STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

VIA ELECTRONIC MAIL

October 15, 2018

Kenneth Baldwin, Esq.
Robinson & Cole, LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-085-180823** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 474 Main Street, Monroe, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) is in receipt of your correspondence of October 15, 2018 submitted in response to the Council's August 24, 2018 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/FC/IN

Robidoux, Evan

From: Mayo, Rachel <rmayo@RC.com>
Sent: Monday, October 15, 2018 10:01 AM
To: Bachman, Melanie; CSC-DL Siting Council
Cc: Robidoux, Evan; Baldwin, Kenneth; Mayo, Rachel
Subject: RE: Council Incomplete Letter for EM-VER-085-180823-MainSt-Monroe
Attachments: 876355- CN5-394R1_Report.pdf

Good Morning,
In response to the Council's letter of August 24, 2018 we submit the attached updated Structural Report, which includes the previously approved T-Mobile modifications.
Please let me know if you need additional information.

Rachel A. Mayo
Land Use Analyst

Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103
Direct 860.275.8213 | Fax 860.275.8299
rmayo@rc.com | www.rc.com
Bio | Contact Card

Robinson+Cole
Boston | Hartford | New York | Providence | Stamford
Albany | Los Angeles | Miami | New London

From: Robidoux, Evan [mailto:Evan.Robidoux@ct.gov]
Sent: Wednesday, August 29, 2018 1:58 PM
To: Baldwin, Kenneth
Cc: CSC-DL Siting Council; Mayo, Rachel
Subject: Council Incomplete Letter for EM-VER-085-180823-MainSt-Monroe
Please see the attached correspondence.
Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Date: **October 12, 2018**

MORRISON HERSHFIELD

Ms. Denice Nicholson
Crown Castle
3 Corporate Park Drive
Clifton Park, NY 12065

Morrison Hershfield
1455 Lincoln parkway, Suite 500
Atlanta, GA 30346
(770) 379-8500

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	PSLC 469337
	Carrier Site Name:	Monroe West CT
Crown Castle Designation:	**Crown Castle BU Number:**	876355
	Crown Castle Site Name:	Upper Stepney - TLC
	Crown Castle JDE Job Number:	527804
	Crown Castle Work Order Number:	1627975
	Crown Castle Order Number:	457144 Rev. 0
Engineering Firm Designation:	**Morrison Hershfield Project Number:**	CN5-394R1 / 1800030
Site Data:	**474-480 Main St., Monroe, Fairfield County, CT 06468** **Latitude *41° 19' 31.99"*, Longitude *-73° 15' 57.05"*** **191.5 Foot - Monopole Tower**	

Dear Ms. Nicholson,

Morrison Hershfield 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 2016 CSBC. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:

G. Lance Cooke, P.E. (CT License PEN.0028133)
Senior Engineer

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 191.5 ft monopole tower designed by Engineered Endeavors, 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)
160.0	160.0	4	Antel	LPA-80063/6CF w/ pipe mount	13	1-5/8
		2	Antel	LPA-80080/4CF w/ pipe mount		
		6	Commscope	JAHH-65B-R3B-V3		
		3	Lucent	RRH2X60-700		
		3	Lucent	RRH4X45-AWS4 B66		
		1	RFS	DB-B1-6C-8AB-0Z		
		3	-	Side-By-Side Mounting Kit [# BSAMNT-SBS-2-2]		
		1	-	Platform Mount [LP 303-1]		

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)
192.0	194.0	6	EMS	RV65-18-02DPL2 w/ pipe mount	24	1-5/8
		3	RFS	APX16DWV-16DWV-S-E-A20 w/ pipe mount		
		3	Commscope	ATSBT-TOP-MF-4G		
	192.0	3	RFS	APXVAA24_43-U-A20 w/ pipe mount		
		3	Ericsson	KRY 112 144/2		
		3	Ericsson	KRY 112 489/2		
		1	Commscope	Handrail Kit [# MT-195-14]		
		1	Commscope	Platform Mount [# MT-196-14]		
154.0	154.0	3	Lucent	PCS 1900 MHz 4x45W-65 MHz		
		1	-	Side Arm Mount [SO 102-3]		
	152.0	3	Lucent	800 MHz 2x50W RRH		
		3	Lucent	800 External Notch Filter		
150.0	154.0	3	Lucent	TD-RRH8X20-25	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)
	152.0	3	RFS	APXVSPP18-C-A20 w/ pipe mount		
		1	RFS	APXVTM14-C-120 w/ pipe mount		
	150.0	9	RFS	ACU-A20-N		
		1	-	Platform Mount [LP 601-1]		
137.0	140.0	3	Powerwave	7770.00 w/ pipe mount	6 2 1 1	1-1/4 5/8 3/8 1-1/2C
		3	Powerwave	P65-16-XLH-RR w/ pipe mount		
		3	Ericsson	RRUS-11		
		1	Raycap	DC6-48-60-18-8F		
	139.0	6	Powerwave	LGP21401		
	137.0	1	-	Platform Mount [LP 303-1]		
50.0	52.0	1	Kathrein	OG-860/1920/GPS-A	1	1/2
	50.0	1	-	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Clarence Welti Associates, Inc.	1531885	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Engineered Endeavors, Inc.	1631625	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Engineered Endeavors, Inc.	1631582	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Morrison Hershfield	7717495	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.4.0), 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 and maintained in accordance with the manufacturer's specifications.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Morrison Hershfield 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	191.5 - 172.46	Pole	TP20.46x15.5x0.1875	1	-3.57	883.99	27.0	Pass
L2	172.46 - 127.753	Pole	TP31.6x19.2818x0.3125	2	-17.20	2323.28	44.6	Pass
L3	127.753 - 83.0833	Pole	TP42.49x29.8151x0.4375	3	-28.87	4392.51	43.2	Pass
L4	83.0833 - 40.4566	Pole	TP52.59x40.1113x0.5	4	-44.84	6137.65	41.5	Pass
L5	40.4566 - 0	Pole	TP62x49.766x0.5	5	-66.86	7080.39	44.7	Pass
							Summary	
						Pole (L5)	44.7	Pass
						Rating =	44.7	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	44.2	Pass
1	Base Plate	0	53.0	Pass
1	Base Foundation	0	73.8	Pass
1	Base Foundation Soil Interaction	0	49.3	Pass

Structure Rating (max from all components) =	73.8%*

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) *Rating per TIA-222-H Section 15.5.

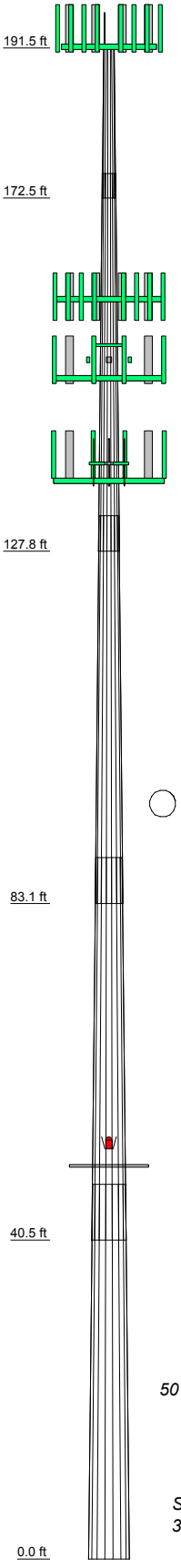
4.1) Recommendations

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	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	19.04	18	0.1875	3.08	15.5000	20.4600		0.7
2	47.79	18	0.3125	4.50	19.2818	31.6000		4.1
3	49.17	18	0.4375	5.83	29.8151	42.4900	A572-65	8.3
4	48.46	18	0.5000	7.08	40.1113	52.5900		12.0
5	47.54	18	0.5000		49.7660	62.0000		14.2
								39.3



ALL REACTIONS ARE FACTORED

AXIAL 98 K

SHEAR 8 K — *MOMENT 1105 kip-ft*

TORQUE 0 kip-ft
50 mph WIND - 1.2750 in ICE

AXIAL 67 K

SHEAR 30 K — *MOMENT 3914 kip-ft*

TORQUE 1 kip-ft
REACTIONS - 120 mph WIND

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Fairfield 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 1.27 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: 44.7%

Morrison Hershfield
Consulting Engineers
1455 Lincoln parkway, Suite 500
Atlanta, GA 30346
Phone: (770) 379-8500
FAX: (770) 379-8501

Job: ***CN5-394R1 / 1800030***			
Project: ***876355 / Upper Stepney - TLC***			
Client: Crown Castle USA	Drawn by: MG	App'd:	
Code: TIA-222-H	Date: 10/12/18	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:

Tower is located in Fairfield County, Connecticut.
Tower base elevation above sea level: 446.00 ft.
Basic wind speed of 120 mph.
Risk Category II.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.2750 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
TIA-222-H Annex S.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
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	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	191.50-172.46	19.04	3.08	18	15.5000	20.4600	0.1875	0.7500	A572-65 (65 ksi)
L2	172.46-127.75	47.79	4.50	18	19.2818	31.6000	0.3125	1.2500	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	127.75-83.08	49.17	5.83	18	29.8151	42.4900	0.4375	1.7500	A572-65 (65 ksi)
L4	83.08-40.46	48.46	7.08	18	40.1113	52.5900	0.5000	2.0000	A572-65 (65 ksi)
L5	40.46-0.00	47.54		18	49.7660	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	15.7102	9.1129	269.9504	5.4359	7.8740	34.2838	540.2560	4.5573	2.3980	12.789
	20.7467	12.0647	626.4228	7.1967	10.3937	60.2696	1253.6699	6.0335	3.2710	17.445
L2	20.3380	18.8152	855.3570	6.7341	9.7951	87.3246	1711.8395	9.4094	2.8436	9.1
	32.0393	31.0333	3838.0178	11.1071	16.0528	239.0871	7681.0857	15.5196	5.0116	16.037
L3	31.3854	40.7945	4448.0643	10.4290	15.1461	293.6778	8901.9815	20.4011	4.4775	10.234
	43.0780	58.3952	13046.6163	14.9286	21.5849	604.4320	26110.3996	29.2031	6.7082	15.333
L4	42.1782	62.8631	12461.5461	14.0620	20.3765	611.5633	24939.4894	31.4375	6.1796	12.359
	53.3242	82.6668	28338.5385	18.4919	26.7157	1060.7440	56714.3657	41.3413	8.3758	16.752
L5	52.3075	78.1851	23974.8552	17.4894	25.2811	948.3303	47981.2572	39.1000	7.8788	15.758
	62.8793	97.6005	46637.9792	21.8325	31.4960	1480.7588	93337.3258	48.8095	10.0320	20.064

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 191.50-172.46				1	1	1			
L2 172.46-127.75				1	1	1			
L3 127.75-83.08				1	1	1			
L4 83.08-40.46				1	1	1			
L5 40.46-0.00				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
*******										
Safety Line 3/8"	C	No	Surface Ar (CaAa)	191.50 - 11.00	1	1	0.000 0.000	0.3750		0.22
Climbing Pegs	C	No	Surface Ar (CaAa)	191.50 - 11.00	1	1	-0.050 0.050	0.7050		1.80
HB158-1-08U8-S8J18(1-5/8)	B	No	Surface Ar (CaAa)	160.00 - 10.00	1	1	0.450 0.450	1.9800		1.30
******										

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
*******									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	191.50 - 2.00	24	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
******									
AVA7-50(1-5/8)	B	No	No	Inside Pole	160.00 - 10.00	12	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
******									
HB114-1-0813U4-M5J(1-1/4)	B	No	No	Inside Pole	150.00 - 7.50	3	No Ice	0.00	1.20
							1/2" Ice	0.00	1.20
							1" Ice	0.00	1.20
							2" Ice	0.00	1.20
***									
HB114-21U3M12-XXXF(1-1/4)	B	No	No	Inside Pole	150.00 - 7.50	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
******									
LDF6-50A(1-1/4)	B	No	No	Inside Pole	137.00 - 10.00	6	No Ice	0.00	0.60
							1/2" Ice	0.00	0.60
							1" Ice	0.00	0.60
							2" Ice	0.00	0.60
FB-L98B-002-75000(3/8)	B	No	No	Inside Pole	137.00 - 10.00	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-VG82ST-BRDA(5/8)	C	No	No	Inside Pole	137.00 - 7.50	2	No Ice	0.00	0.31
							1/2" Ice	0.00	0.31
							1" Ice	0.00	0.31
							2" Ice	0.00	0.31
Conduit (1-1/2)	C	No	No	Inside Pole	137.00 - 7.50	1	No Ice	0.00	1.00
							1/2" Ice	0.00	1.00
							1" Ice	0.00	1.00
							2" Ice	0.00	1.00
******									
LDF4-50A(1/2)	B	No	No	Inside Pole	50.00 - 7.50	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
******									

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	191.50-172.46	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	2.056	0.000	0.41
L2	172.46-127.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	6.385	0.000	0.45
		C	0.000	0.000	4.828	0.000	0.99
L3	127.75-83.08	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	8.845	0.000	0.81
		C	0.000	0.000	4.824	0.000	1.04
L4	83.08-40.46	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	8.440	0.000	0.78
		C	0.000	0.000	4.604	0.000	0.99
L5	40.46-0.00	A	0.000	0.000	0.000	0.000	0.00

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
		B	0.000	0.000	6.030	0.000	0.57
		C	0.000	0.000	3.181	0.000	0.87

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	191.50-172.46	A	1.512	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	13.572	0.000	0.56
L2	172.46-127.75	A	1.482	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	16.136	0.000	0.66
		C		0.000	0.000	31.867	0.000	1.32
L3	127.75-83.08	A	1.431	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	22.086	0.000	1.09
		C		0.000	0.000	31.307	0.000	1.37
L4	83.08-40.46	A	1.357	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	20.639	0.000	1.03
		C		0.000	0.000	29.001	0.000	1.29
L5	40.46-0.00	A	1.210	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	14.295	0.000	0.74
		C		0.000	0.000	19.168	0.000	1.05

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	191.50-172.46	0.0000	0.8241	0.0000	2.3267
L2	172.46-127.75	1.0409	1.2374	1.2143	2.8946
L3	127.75-83.08	1.3618	1.3903	1.6765	3.2516
L4	83.08-40.46	1.3825	1.4176	1.7435	3.3798
L5	40.46-0.00	1.0490	1.0568	1.3530	2.5344

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	2	Safety Line 3/8"	172.46 - 191.50	1.0000	1.0000
L1	3	Climbing Pegs	172.46 - 191.50	1.0000	1.0000
L1	8	HB158-1-08U8-S8J18(1-5/8)	172.46 - 160.00	1.0000	1.0000
L2	2	Safety Line 3/8"	127.75 - 172.46	1.0000	1.0000
L2	3	Climbing Pegs	127.75 - 172.46	1.0000	1.0000
L2	8	HB158-1-08U8-S8J18(1-5/8)	127.75 - 160.00	1.0000	1.0000
L3	2	Safety Line 3/8"	83.08 - 127.75	1.0000	1.0000
L3	3	Climbing Pegs	83.08 - 127.75	1.0000	1.0000
L3	8	HB158-1-08U8-S8J18(1-5/8)	83.08 - 127.75	1.0000	1.0000
L4	2	Safety Line 3/8"	40.46 -	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L4	3	Climbing Pegs	83.08 40.46 - 83.08	1.0000	1.0000
L4	8	HB158-1-08U8-S8J18(1-5/8)	40.46 - 83.08	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" x 5'	C	From Leg	0.00 0.00 2.50	0.0000	191.50	No Ice 1/2" Ice 1" Ice 2" Ice	0.31 0.83 1.32 1.96	0.31 0.83 1.32 1.96	0.03 0.03 0.04 0.07
******									
(2) RV65-18-02DPL2 w/ pipe mount	A	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.89 4.50 5.01 6.03	3.65 4.71 5.48 7.05	0.05 0.08 0.13 0.23
(2) RV65-18-02DPL2 w/ pipe mount	B	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.89 4.50 5.01 6.03	3.65 4.71 5.48 7.05	0.05 0.08 0.13 0.23
(2) RV65-18-02DPL2 w/ pipe mount	C	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.89 4.50 5.01 6.03	3.65 4.71 5.48 7.05	0.05 0.08 0.13 0.23
Handrail Kit [# MT-195-14]	C	None		0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.00 8.50 11.00 16.00	6.00 8.50 11.00 16.00	0.32 0.42 0.52 0.73
Platform Mount [# MT-196-14]	C	None		0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	17.46 22.44 27.42 37.38	17.46 22.44 27.42 37.38	1.23 1.49 1.74 2.24
***									
APX16DWV-16DWV-S-E-A20 w/ pipe mount	A	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.82 7.28 7.72 8.63	3.49 4.26 4.96 6.40	0.06 0.11 0.16 0.30
APX16DWV-16DWV-S-E-A20 w/ pipe mount	B	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.82 7.28 7.72 8.63	3.49 4.26 4.96 6.40	0.06 0.11 0.16 0.30
APX16DWV-16DWV-S-E-A20 w/ pipe mount	C	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.82 7.28 7.72 8.63	3.49 4.26 4.96 6.40	0.06 0.11 0.16 0.30
APXVAA24_43-U-A20 w/ pipe mount	A	From Leg	4.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice	20.48 21.23 21.99	10.87 12.39 13.94	0.13 0.27 0.41

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" Ice	23.44	16.29	0.74
						2" Ice			
APXVAA24_43-U-A20 w/ pipe mount	B	From Leg	4.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	10.87 12.39 13.94 16.29	0.13 0.27 0.41 0.74
APXVAA24_43-U-A20 w/ pipe mount	C	From Leg	4.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	10.87 12.39 13.94 16.29	0.13 0.27 0.41 0.74
(2) KRY 112 489/2	A	From Leg	4.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.56 0.66 0.76 1.00	0.37 0.45 0.54 0.75	0.02 0.02 0.03 0.05
KRY 112 489/2	B	From Leg	4.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.56 0.66 0.76 1.00	0.37 0.45 0.54 0.75	0.02 0.02 0.03 0.05
KRY 112 144/2	B	From Leg	4.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.48 0.57 0.66 0.88	0.23 0.30 0.38 0.55	0.01 0.01 0.02 0.04
(2) KRY 112 144/2	C	From Leg	4.00 0.00 0.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.48 0.57 0.66 0.88	0.23 0.30 0.38 0.55	0.01 0.01 0.02 0.04
ATSBT-TOP-MF-4G	A	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.17 0.23 0.29 0.44	0.09 0.14 0.19 0.32	0.00 0.00 0.01 0.01
ATSBT-TOP-MF-4G	B	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.17 0.23 0.29 0.44	0.09 0.14 0.19 0.32	0.00 0.00 0.01 0.01
ATSBT-TOP-MF-4G	C	From Leg	4.00 0.00 2.00	0.0000	192.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.17 0.23 0.29 0.44	0.09 0.14 0.19 0.32	0.00 0.00 0.01 0.01
******									
(2) LPA-80063/6CF w/ pipe mount	A	From Leg	4.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.59 10.06 10.54 11.52	9.98 10.94 11.77 13.48	0.06 0.15 0.25 0.47
(2) LPA-80063/6CF w/ pipe mount	B	From Leg	4.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice 1" Ice 2" Ice	9.59 10.06 10.54 11.52	9.98 10.94 11.77 13.48	0.06 0.15 0.25 0.47
(2) LPA-80080/4CF w/ pipe mount	C	From Leg	4.00 0.00 0.00	0.0000	160.00	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
DB-B1-6C-8AB-0Z	C	From Leg	4.00 0.00	0.0000	160.00	No Ice 1/2"	4.80 5.07	2.00 2.19	0.04 0.08

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	5.35	2.39	0.12
						1" Ice	5.93	2.81	0.21
						2" Ice			
Platform Mount [LP 303-1]	C	None		0.0000	160.00	No Ice	14.66	14.66	1.25
						1/2" Ice	18.87	18.87	1.48
						1" Ice	23.08	23.08	1.71
						2" Ice	31.50	31.50	2.18
***									
(2) JAHH-65B-R3B-V3	A	From Leg	4.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			0.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
						2" Ice	11.02	7.86	0.33
(2) JAHH-65B-R3B-V3	B	From Leg	4.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			0.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
						2" Ice	11.02	7.86	0.33
(2) JAHH-65B-R3B-V3	C	From Leg	4.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			0.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
						2" Ice	11.02	7.86	0.33
RRH2X60-700	A	From Leg	4.00	0.0000	160.00	No Ice	3.50	1.82	0.06
			0.00			1/2" Ice	3.76	2.05	0.08
			0.00			1" Ice	4.03	2.29	0.11
						2" Ice	4.58	2.79	0.17
(2) RRH2X60-700	B	From Leg	4.00	0.0000	160.00	No Ice	3.50	1.82	0.06
			0.00			1/2" Ice	3.76	2.05	0.08
			0.00			1" Ice	4.03	2.29	0.11
						2" Ice	4.58	2.79	0.17
(3) RRH4X45-AWS4 B66	A	From Leg	4.00	0.0000	160.00	No Ice	2.66	1.59	0.06
			0.00			1/2" Ice	2.88	1.77	0.08
			0.00			1" Ice	3.10	1.96	0.11
						2" Ice	3.58	2.36	0.17
Side-By-Side Mounting Kit [# BSAMNT-SBS-2-2]	A	From Leg	4.00	0.0000	160.00	No Ice	3.00	0.90	0.07
			0.00			1/2" Ice	3.90	1.17	0.10
			0.00			1" Ice	4.80	1.44	0.13
						2" Ice	6.60	1.98	0.19
Side-By-Side Mounting Kit [# BSAMNT-SBS-2-2]	B	From Leg	4.00	0.0000	160.00	No Ice	3.00	0.90	0.07
			0.00			1/2" Ice	3.90	1.17	0.10
			0.00			1" Ice	4.80	1.44	0.13
						2" Ice	6.60	1.98	0.19
Side-By-Side Mounting Kit [# BSAMNT-SBS-2-2]	C	From Leg	4.00	0.0000	160.00	No Ice	3.00	0.90	0.07
			0.00			1/2" Ice	3.90	1.17	0.10
			0.00			1" Ice	4.80	1.44	0.13
						2" Ice	6.60	1.98	0.19
******									
800 External Notch Filter	A	From Leg	2.00	0.0000	154.00	No Ice	0.66	0.32	0.01
			0.00			1/2" Ice	0.76	0.40	0.02
			-2.00			1" Ice	0.87	0.48	0.02
						2" Ice	1.11	0.67	0.04
800 External Notch Filter	B	From Leg	2.00	0.0000	154.00	No Ice	0.66	0.32	0.01
			0.00			1/2" Ice	0.76	0.40	0.02
			-2.00			1" Ice	0.87	0.48	0.02
						2" Ice	1.11	0.67	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
800 External Notch Filter	C	From Leg	2.00 0.00 -2.00	0.0000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.66 0.76 0.87 1.11	0.32 0.40 0.48 0.67	0.01 0.02 0.02 0.04
800 MHz 2x50W RRH	A	From Leg	2.00 0.00 -2.00	0.0000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.13 2.32 2.51 2.92	1.77 1.95 2.13 2.51	0.05 0.07 0.10 0.16
800 MHz 2x50W RRH	B	From Leg	2.00 0.00 -2.00	0.0000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.13 2.32 2.51 2.92	1.77 1.95 2.13 2.51	0.05 0.07 0.10 0.16
800 MHz 2x50W RRH	C	From Leg	2.00 0.00 -2.00	0.0000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.13 2.32 2.51 2.92	1.77 1.95 2.13 2.51	0.05 0.07 0.10 0.16
PCS 1900 MHz 4x45W-65 MHz	A	From Leg	2.00 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.10	0.06 0.08 0.11 0.17
PCS 1900 MHz 4x45W-65 MHz	B	From Leg	2.00 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.10	0.06 0.08 0.11 0.17
PCS 1900 MHz 4x45W-65 MHz	C	From Leg	2.00 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.32 2.53 2.74 3.19	2.24 2.44 2.65 3.10	0.06 0.08 0.11 0.17
Side Arm Mount [SO 102-3]	C	None		0.0000	154.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.00 3.48 3.96 4.92	3.00 3.48 3.96 4.92	0.08 0.11 0.14 0.20
******									
APXVSPP18-C-A20 w/ pipe mount	A	From Leg	4.00 0.00 2.00	0.0000	150.00	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	0.09 0.16 0.23 0.41
APXVSPP18-C-A20 w/ pipe mount	B	From Leg	4.00 0.00 2.00	0.0000	150.00	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	0.09 0.16 0.23 0.41
APXVSPP18-C-A20 w/ pipe mount	C	From Leg	4.00 0.00 2.00	0.0000	150.00	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	0.09 0.16 0.23 0.41
(3) ACU-A20-N	A	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.12 0.16 0.21 0.34	0.07 0.10 0.15 0.26	0.00 0.00 0.00 0.01
(3) ACU-A20-N	B	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice	0.12 0.16 0.21 0.34	0.07 0.10 0.15 0.26	0.00 0.00 0.00 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			
(3) ACU-A20-N	C	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.12 0.16 0.21 0.34	0.07 0.10 0.15 0.26	0.00 0.00 0.00 0.01
6' x 2" Mount Pipe	A	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6' x 2" Mount Pipe	B	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
6' x 2" Mount Pipe	C	From Leg	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.92 2.29 3.06	1.43 1.92 2.29 3.06	0.02 0.03 0.05 0.09
Climbing Ladder 6'	C	From Leg	2.00 0.00 -3.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.00 8.00 10.00 14.00	6.00 8.00 10.00 14.00	0.16 0.24 0.32 0.48
Platform Mount [LP 601-1]	C	None		0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	28.47 33.59 38.71 48.95	28.47 33.59 38.71 48.95	1.12 1.51 1.91 2.69
***									
APXVTM14-C-120 w/ pipe mount	C	From Leg	4.00 0.00 2.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.65 7.14 7.60 8.55	5.03 5.89 6.63 8.13	0.09 0.15 0.21 0.36
TD-RRH8X20-25	A	From Leg	4.00 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8X20-25	B	From Leg	4.00 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
TD-RRH8X20-25	C	From Leg	4.00 0.00 4.00	0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.05 4.30 4.56 5.10	1.53 1.71 1.90 2.30	0.07 0.10 0.13 0.20
******									
7770.00 w/ pipe mount	A	From Leg	4.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.84 6.32 6.77 7.71	4.35 5.20 5.92 7.41	0.06 0.11 0.16 0.30
7770.00 w/ pipe mount	B	From Leg	4.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.84 6.32 6.77 7.71	4.35 5.20 5.92 7.41	0.06 0.11 0.16 0.30
7770.00 w/ pipe mount	C	From Leg	4.00 0.00	0.0000	137.00	No Ice 1/2"	5.84 6.32	4.35 5.20	0.06 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
			3.00			Ice	6.77	5.92	0.16
						1" Ice	7.71	7.41	0.30
						2" Ice			
P65-16-XLH-RR w/ pipe mount	A	From Leg	4.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.37 8.93 9.46 10.53	6.36 7.54 8.43 10.24	0.09 0.16 0.23 0.40
P65-16-XLH-RR w/ pipe mount	B	From Leg	4.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.37 8.93 9.46 10.53	6.36 7.54 8.43 10.24	0.09 0.16 0.23 0.40
P65-16-XLH-RR w/ pipe mount	C	From Leg	4.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.37 8.93 9.46 10.53	6.36 7.54 8.43 10.24	0.09 0.16 0.23 0.40
RRUS-11	A	From Leg	4.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.52 2.72 2.92 3.35	1.07 1.21 1.36 1.68	0.06 0.07 0.10 0.15
RRUS-11	B	From Leg	4.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.52 2.72 2.92 3.35	1.07 1.21 1.36 1.68	0.06 0.07 0.10 0.15
RRUS-11	C	From Leg	4.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.52 2.72 2.92 3.35	1.07 1.21 1.36 1.68	0.06 0.07 0.10 0.15
(2) LGP21401	A	From Leg	4.00 0.00 2.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
(2) LGP21401	B	From Leg	4.00 0.00 2.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
(2) LGP21401	C	From Leg	4.00 0.00 2.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.10 1.24 1.38 1.69	0.21 0.27 0.35 0.52	0.01 0.02 0.03 0.05
DC6-48-60-18-8F	C	From Leg	1.00 0.00 3.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.58 1.77 2.18	1.00 1.58 1.77 2.18	0.03 0.05 0.07 0.13
3' x 2" Pipe Mount	A	From Leg	1.00 0.00 2.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.58 0.77 0.97 1.39	0.58 0.77 0.97 1.39	0.01 0.02 0.02 0.05
3' x 2" Pipe Mount	B	From Leg	1.00 0.00 2.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.58 0.77 0.97 1.39	0.58 0.77 0.97 1.39	0.01 0.02 0.02 0.05
3' x 2" Pipe Mount	C	From Leg	1.00 0.00	0.0000	137.00	No Ice 1/2"	0.58 0.77	0.58 0.77	0.01 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			2.00			Ice	0.97	0.97	0.02
						1" Ice	1.39	1.39	0.05
						2" Ice			
Side Arm Mount [SO 102-1]	A	From Leg	0.50 0.00 2.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.50 1.74 1.98 2.46	1.50 1.75 2.00 2.50	0.03 0.04 0.04 0.07
Side Arm Mount [SO 102-1]	B	From Leg	0.50 0.00 2.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.50 1.74 1.98 2.46	1.50 1.75 2.00 2.50	0.03 0.04 0.04 0.07
Side Arm Mount [SO 102-1]	C	From Leg	0.50 0.00 2.00	0.0000	137.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.50 1.74 1.98 2.46	1.50 1.75 2.00 2.50	0.03 0.04 0.04 0.07
Platform Mount [LP 303-1]	C	None		0.0000	137.00	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
******									
OG-860/1920/GPS-A	A	From Leg	3.00 0.00 2.00	0.0000	50.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.31 0.40 0.49 0.70	0.37 0.46 0.55 0.77	0.00 0.01 0.01 0.02
Side Arm Mount [SO 701-1]	A	From Leg	0.50 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
******									

Load Combinations

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

Comb. No.	Description
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	191.5 - 172.46	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-8.76	-0.02	-0.05
			Max. Mx	8	-3.56	-93.52	0.05
			Max. My	2	-3.56	-0.03	93.51
			Max. Vy	8	5.92	-93.52	0.05
			Max. Vx	2	-5.92	-0.03	93.51
			Max. Torque	10			0.05
L2	172.46 - 127.753	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-36.10	0.32	0.75
			Max. Mx	20	-17.23	622.67	2.96
			Max. My	2	-17.21	2.72	627.07
			Max. Vy	20	-19.43	622.67	2.96
			Max. Vx	2	-19.58	2.72	627.07
			Max. Torque	13			1.60
L3	127.753 - 83.0833	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-51.09	-0.13	0.38
			Max. Mx	20	-28.89	1538.14	6.48
			Max. My	2	-28.87	6.25	1548.86
			Max. Vy	20	-22.85	1538.14	6.48
			Max. Vx	2	-22.99	6.25	1548.86
			Max. Torque	16			-0.42
L4	83.0833 - 40.4566	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-70.98	-0.67	0.31
			Max. Mx	20	-44.85	2555.22	9.97
			Max. My	2	-44.84	9.55	2572.07
			Max. Vy	20	-26.29	2555.22	9.97
			Max. Vx	2	-26.40	9.55	2572.07
			Max. Torque	19			-0.57
L5	40.4566 - 0	Pole	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	26	-97.61	-1.21	-0.10
			Max. Mx	8	-66.86	-3885.82	-12.94
			Max. My	2	-66.86	13.24	3908.05
			Max. Vy	8	29.61	-3885.82	-12.94
			Max. Vx	2	-29.72	13.24	3908.05
			Max. Torque	19			-0.57

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	97.61	0.01	8.28
	Max. H_x	20	66.88	29.58	0.08
	Max. H_z	2	66.88	0.08	29.69
	Max. M_x	2	3908.05	0.08	29.69
	Max. M_z	8	3885.82	-29.58	-0.08
	Max. Torsion	7	0.57	-25.58	14.78
	Min. Vert	7	50.16	-25.58	14.78
	Min. H_x	8	66.88	-29.58	-0.08
	Min. H_z	14	66.88	-0.08	-29.69
	Min. M_x	14	-3907.33	-0.08	-29.69
	Min. M_z	20	-3885.71	29.58	0.08
	Min. Torsion	19	-0.57	25.58	-14.78

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	55.73	0.00	0.00	-0.27	-0.05	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	66.88	-0.08	-29.69	-3908.05	13.24	-0.30
0.9 Dead+1.0 Wind 0 deg - No Ice	50.16	-0.08	-29.69	-3861.66	13.08	-0.28
1.2 Dead+1.0 Wind 30 deg - No Ice	66.88	14.72	-25.67	-3377.93	-1931.43	-0.50
0.9 Dead+1.0 Wind 30 deg - No Ice	50.16	14.72	-25.67	-3337.81	-1908.55	-0.49
1.2 Dead+1.0 Wind 60 deg - No Ice	66.88	25.58	-14.78	-1942.74	-3358.62	-0.57
0.9 Dead+1.0 Wind 60 deg - No Ice	50.16	25.58	-14.78	-1919.63	-3318.83	-0.57
1.2 Dead+1.0 Wind 90 deg - No Ice	66.88	29.58	0.08	12.94	-3885.82	-0.48
0.9 Dead+1.0 Wind 90 deg - No Ice	50.16	29.58	0.08	12.87	-3839.80	-0.50
1.2 Dead+1.0 Wind 120 deg - No Ice	66.88	25.65	14.91	1965.02	-3371.86	-0.26
0.9 Dead+1.0 Wind 120 deg - No Ice	50.16	25.65	14.91	1941.82	-3331.91	-0.29
1.2 Dead+1.0 Wind 150 deg - No Ice	66.88	14.86	25.75	3390.46	-1954.43	0.03
0.9 Dead+1.0 Wind 150 deg - No Ice	50.16	14.86	25.75	3350.37	-1931.26	-0.00
1.2 Dead+1.0 Wind 180 deg - No Ice	66.88	0.08	29.69	3907.33	-13.35	0.31
0.9 Dead+1.0 Wind 180 deg - No Ice	50.16	0.08	29.69	3861.14	-13.17	0.29
1.2 Dead+1.0 Wind 210 deg - No Ice	66.88	-14.72	25.67	3377.21	1931.32	0.51

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
0.9 Dead+1.0 Wind 210 deg - No Ice	50.16	-14.72	25.67	3337.29	1908.47	0.50
1.2 Dead+1.0 Wind 240 deg - No Ice	66.88	-25.58	14.78	1942.02	3358.51	0.57
0.9 Dead+1.0 Wind 240 deg - No Ice	50.16	-25.58	14.78	1919.11	3318.74	0.57
1.2 Dead+1.0 Wind 270 deg - No Ice	66.88	-29.58	-0.08	-13.65	3885.71	0.47
0.9 Dead+1.0 Wind 270 deg - No Ice	50.16	-29.58	-0.08	-13.39	3839.72	0.49
1.2 Dead+1.0 Wind 300 deg - No Ice	66.88	-25.65	-14.91	-1965.74	3371.75	0.25
0.9 Dead+1.0 Wind 300 deg - No Ice	50.16	-25.65	-14.91	-1942.34	3331.82	0.28
1.2 Dead+1.0 Wind 330 deg - No Ice	66.88	-14.86	-25.75	-3391.18	1954.32	-0.03
0.9 Dead+1.0 Wind 330 deg - No Ice	50.16	-14.86	-25.75	-3350.89	1931.18	0.00
1.2 Dead+1.0 Ice+1.0 Temp	97.61	0.00	-0.00	0.10	-1.21	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	97.61	-0.01	-8.28	-1102.89	1.14	-0.23
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	97.61	4.12	-7.16	-953.92	-548.69	-0.22
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	97.61	7.15	-4.13	-549.33	-951.84	-0.14
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	97.61	8.26	0.01	2.46	-1100.28	-0.03
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	97.61	7.16	4.15	553.61	-954.25	0.09
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	97.61	4.14	7.17	956.43	-552.87	0.19
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	97.61	0.01	8.28	1102.99	-3.69	0.23
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	97.61	-4.12	7.16	954.02	546.14	0.22
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	97.61	-7.15	4.13	549.43	949.29	0.14
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	97.61	-8.26	-0.01	-2.37	1097.74	0.03
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	97.61	-7.16	-4.15	-553.51	951.70	-0.09
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	97.61	-4.14	-7.17	-956.33	550.32	-0.19
Dead+Wind 0 deg - Service	55.73	-0.02	-6.64	-868.40	2.90	-0.07
Dead+Wind 30 deg - Service	55.73	3.29	-5.74	-750.62	-429.10	-0.11
Dead+Wind 60 deg - Service	55.73	5.72	-3.31	-431.79	-746.14	-0.13
Dead+Wind 90 deg - Service	55.73	6.62	0.02	2.65	-863.27	-0.11
Dead+Wind 120 deg - Service	55.73	5.74	3.34	436.30	-749.09	-0.06
Dead+Wind 150 deg - Service	55.73	3.32	5.76	752.97	-434.21	0.00
Dead+Wind 180 deg - Service	55.73	0.02	6.64	867.79	-3.00	0.07
Dead+Wind 210 deg - Service	55.73	-3.29	5.74	750.02	429.00	0.11
Dead+Wind 240 deg - Service	55.73	-5.72	3.31	431.19	746.04	0.13
Dead+Wind 270 deg - Service	55.73	-6.62	-0.02	-3.25	863.17	0.11
Dead+Wind 300 deg - Service	55.73	-5.74	-3.34	-436.91	748.99	0.06
Dead+Wind 330 deg - Service	55.73	-3.32	-5.76	-753.57	434.12	-0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-55.73	0.00	0.00	55.73	0.00	0.000%
2	-0.08	-66.88	-29.69	0.08	66.88	29.69	0.000%
3	-0.08	-50.16	-29.69	0.08	50.16	29.69	0.000%
4	14.72	-66.88	-25.67	-14.72	66.88	25.67	0.000%
5	14.72	-50.16	-25.67	-14.72	50.16	25.67	0.000%
6	25.58	-66.88	-14.78	-25.58	66.88	14.78	0.000%
7	25.58	-50.16	-14.78	-25.58	50.16	14.78	0.000%
8	29.58	-66.88	0.08	-29.58	66.88	-0.08	0.000%
9	29.58	-50.16	0.08	-29.58	50.16	-0.08	0.000%
10	25.65	-66.88	14.91	-25.65	66.88	-14.91	0.000%
11	25.65	-50.16	14.91	-25.65	50.16	-14.91	0.000%
12	14.86	-66.88	25.75	-14.86	66.88	-25.75	0.000%
13	14.86	-50.16	25.75	-14.86	50.16	-25.75	0.000%
14	0.08	-66.88	29.69	-0.08	66.88	-29.69	0.000%
15	0.08	-50.16	29.69	-0.08	50.16	-29.69	0.000%
16	-14.72	-66.88	25.67	14.72	66.88	-25.67	0.000%
17	-14.72	-50.16	25.67	14.72	50.16	-25.67	0.000%
18	-25.58	-66.88	14.78	25.58	66.88	-14.78	0.000%
19	-25.58	-50.16	14.78	25.58	50.16	-14.78	0.000%
20	-29.58	-66.88	-0.08	29.58	66.88	0.08	0.000%
21	-29.58	-50.16	-0.08	29.58	50.16	0.08	0.000%
22	-25.65	-66.88	-14.91	25.65	66.88	14.91	0.000%
23	-25.65	-50.16	-14.91	25.65	50.16	14.91	0.000%
24	-14.86	-66.88	-25.75	14.86	66.88	25.75	0.000%
25	-14.86	-50.16	-25.75	14.86	50.16	25.75	0.000%
26	0.00	-97.61	0.00	-0.00	97.61	0.00	0.000%
27	-0.01	-97.61	-8.28	0.01	97.61	8.28	0.000%
28	4.12	-97.61	-7.16	-4.12	97.61	7.16	0.000%
29	7.15	-97.61	-4.13	-7.15	97.61	4.13	0.000%
30	8.26	-97.61	0.01	-8.26	97.61	-0.01	0.000%
31	7.16	-97.61	4.15	-7.16	97.61	-4.15	0.000%
32	4.14	-97.61	7.17	-4.14	97.61	-7.17	0.000%
33	0.01	-97.61	8.28	-0.01	97.61	-8.28	0.000%
34	-4.12	-97.61	7.16	4.12	97.61	-7.16	0.000%
35	-7.15	-97.61	4.13	7.15	97.61	-4.13	0.000%
36	-8.26	-97.61	-0.01	8.26	97.61	0.01	0.000%
37	-7.16	-97.61	-4.15	7.16	97.61	4.15	0.000%
38	-4.14	-97.61	-7.17	4.14	97.61	7.17	0.000%
39	-0.02	-55.73	-6.64	0.02	55.73	6.64	0.000%
40	3.29	-55.73	-5.74	-3.29	55.73	5.74	0.000%
41	5.72	-55.73	-3.31	-5.72	55.73	3.31	0.000%
42	6.62	-55.73	0.02	-6.62	55.73	-0.02	0.000%
43	5.74	-55.73	3.34	-5.74	55.73	-3.34	0.000%
44	3.32	-55.73	5.76	-3.32	55.73	-5.76	0.000%
45	0.02	-55.73	6.64	-0.02	55.73	-6.64	0.000%
46	-3.29	-55.73	5.74	3.29	55.73	-5.74	0.000%
47	-5.72	-55.73	3.31	5.72	55.73	-3.31	0.000%
48	-6.62	-55.73	-0.02	6.62	55.73	0.02	0.000%
49	-5.74	-55.73	-3.34	5.74	55.73	3.34	0.000%
50	-3.32	-55.73	-5.76	3.32	55.73	5.76	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00053872
3	Yes	4	0.00000001	0.00023009
4	Yes	6	0.00000001	0.00005747
5	Yes	5	0.00000001	0.00048675
6	Yes	6	0.00000001	0.00005818
7	Yes	5	0.00000001	0.00049310
8	Yes	4	0.00000001	0.00050603

9	Yes	4	0.00000001	0.00020790
10	Yes	6	0.00000001	0.00005812
11	Yes	5	0.00000001	0.00049200
12	Yes	6	0.00000001	0.00005885
13	Yes	5	0.00000001	0.00049868
14	Yes	4	0.00000001	0.00051809
15	Yes	4	0.00000001	0.00021630
16	Yes	6	0.00000001	0.00005808
17	Yes	5	0.00000001	0.00049199
18	Yes	6	0.00000001	0.00005720
19	Yes	5	0.00000001	0.00048442
20	Yes	4	0.00000001	0.00067921
21	Yes	4	0.00000001	0.00036883
22	Yes	6	0.00000001	0.00005905
23	Yes	5	0.00000001	0.00050036
24	Yes	6	0.00000001	0.00005850
25	Yes	5	0.00000001	0.00049494
26	Yes	4	0.00000001	0.00000001
27	Yes	5	0.00000001	0.00038595
28	Yes	5	0.00000001	0.00047501
29	Yes	5	0.00000001	0.00047602
30	Yes	5	0.00000001	0.00038401
31	Yes	5	0.00000001	0.00047709
32	Yes	5	0.00000001	0.00047659
33	Yes	5	0.00000001	0.00038470
34	Yes	5	0.00000001	0.00047431
35	Yes	5	0.00000001	0.00047185
36	Yes	5	0.00000001	0.00038334
37	Yes	5	0.00000001	0.00047706
38	Yes	5	0.00000001	0.00047905
39	Yes	4	0.00000001	0.00004243
40	Yes	4	0.00000001	0.00024609
41	Yes	4	0.00000001	0.00025631
42	Yes	4	0.00000001	0.00004410
43	Yes	4	0.00000001	0.00024735
44	Yes	4	0.00000001	0.00025704
45	Yes	4	0.00000001	0.00004222
46	Yes	4	0.00000001	0.00025261
47	Yes	4	0.00000001	0.00024148
48	Yes	4	0.00000001	0.00004554
49	Yes	4	0.00000001	0.00026113
50	Yes	4	0.00000001	0.00025239

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	191.5 - 172.46	26.073	50	1.4062	0.0011
L2	175.543 - 127.753	21.525	50	1.2920	0.0010
L3	132.253 - 83.0833	11.383	50	0.9014	0.0003
L4	88.9166 - 40.4566	4.824	50	0.5331	0.0001
L5	47.54 - 0	1.345	50	0.2611	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
192.00	(2) RV65-18-02DPL2 w/ pipe mount	50	26.073	1.4062	0.0011	20940
191.50	Lightning Rod 5/8" x 5'	50	26.073	1.4062	0.0011	20940
160.00	(2) LPA-80063/6CF w/ pipe	50	17.469	1.1612	0.0007	6305

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
	mount					
154.00	800 External Notch Filter	50	16.025	1.1064	0.0006	6208
150.00	APXVSPP18-C-A20 w/ pipe mount	50	15.101	1.0691	0.0005	6144
137.00	7770.00 w/ pipe mount	50	12.316	0.9460	0.0004	5941
50.00	OG-860/1920/GPS-A	50	1.479	0.2756	0.0001	7843

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	191.5 - 172.46	117.243	24	6.3288	0.0053
L2	175.543 - 127.753	96.836	24	5.8168	0.0046
L3	132.253 - 83.0833	51.262	24	4.0620	0.0015
L4	88.9166 - 40.4566	21.728	24	2.4027	0.0006
L5	47.54 - 0	6.057	24	1.1760	0.0003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
192.00	(2) RV65-18-02DPL2 w/ pipe mount	24	117.243	6.3288	0.0053	4780
191.50	Lightning Rod 5/8" x 5'	24	117.243	6.3288	0.0053	4780
160.00	(2) LPA-80063/6CF w/ pipe mount	24	78.622	5.2297	0.0034	1428
154.00	800 External Notch Filter	24	72.134	4.9836	0.0028	1403
150.00	APXVSPP18-C-A20 w/ pipe mount	24	67.981	4.8159	0.0025	1387
137.00	7770.00 w/ pipe mount	24	55.457	4.2627	0.0016	1338
50.00	OG-860/1920/GPS-A	24	6.661	1.2414	0.0003	1742

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	191.5 - 172.46 (1)	TP20.46x15.5x0.1875	19.04	0.00	0.0	11.5867	-3.57	841.89	0.004
L2	172.46 - 127.753 (2)	TP31.6x19.2818x0.3125	47.79	0.00	0.0	29.8828	-17.20	2212.65	0.008
L3	127.753 - 83.0833 (3)	TP42.49x29.8151x0.4375	49.17	0.00	0.0	56.3071	-28.87	4183.34	0.007
L4	83.0833 - 40.4566 (4)	TP52.59x40.1113x0.5	48.46	0.00	0.0	79.7721	-44.84	5845.38	0.008
L5	40.4566 - 0 (5)	TP62x49.766x0.5	47.54	0.00	0.0	97.6005	-66.86	6743.23	0.010

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	191.5 - 172.46 (1)	TP20.46x15.5x0.1875	93.53	336.46	0.278	0.00	336.46	0.000
L2	172.46 - 127.753 (2)	TP31.6x19.2818x0.3125	628.23	1367.38	0.459	0.00	1367.38	0.000
L3	127.753 - 83.0833 (3)	TP42.49x29.8151x0.4375	1551.53	3478.03	0.446	0.00	3478.03	0.000
L4	83.0833 - 40.4566 (4)	TP52.59x40.1113x0.5	2576.14	6029.49	0.427	0.00	6029.49	0.000
L5	40.4566 - 0 (5)	TP62x49.766x0.5	3914.01	8525.50	0.459	0.00	8525.50	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	191.5 - 172.46 (1)	TP20.46x15.5x0.1875	5.92	203.35	0.029	0.03	340.06	0.000
L2	172.46 - 127.753 (2)	TP31.6x19.2818x0.3125	19.61	524.44	0.037	0.12	1355.15	0.000
L3	127.753 - 83.0833 (3)	TP42.49x29.8151x0.4375	23.03	988.19	0.023	0.12	3433.81	0.000
L4	83.0833 - 40.4566 (4)	TP52.59x40.1113x0.5	26.45	1400.00	0.019	0.03	6040.87	0.000
L5	40.4566 - 0 (5)	TP62x49.766x0.5	29.76	1712.89	0.017	0.03	9076.00	0.000

Pole Interaction Design Data

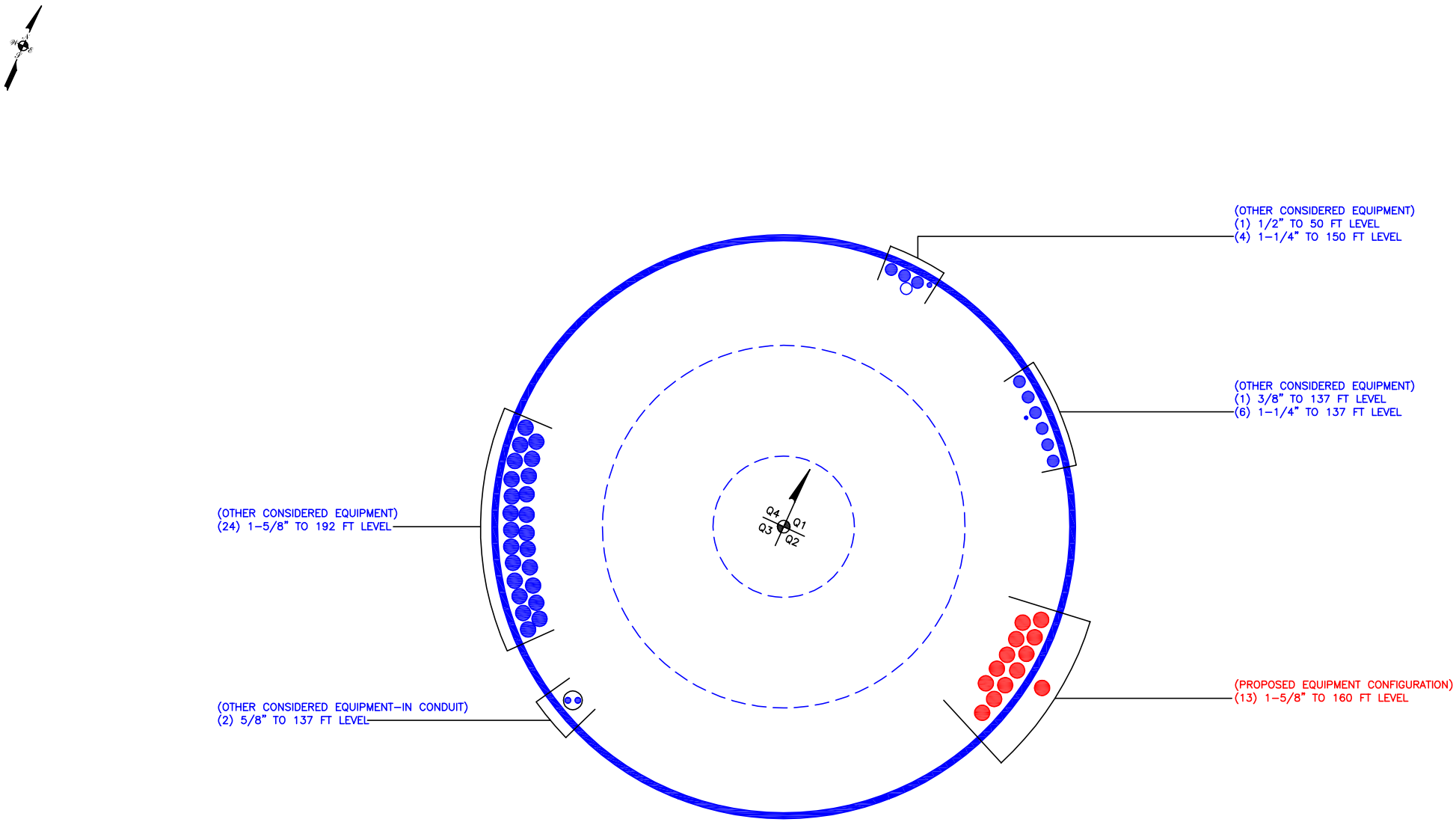
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	191.5 - 172.46 (1)	0.004	0.278	0.000	0.029	0.000	0.283	1.050	4.8.2
L2	172.46 - 127.753 (2)	0.008	0.459	0.000	0.037	0.000	0.469	1.050	4.8.2
L3	127.753 - 83.0833 (3)	0.007	0.446	0.000	0.023	0.000	0.454	1.050	4.8.2
L4	83.0833 - 40.4566 (4)	0.008	0.427	0.000	0.019	0.000	0.435	1.050	4.8.2
L5	40.4566 - 0 (5)	0.010	0.459	0.000	0.017	0.000	0.469	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	191.5 - 172.46	Pole	TP20.46x15.5x0.1875	1	-3.57	883.99	27.0	Pass
L2	172.46 - 127.753	Pole	TP31.6x19.2818x0.3125	2	-17.20	2323.28	44.6	Pass
L3	127.753 - 83.0833	Pole	TP42.49x29.8151x0.4375	3	-28.87	4392.51	43.2	Pass
L4	83.0833 - 40.4566	Pole	TP52.59x40.1113x0.5	4	-44.84	6137.65	41.5	Pass
L5	40.4566 - 0	Pole	TP62x49.766x0.5	5	-66.86	7080.39	44.7	Pass
							Summary	
						Pole (L5)	44.7	Pass
						RATING =	**44.7**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 876355 TOWER ID: C_BASELEVEL

APPENDIX C

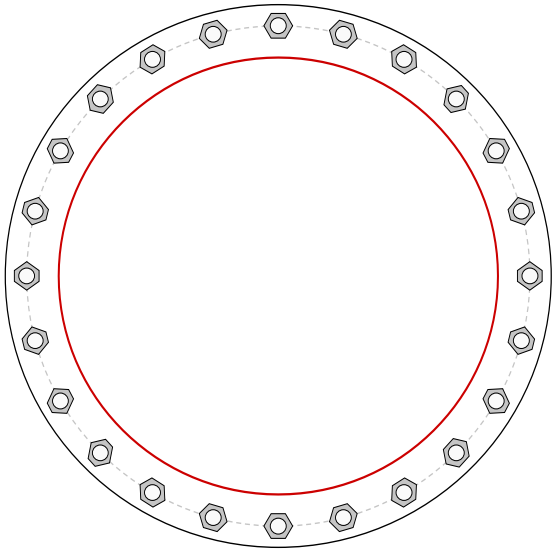
ADDITIONAL CALCULATIONS

Monopole Base Plate Connection

Site Info	
BU #	876355
Site Name	Upper Stepney - TLC
Order #	457144 Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2

Applied Loads	
Moment (kip-ft)	3914.01
Axial Force (kips)	66.86
Shear Force (kips)	29.76



Connection Properties

Anchor Rod Data

(24) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 71" BC

Base Plate Data

77" OD x 2.25" Plate (A871-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

62" x 0.5" 18-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu = 112.99	ϕPn = 243.75	**Stress Rating**
Vu = 1.24	ϕVn = 73.13	**44.2%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	30.07	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**53.0%**	**Pass**

Pier and Pad Foundation

BU # :	876355
Site Name:	Upper Stepney - TL
App. Number:	457144 Rev. 0

TIA-222 Revision:	H
Tower Type:	Monopole

Block Foundation?:	☐

Superstructure Analysis Reactions

Compression, P_{comp}:	67	kips
Base Shear, Vu_comp:	30	kips
Moment, M_u:	3914	ft-kips
Tower Height, **H**:	191.5	ft
BP Dist. Above Fdn, bp_{dist}:	4.25	in

Pier Properties

Pier Shape:	Square	
Pier Diameter, **dpier**:	7.5	ft
Ext. Above Grade, **E**:	1	ft
Pier Rebar Size, **Sc**:	8	
Pier Rebar Quantity, **mc**:	51	
Pier Tie/Spiral Size, **St**:	4	
Pier Tie/Spiral Quantity, **mt**:	4	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	3	in

Pad Properties

Depth, **D**:	5	ft
Pad Width, **W**:	30	ft
Pad Thickness, **T**:	3	ft
Pad Rebar Size, **Sp**:	8	
Pad Rebar Quantity, **mp**:	52	
Pad Clear Cover, cc_{pad}:	3	in

Material Properties

Rebar Grade, **Fy**:	60000	psi
Concrete Compressive Strength, **F'c**:	4000	psi
Dry Concrete Density, δ**c**:	150	pcf

Soil Properties

Total Soil Unit Weight, γ:	110	pcf
Ultimate Gross Bearing, Qult:	12.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	30	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:	0.7	
Neglected Depth, **N**:	3.50	ft
Foundation Bearing on Rock?	Yes	
Groundwater Depth, **gw**:	N/A	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	364.75	30.00	**7.8%**	**Pass**
Bearing Pressure (ksf)	9.00	2.20	**23.3%**	**Pass**
*Overturning (kip*ft)*	8333.68	4104.63	**49.3%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	7072.86	4004.00	**53.9%**	**Pass**
Pier Compression (kip)	35802.00	97.38	**0.3%**	**Pass**
*Pad Flexure (kip*ft)*	5636.96	1488.72	**25.2%**	**Pass**
Pad Shear - 1-way (kips)	1075.81	193.24	**17.1%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.190	0.036	**18.1%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	3100.98	2402.40	**73.8%**	**Pass**

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

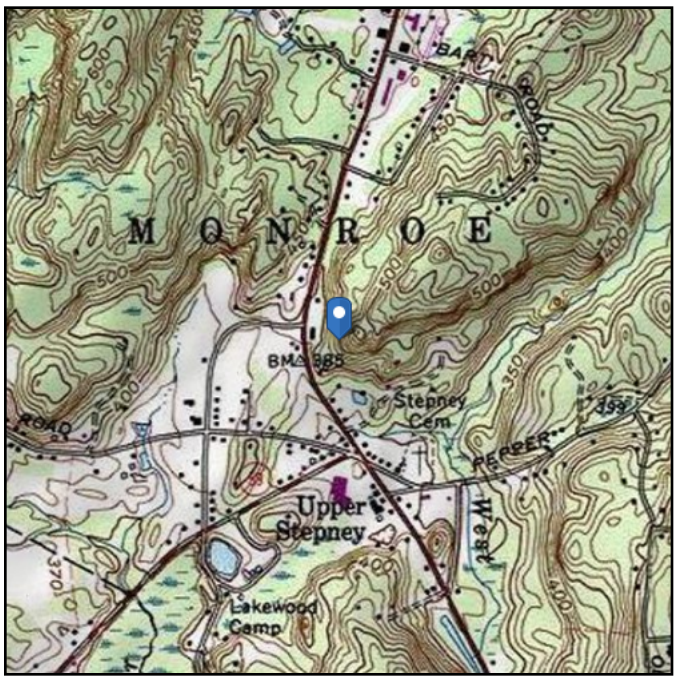
Soil Rating*:	**49.3%**
Structural Rating*:	**73.8%**

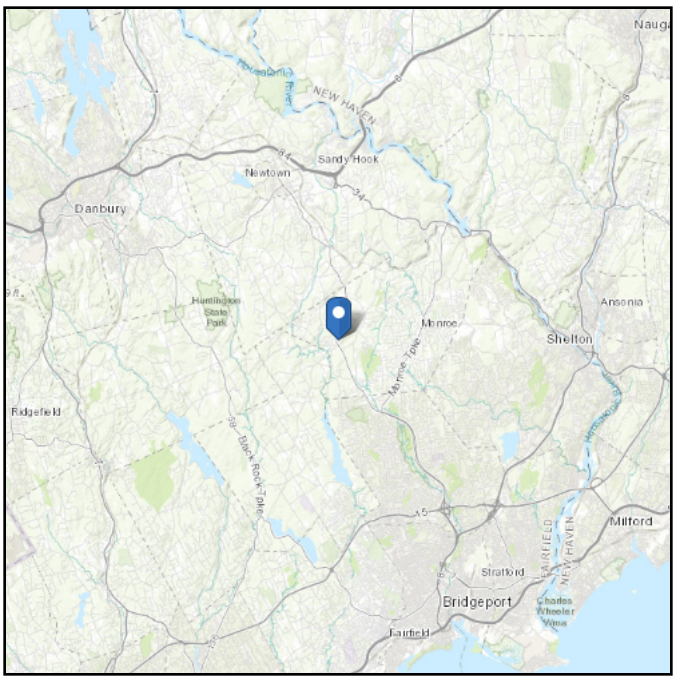
ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 445.89 ft (NAVD 88)
Latitude: 41.325553
Longitude: -73.265847





Wind

Results:

Wind Speed:	120 Vmph
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	91 Vmph
100-year MRI	98 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Fri Oct 12 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.

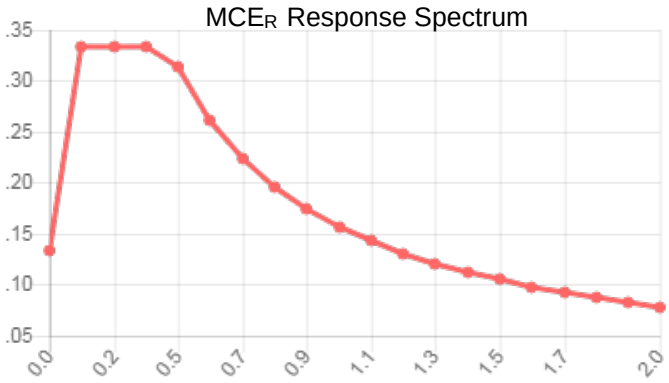
Seismic

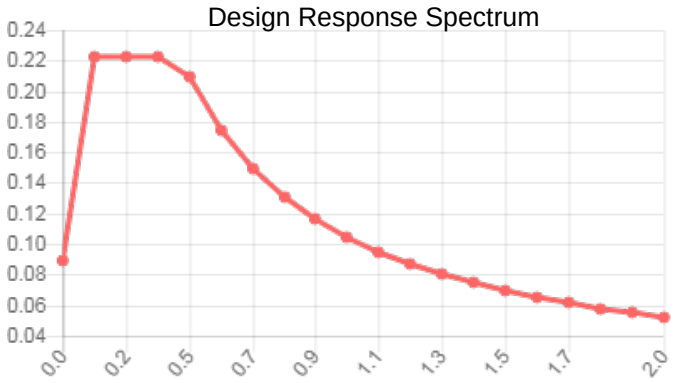
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.209	S_{DS} :	0.223
S_1 :	0.065	S_{D1} :	0.105
F_a :	1.600	T_L :	6.000
F_v :	2.400	PGA :	0.113
S_{MS} :	0.334	PGA_M :	0.178
S_{M1} :	0.157	F_{PGA} :	1.574
		I_e :	1

Seismic Design Category B





Data Accessed: Fri Oct 12 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.

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Fri Oct 12 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.

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

www.ct.gov/csc

August 24, 2018

Kenneth Baldwin
Robinson & Cole, LLP
280 Trumbull Street
Hartford CT 06103-3597

RE: **EM-VER-085-180823** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 474 Main Street, Monroe, Connecticut.

Dear Mr. Baldwin:

The Connecticut Siting Council (Council) received a notice of intent to modify the above-referenced facility on August 23, 2018.

According to Section 16-50j-71 of the Regulations of Connecticut State Agencies, "...any modification, as defined in Section 16-50j-2a of the Regulations of Connecticut State Agencies, to an existing tower site, except as specified in Sections 16-50j-72 and 16-50j-88 of the Regulations of Connecticut State Agencies, may have a substantial adverse environmental effect."

Staff has reviewed this exempt modification request for completeness and has identified a deficiency in the Structural Analysis Report provided with the above exempt modification request. The above-referenced exempt modification request includes a structural analysis report dated August 25, 2017. Previous to that date, the Council acknowledged a T-Mobile exempt modification on May 21, 2018 with a structural report dated December 27, 2017.

The August 25, 2017 structural analysis report provided with your filing does not account for the approved T-Mobile equipment. Please refer to T-Mobile's April 24, 2018 request for exempt modification for this facility (EM-T-Mobile-085-180430) available on the Council's website at the following link:

https://www.ct.gov/csc/lib/csc/ems/monroe/474main/t-mobile/em-t-mobile-085-180430_filing_mainst.pdf

Therefore, the exempt modification request is incomplete at this time. The Council recommends that Robinson & Cole provide an updated structural analysis report accounting for T-Mobile's approved equipment, as well as any required mount modifications on or before September 24, 2018. If additional time is needed to gather the requested information, please submit a written request for an extension of time prior to September 24, 2018.

This notice of incompletion shall have the effect of tolling the Federal Communications Commission (FCC) 60-day timeframe in accordance with Paragraph 217 of the FCC Wireless Infrastructure Report and Order issued on October 21, 2014 (FCC 14-153).

Thank you for your attention to this matter. Should you have any questions, please feel free to contact me at 860-827-2951.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/MP/IN

C: The Honorable Ken Kellogg, First Selectman, Town of Monroe
William Agresta, AICP, Planning and Zoning Administrator, Town of Monroe