14	-5.98	0.04	-32.21

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	51.11	0.00	0.00	0.10	2.05	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	61.33	0.03	-32.21	-4127.06	0.30	-6.78
0.9 Dead+1.0 Wind 0 deg - No Ice	46.00	0.03	-32.21	-4075.12	-0.36	-6.77
1.2 Dead+1.0 Wind 30 deg -	61.33	15.78	-28.00	-3590.69	-1998.90	-6.60

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
No Ice						
0.9 Dead+1.0 Wind 30 deg - No Ice	46.00	15.78	-28.00	-3545.48	-1974.52	-6.58
1.2 Dead+1.0 Wind 60 deg - No Ice	61.33	27.44	-16.20	-2078.89	-3489.23	-4.63
0.9 Dead+1.0 Wind 60 deg - No Ice	46.00	27.44	-16.20	-2052.72	-3446.12	-4.61
1.2 Dead+1.0 Wind 90 deg - No Ice	61.33	31.70	-0.01	1.59	-4033.14	-1.38
0.9 Dead+1.0 Wind 90 deg - No Ice	46.00	31.70	-0.01	1.53	-3983.18	-1.36
1.2 Dead+1.0 Wind 120 deg - No Ice	61.33	27.35	16.19	2082.43	-3475.73	2.08
0.9 Dead+1.0 Wind 120 deg - No Ice	46.00	27.35	16.19	2056.14	-3432.81	2.10
1.2 Dead+1.0 Wind 150 deg - No Ice	61.33	15.78	27.89	3574.03	-2005.32	4.45
0.9 Dead+1.0 Wind 150 deg - No Ice	46.00	15.78	27.89	3529.01	-1980.82	4.46
1.2 Dead+1.0 Wind 180 deg - No Ice	61.33	-0.04	32.21	4126.53	6.99	5.98
0.9 Dead+1.0 Wind 180 deg - No Ice	46.00	-0.04	32.21	4074.58	6.26	5.98
1.2 Dead+1.0 Wind 210 deg - No Ice	61.33	-15.81	28.00	3592.41	2009.89	5.92
0.9 Dead+1.0 Wind 210 deg - No Ice	46.00	-15.81	28.00	3547.14	1984.07	5.91
1.2 Dead+1.0 Wind 240 deg - No Ice	61.33	-27.42	16.27	2091.42	3490.07	4.45
0.9 Dead+1.0 Wind 240 deg - No Ice	46.00	-27.42	16.27	2065.02	3445.65	4.43
1.2 Dead+1.0 Wind 270 deg - No Ice	61.33	-31.70	-0.07	-15.37	4039.36	1.27
0.9 Dead+1.0 Wind 270 deg - No Ice	46.00	-31.70	-0.07	-15.14	3988.01	1.25
1.2 Dead+1.0 Wind 300 deg - No Ice	61.33	-27.39	-16.18	-2080.23	3487.75	-2.31
0.9 Dead+1.0 Wind 300 deg - No Ice	46.00	-27.39	-16.18	-2053.99	3443.34	-2.33
1.2 Dead+1.0 Wind 330 deg - No Ice	61.33	-15.79	-27.88	-3573.24	2011.67	-5.03
0.9 Dead+1.0 Wind 330 deg - No Ice	46.00	-15.79	-27.88	-3528.26	1985.79	-5.04
1.2 Dead+1.0 Ice+1.0 Temp	96.57	-0.00	0.00	3.88	8.27	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	96.57	-0.00	-8.88	-1153.71	10.06	-1.61
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	96.57	4.38	-7.70	-1001.15	-558.52	-1.45
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	96.57	7.62	-4.45	-576.40	-981.04	-0.89
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	96.57	8.81	0.01	6.34	-1136.08	-0.08
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	96.57	7.61	4.47	588.60	-980.20	0.71
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	96.57	4.40	7.69	1007.50	-563.47	1.21
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	96.57	0.00	8.88	1161.47	7.37	1.45
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	96.57	-4.39	7.71	1009.39	576.74	1.31
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	96.57	-7.62	4.46	586.96	997.08	0.86
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	96.57	-8.81	-0.02	-1.43	1153.27	0.07
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	96.57	-7.62	-4.46	-580.25	998.63	-0.75
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	96.57	-4.40	-7.69	-999.45	580.69	-1.32
Dead+Wind 0 deg - Service	51.11	0.01	-7.59	-964.57	1.63	-1.61

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 30 deg - Service	51.11	3.71	-6.59	-839.20	-465.66	-1.56
Dead+Wind 60 deg - Service	51.11	6.46	-3.82	-485.83	-813.98	-1.10
Dead+Wind 90 deg - Service	51.11	7.46	-0.00	0.42	-941.09	-0.32
Dead+Wind 120 deg - Service	51.11	6.44	3.81	486.76	-810.82	0.50
Dead+Wind 150 deg - Service	51.11	3.72	6.57	835.41	-467.15	1.06
Dead+Wind 180 deg - Service	51.11	-0.01	7.58	964.56	3.20	1.42
Dead+Wind 210 deg - Service	51.11	-3.72	6.59	839.71	471.35	1.40
Dead+Wind 240 deg - Service	51.11	-6.46	3.83	488.86	817.29	1.05
Dead+Wind 270 deg - Service	51.11	-7.46	-0.02	-3.53	945.65	0.30
Dead+Wind 300 deg - Service	51.11	-6.45	-3.81	-486.13	816.74	-0.55
Dead+Wind 330 deg - Service	51.11	-3.72	-6.57	-835.11	471.76	-1.20

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	-51.11	0.00	0.00	51.11	0.00	0.000%
2	0.03	-61.33	-32.21	-0.03	61.33	32.21	0.000%
3	0.03	-46.00	-32.21	-0.03	46.00	32.21	0.000%
4	15.78	-61.33	-28.00	-15.78	61.33	28.00	0.000%
5	15.78	-46.00	-28.00	-15.78	46.00	28.00	0.000%
6	27.44	-61.33	-16.20	-27.44	61.33	16.20	0.000%
7	27.44	-46.00	-16.20	-27.44	46.00	16.20	0.000%
8	31.70	-61.33	-0.01	-31.70	61.33	0.01	0.000%
9	31.70	-46.00	-0.01	-31.70	46.00	0.01	0.000%
10	27.35	-61.33	16.19	-27.35	61.33	-16.19	0.000%
11	27.35	-46.00	16.19	-27.35	46.00	-16.19	0.000%
12	15.78	-61.33	27.89	-15.78	61.33	-27.89	0.000%
13	15.78	-46.00	27.89	-15.78	46.00	-27.89	0.000%
14	-0.04	-61.33	32.21	0.04	61.33	-32.21	0.000%
15	-0.04	-46.00	32.21	0.04	46.00	-32.21	0.000%
16	-15.81	-61.33	28.00	15.81	61.33	-28.00	0.000%
17	-15.81	-46.00	28.00	15.81	46.00	-28.00	0.000%
18	-27.42	-61.33	16.27	27.42	61.33	-16.27	0.000%
19	-27.42	-46.00	16.27	27.42	46.00	-16.27	0.000%
20	-31.70	-61.33	-0.07	31.70	61.33	0.07	0.000%
21	-31.70	-46.00	-0.07	31.70	46.00	0.07	0.000%
22	-27.39	-61.33	-16.18	27.39	61.33	16.18	0.000%
23	-27.39	-46.00	-16.18	27.39	46.00	16.18	0.000%
24	-15.79	-61.33	-27.88	15.79	61.33	27.88	0.000%
25	-15.79	-46.00	-27.88	15.79	46.00	27.88	0.000%
26	0.00	-96.57	0.00	0.00	96.57	-0.00	0.000%
27	-0.00	-96.57	-8.88	0.00	96.57	8.88	0.000%
28	4.38	-96.57	-7.70	-4.38	96.57	7.70	0.000%
29	7.62	-96.57	-4.45	-7.62	96.57	4.45	0.000%
30	8.81	-96.57	0.01	-8.81	96.57	-0.01	0.000%
31	7.61	-96.57	4.47	-7.61	96.57	-4.47	0.000%
32	4.40	-96.57	7.69	-4.40	96.57	-7.69	0.000%
33	0.00	-96.57	8.88	-0.00	96.57	-8.88	0.000%
34	-4.39	-96.57	7.71	4.39	96.57	-7.71	0.000%
35	-7.62	-96.57	4.46	7.62	96.57	-4.46	0.000%
36	-8.81	-96.57	-0.02	8.81	96.57	0.02	0.000%
37	-7.62	-96.57	-4.46	7.62	96.57	4.46	0.000%
38	-4.40	-96.57	-7.69	4.40	96.57	7.69	0.000%
39	0.01	-51.11	-7.59	-0.01	51.11	7.59	0.000%
40	3.71	-51.11	-6.59	-3.71	51.11	6.59	0.000%
41	6.46	-51.11	-3.82	-6.46	51.11	3.82	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
42	7.46	-51.11	-0.00	-7.46	51.11	0.00	0.000%
43	6.44	-51.11	3.81	-6.44	51.11	-3.81	0.000%
44	3.72	-51.11	6.57	-3.72	51.11	-6.57	0.000%
45	-0.01	-51.11	7.58	0.01	51.11	-7.58	0.000%
46	-3.72	-51.11	6.59	3.72	51.11	-6.59	0.000%
47	-6.46	-51.11	3.83	6.46	51.11	-3.83	0.000%
48	-7.46	-51.11	-0.02	7.46	51.11	0.02	0.000%
49	-6.45	-51.11	-3.81	6.45	51.11	3.81	0.000%
50	-3.72	-51.11	-6.57	3.72	51.11	6.57	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	0.00045598
3	Yes	5	0.00000001	0.00022352
4	Yes	6	0.00000001	0.00012190
5	Yes	5	0.00000001	0.00099588
6	Yes	6	0.00000001	0.00014264
7	Yes	6	0.00000001	0.00004907
8	Yes	5	0.00000001	0.00008337
9	Yes	4	0.00000001	0.00092033
10	Yes	6	0.00000001	0.00013837
11	Yes	6	0.00000001	0.00004752
12	Yes	6	0.00000001	0.00012453
13	Yes	6	0.00000001	0.00004227
14	Yes	5	0.00000001	0.00040645
15	Yes	5	0.00000001	0.00019900
16	Yes	6	0.00000001	0.00014840
17	Yes	6	0.00000001	0.00005106
18	Yes	6	0.00000001	0.00012795
19	Yes	6	0.00000001	0.00004346
20	Yes	5	0.00000001	0.00009978
21	Yes	5	0.00000001	0.00004706
22	Yes	6	0.00000001	0.00012954
23	Yes	6	0.00000001	0.00004405
24	Yes	6	0.00000001	0.00014683
25	Yes	6	0.00000001	0.00005053
26	Yes	4	0.00000001	0.00012578
27	Yes	5	0.00000001	0.00087936
28	Yes	6	0.00000001	0.00011943
29	Yes	6	0.00000001	0.00012114
30	Yes	5	0.00000001	0.00084431
31	Yes	6	0.00000001	0.00012227
32	Yes	6	0.00000001	0.00012049
33	Yes	5	0.00000001	0.00087980
34	Yes	6	0.00000001	0.00012672
35	Yes	6	0.00000001	0.00012373
36	Yes	5	0.00000001	0.00086940
37	Yes	6	0.00000001	0.00012364
38	Yes	6	0.00000001	0.00012687
39	Yes	4	0.00000001	0.00047875
40	Yes	4	0.00000001	0.00058006
41	Yes	4	0.00000001	0.00079108
42	Yes	4	0.00000001	0.00014903
43	Yes	4	0.00000001	0.00072257
44	Yes	4	0.00000001	0.00057319
45	Yes	4	0.00000001	0.00042446
46	Yes	4	0.00000001	0.00088943
47	Yes	4	0.00000001	0.00059796
48	Yes	4	0.00000001	0.00015088
49	Yes	4	0.00000001	0.00060980
50	Yes	4	0.00000001	0.00087293

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	175 - 164.25	24.229	39	1.1716	0.0105
L2	167.17 - 129.67	22.310	39	1.1680	0.0093
L3	133.5 - 96	14.441	39	1.0250	0.0048
L4	100.67 - 63.17	8.168	39	0.7794	0.0026
L5	68.67 - 31.17	3.767	39	0.5173	0.0014
L6	37.42 - 0	1.129	39	0.2724	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
175.00	VHLP2.6	39	24.229	1.1716	0.0123	67333
172.00	Platform Mount [LP 701-1]	39	23.493	1.1710	0.0117	67333
168.00	Side Arm Mount [SO 701-1]	39	22.513	1.1688	0.0109	48251
162.00	Platform Mount [LP 712-1]	39	21.050	1.1593	0.0097	26491
152.00	Heavy 12' UPNY Boom [SM 801-3]	39	18.650	1.1265	0.0080	15211
142.00	Platform Mount [LP 303-1]	39	16.327	1.0769	0.0065	10581
115.00	APXV18-206517S-C w/ Mount Pipe	39	10.696	0.8929	0.0038	7515
50.00	Side Arm Mount [SO 701-1]	39	1.978	0.3688	0.0010	6525

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	175 - 164.25	103.691	2	5.0180	0.0444
L2	167.17 - 129.67	95.480	2	5.0022	0.0393
L3	133.5 - 96	61.827	2	4.3896	0.0206
L4	100.67 - 63.17	34.977	2	3.3390	0.0109
L5	68.67 - 31.17	16.131	2	2.2159	0.0057
L6	37.42 - 0	4.832	2	1.1664	0.0025

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
175.00	VHLP2.6	2	103.691	5.0180	0.0519	16962
172.00	Platform Mount [LP 701-1]	2	100.541	5.0154	0.0492	16962
168.00	Side Arm Mount [SO 701-1]	2	96.348	5.0057	0.0457	12097
162.00	Platform Mount [LP 712-1]	2	90.090	4.9645	0.0408	6455
152.00	Heavy 12' UPNY Boom [SM 801-3]	2	79.825	4.8241	0.0335	3621
142.00	Platform Mount [LP 303-1]	2	69.894	4.6117	0.0274	2507
115.00	APXV18-206517S-C w/ Mount Pipe	2	45.801	3.8245	0.0161	1773
50.00	Side Arm Mount [SO 701-1]	2	8.469	1.5795	0.0041	1525

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	175 - 164.25 (1)	TP26x22x0.25	10.75	0.00	0.0	19.570 5	-4.16	1144.87	0.004
L2	164.25 - 129.67 (2)	TP34.0625x24.4135x0.31 25	37.50	0.00	0.0	32.498 3	-17.96	1901.15	0.009
L3	129.67 - 96 (3)	TP41.75x32.452x0.375	37.50	0.00	0.0	47.868 4	-26.09	2800.30	0.009
L4	96 - 63.17 (4)	TP49.0625x39.8421x0.37 5	37.50	0.00	0.0	56.340 7	-35.70	3295.93	0.011
L5	63.17 - 31.17 (5)	TP56.125x46.9602x0.375	37.50	0.00	0.0	64.538 4	-46.70	3775.49	0.012
L6	31.17 - 0 (6)	TP62.9375x53.8475x0.37 5	37.42	0.00	0.0	74.465 0	-61.31	4356.20	0.014

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	175 - 164.25 (1)	TP26x22x0.25	29.97	729.12	0.041	0.00	729.12	0.000
L2	164.25 - 129.67 (2)	TP34.0625x24.4135x0.31 25	495.01	1584.18	0.312	0.00	1584.18	0.000
L3	129.67 - 96 (3)	TP41.75x32.452x0.375	1244.18	2847.12	0.437	0.00	2847.12	0.000
L4	96 - 63.17 (4)	TP49.0625x39.8421x0.37 5	2073.39	3755.71	0.552	0.00	3755.71	0.000
L5	63.17 - 31.17 (5)	TP56.125x46.9602x0.375	2965.97	4686.62	0.633	0.00	4686.62	0.000
L6	31.17 - 0 (6)	TP62.9375x53.8475x0.37 5	4127.06	5847.24	0.706	0.00	5847.24	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	175 - 164.25 (1)	TP26x22x0.25	5.97	337.67	0.018	3.44	741.85	0.005
L2	164.25 - 129.67 (2)	TP34.0625x24.4135x0.31 25	21.19	562.69	0.038	6.71	1636.53	0.004
L3	129.67 - 96 (3)	TP41.75x32.452x0.375	24.51	831.75	0.029	6.69	2958.81	0.002
L4	96 - 63.17 (4)	TP49.0625x39.8421x0.37 5	27.27	980.98	0.028	6.68	4098.86	0.002
L5	63.17 - 31.17 (5)	TP56.125x46.9602x0.375	29.76	1125.35	0.026	6.78	5378.43	0.001
L6	31.17 - 0 (6)	TP62.9375x53.8475x0.37 5	32.24	1298.54	0.025	6.78	7160.17	0.001

Pole Interaction Design Data

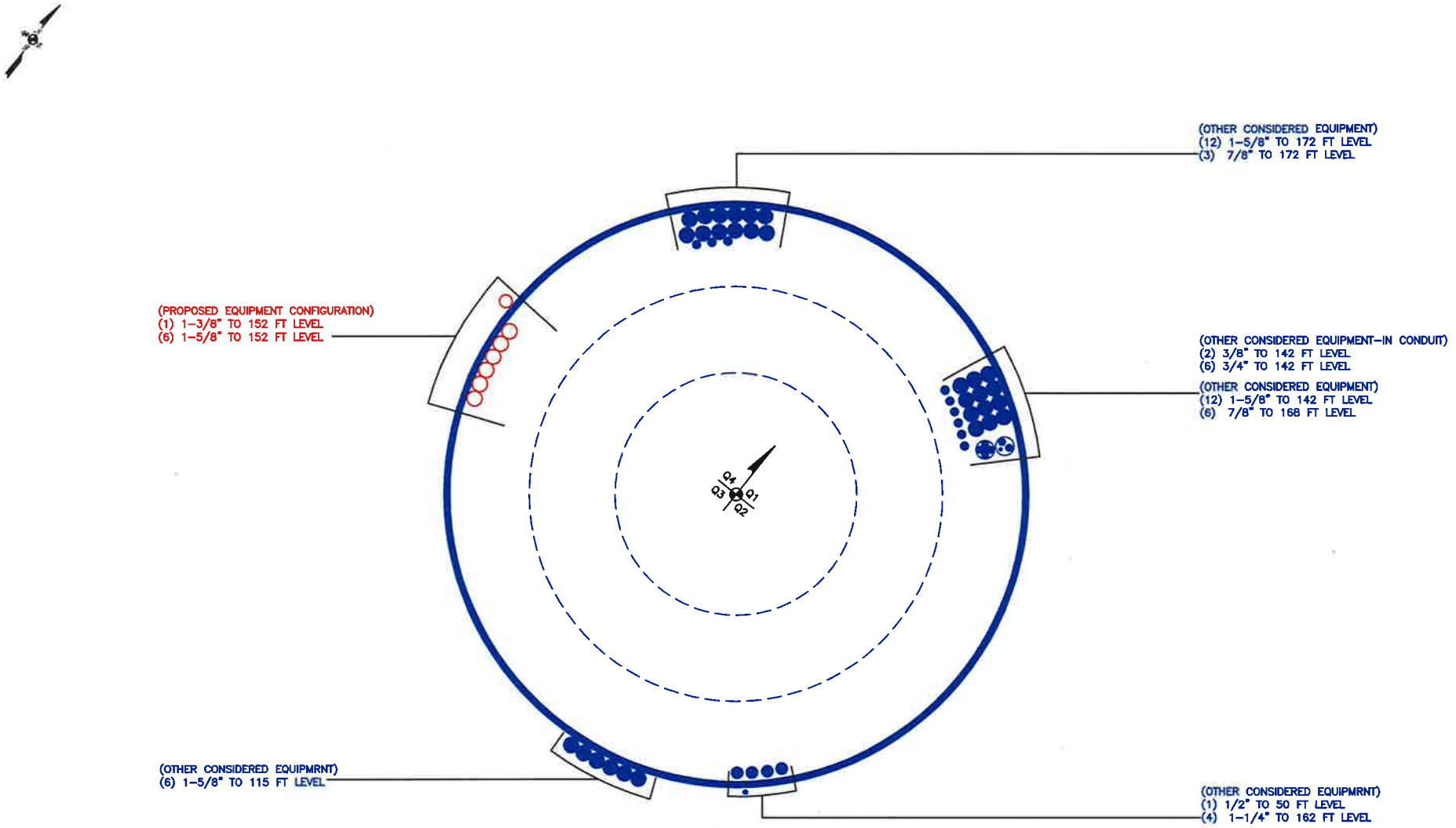
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	175 - 164.25 (1)	0.004	0.041	0.000	0.018	0.005	0.045	1.050	4.8.2
L2	164.25 - 129.67 (2)	0.009	0.312	0.000	0.038	0.004	0.324	1.050	4.8.2
L3	129.67 - 96 (3)	0.009	0.437	0.000	0.029	0.002	0.447	1.050	4.8.2
L4	96 - 63.17 (4)	0.011	0.552	0.000	0.028	0.002	0.564	1.050	4.8.2
L5	63.17 - 31.17 (5)	0.012	0.633	0.000	0.026	0.001	0.646	1.050	4.8.2
L6	31.17 - 0 (6)	0.014	0.706	0.000	0.025	0.001	0.721	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	175 - 164.25	Pole	TP26x22x0.25	1	-4.16	1202.11	4.3	Pass
L2	164.25 - 129.67	Pole	TP34.0625x24.4135x0.3125	2	-17.96	1996.21	30.8	Pass
L3	129.67 - 96	Pole	TP41.75x32.452x0.375	3	-26.09	2940.31	42.6	Pass
L4	96 - 63.17	Pole	TP49.0625x39.8421x0.375	4	-35.70	3460.73	53.7	Pass
L5	63.17 - 31.17	Pole	TP56.125x46.9602x0.375	5	-46.70	3964.26	61.5	Pass
L6	31.17 - 0	Pole	TP62.9375x53.8475x0.375	6	-61.31	4574.01	68.6	Pass
							Summary	
						Pole (L6)	68.6	Pass
						RATING =	**68.6**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 823530 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

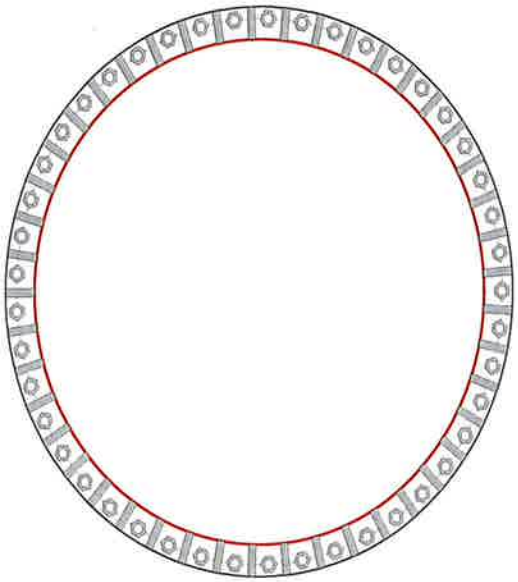
Monopole Base Plate Connection

Site Info	
BU #	823530
Site Name	364/Chapel St. Monop
Order #	460116 Rev.0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1.25

Applied Loads	
Moment (kip-ft)	4127.06
Axial Force (kips)	61.31
Shear Force (kips)	32.24

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(45) 1-1/4" ø bolts (Other N; Fy=105 ksi, Fu=125 ksi) on 68" BC

Base Plate Data

71" OD x 1.5" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

(45) 12"H x 4"W x 1"T, Notch: 0.5"
plate: Fy= 50 ksi ; weld: Fy= 70 ksi
horiz. weld: 0.5" fillet
vert. weld: 0.25" fillet

Pole Data

62.9375" x 0.375" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary		*(units of kips, kip-in)*
Pu_c = 66.09	ϕPn_c = 101.75	**Stress Rating**
Vu = 0.72	ϕVn = 30.52	**61.9%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary	
Max Stress (ksi):	-
Allowable Stress (ksi):	-
Stress Rating:	**Pirod OK**

Stiffener Summary	
Horizontal Weld:	**Pirod OK**
Vertical Weld:	**Pirod OK**
Plate Flexure+Shear:	**Pirod OK**
Plate Tension+Shear:	**Pirod OK**
Plate Compression:	**Pirod OK**

Pole Summary	
Punching Shear:	**Pirod OK**

Pier and Pad Foundation

BU # :	823530
Site Name:	CT364/Chapel St. I
App. Number:	460116 Rev.0

TIA-222 Revision:	H
Tower Type:	Monopole

Top & Bot. Pad Rein. Different?:	☐
Block Foundation?:	☐

Superstructure Analysis Reactions

Compression, P_{comp}:	61	kips
Base Shear, Vu_comp:	32	kips
Moment, M_u:	4127	ft-kips
Tower Height, H:	175	ft
BP Dist. Above Fdn, bp_{dist}:	2.5	in

Pier Properties

Pier Shape:	Circular	
Pier Diameter, dpier:	7.5	ft
Ext. Above Grade, E:	0.5	ft
Pier Rebar Size, Sc:	9	
Pier Rebar Quantity, mc:	36	
Pier Tie/Spiral Size, St:	4	
Pier Tie/Spiral Quantity, mt:	10	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, D:	8	ft
Pad Width, W:	22.5	ft
Pad Thickness, T:	2.75	ft
Pad Rebar Size (Bottom), Sp:	9	
Pad Rebar Quantity (Bottom), mp:	23	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

Rebar Grade, Fy:	60000	psi
Concrete Compressive Strength, F'c:	3000	psi
Dry Concrete Density, δc:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	125	pcf
Ultimate Gross Bearing, Qult:	30.970	ksf
Cohesion, Cu:	0.000	ksf
Friction Angle, φ:	40	degrees
SPT Blow Count, N_{blows}:	30	
Base Friction, μ:	0.45	
Neglected Depth, N:	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw:	12	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	385.93	32.00	**7.9%**	**Pass**
Bearing Pressure (ksf)	23.23	3.37	**14.5%**	**Pass**
*Overturning (kip*ft)*	7092.86	4405.67	**62.1%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	6225.42	4311.00	**66.0%**	**Pass**
Pier Compression (kip)	21089.12	106.72	**0.5%**	**Pass**
*Pad Flexure (kip*ft)*	2826.15	1781.03	**60.0%**	**Pass**
Pad Shear - 1-way (kips)	627.95	321.04	**48.7%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.164	0.000	**0.0%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	3889.71	2586.60	**63.3%**	**Pass**

**Rating per TIA-222-H Section 15.5*

Soil Rating*:	**62.1%**
Structural Rating*:	**66.0%**

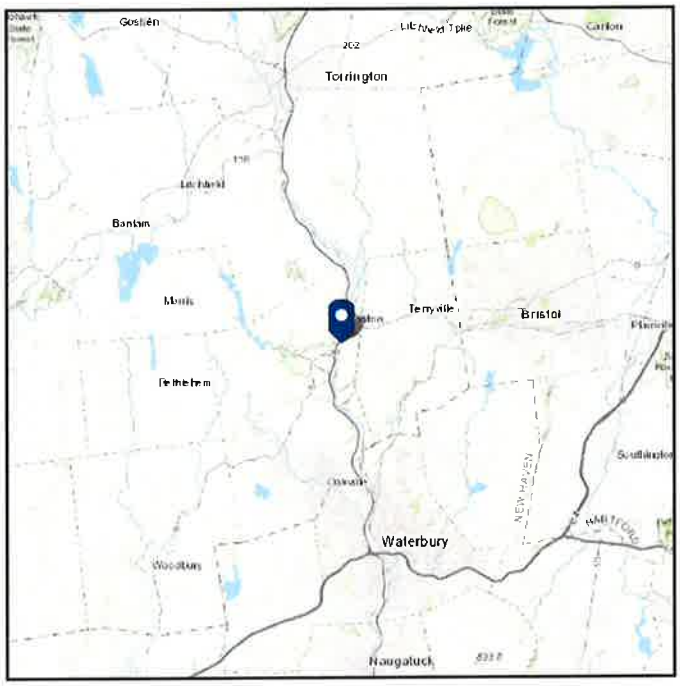
Version 3.1.0

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 543 ft (NAVD 88)
Latitude: 41.663467
Longitude: -73.074281



Wind

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

Date Accessed: Tue Jul 03 2018

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

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AMERICAN SOCIETY OF CIVIL ENGINEERS

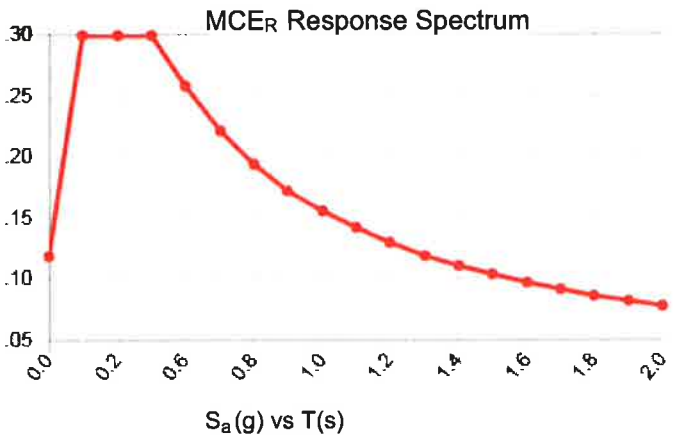
Seismic

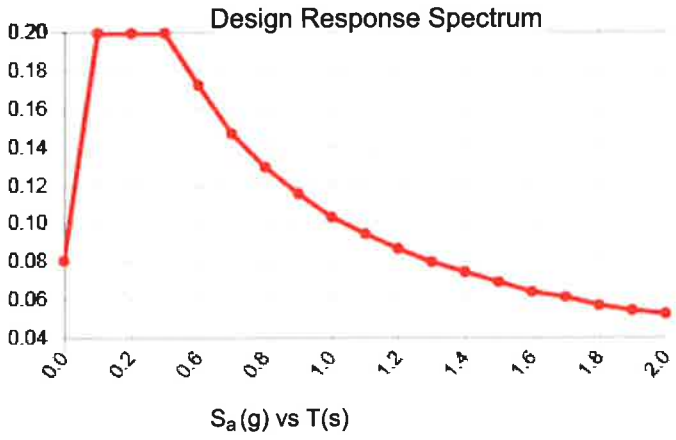
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.186	S_{DS} :	0.199
S_1 :	0.064	S_{D1} :	0.103
F_a :	1.600	T_L :	6.000
F_v :	2.400	PGA :	0.096
S_{MS} :	0.298	PGA_M :	0.153
S_{M1} :	0.155	F_{PGA} :	1.600
		I_e :	1

Seismic Design Category B





Data Accessed: Tue Jul 03 2018

Date Source: USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

ASCE
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Ice

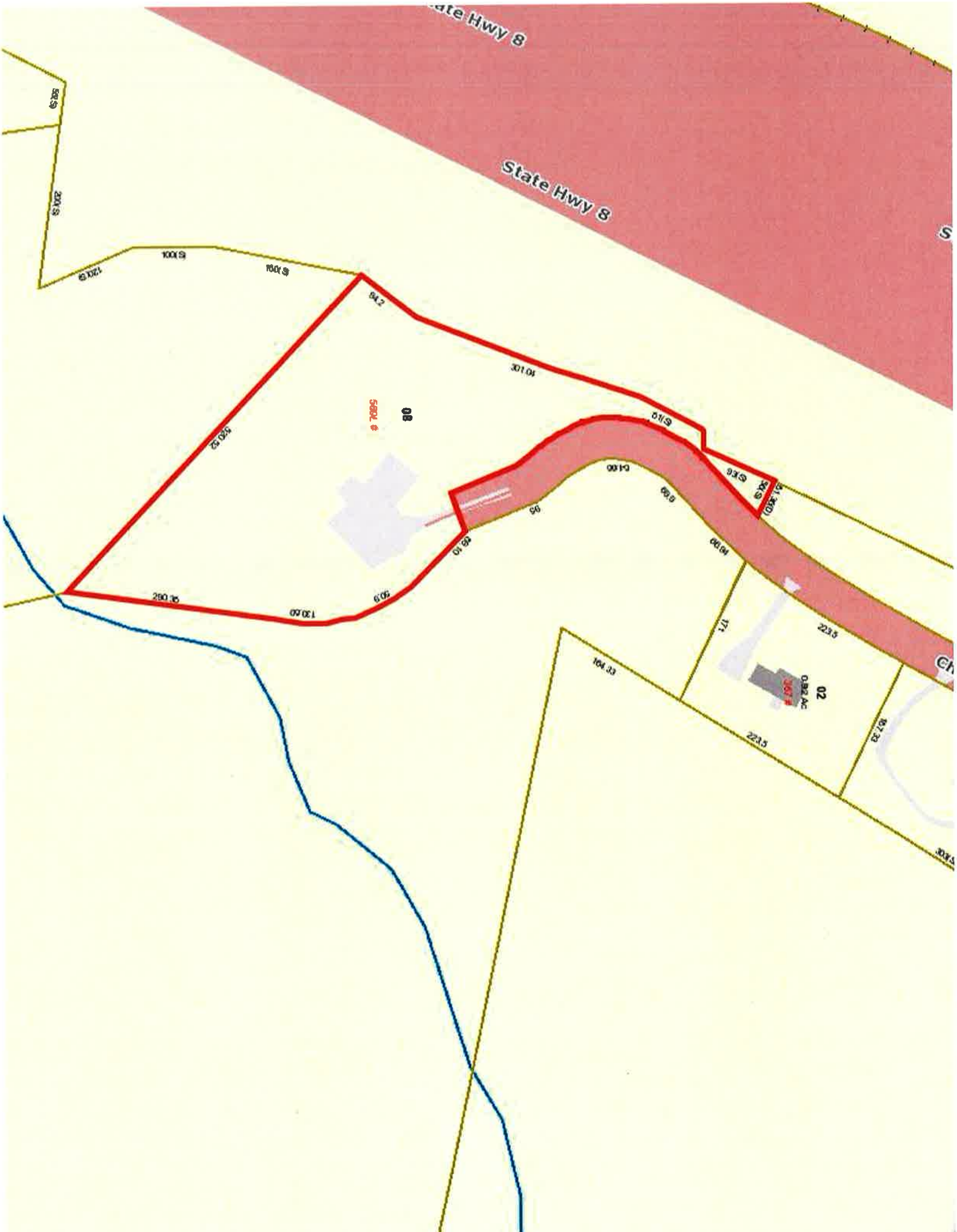
Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Tue Jul 03 2018

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

ATTACHMENT 4


State Hwy 8
State Hwy 8
94.2
301.04
223.5
171
164.33
223.5
02
0.82 AC
167.33
95
130.60
290.35

Thomaston, CT : Commercial Property Record Card

[Back to Search Results]

[Start a New Search][Help with Printing]

Search For Properties

Account **Name** **Street Name**

CHAPEL ST Search Reset

Account	Card	Map-Block-Lot	Location	Zoning	State Class	Acres
T0304400	1	55-03-08	580 CHAPEL ST	RA80	903 - City/Town Property	6.540

Living Units
0

Owner Information

Thomaston Town Of
158 Main St
Thomaston CT 06787

Property Picture

Deed Information

Book/Page: 56/664
Deed Date: 1966/05/04

Building Information

Building No: 0
Year Built: 0
No of Units: 0
Structure Type:
Grade:
Identical Units: 0

Valuation

Land:	$218,700
Building:	$0
Total:	$218,700
Net Assessment:	$153,090

Sales History

Book/Page	Date	Price	Type	Validity

Out Building Information

Structure Code	Width	Lgth/SqFt	Year	RCNLD

Exterior/Interior Information

Levels	Size	Use Type	Ext. Walls	Const. Type	Partitions	Heating	A/C	Plumbing	Condition	Func. Utility	Unadj. RCNLD

Building Sketch

	Descriptor/Area

Notice

Tax Year 2017 Values

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bigRoom STUDIOS

ATTACHMENT 5

UNITED STATES POSTAL SERVICE®

Certificate of Mailing — Firm

Name and Address of Sender	TOTAL NO. of Pieces Listed by Sender	TOTAL NO. of Pieces Received at Post Office™	Affix Stamp Here *Postmark with Date of Receipt.*
Kenneth C. Baldwin, Esq. Robinson & Cole LLP 280 Trumbull Street Hartford, CT 06103	2		neopost 02/20/2019 US POSTAGE $002.79⁰ ZIP 06103 041L12203937
	Postmaster, per *(name of receiving employee)*		OLD STATE HOUSE STATION 06103 FEB 20 2019 USPS

USPS® Tracking Number / Firm-specific Identifier	Address (Name, Street, City, State, and ZIP Code™)	Postage	Fee	Special Handling	Parcel Airlift
1.	Edmond V. Mone, First Selectman Town of Thomaston 158 Main Street Thomaston, CT 06787				
2.	Jeremy Leifert, Land Use Administrator/Zoning Enforcement Officer Town of Thomaston 158 Main Street Thomaston, CT 06787				
3.					
4.					
5.					
6.					