



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

March 15, 2019

Anne Marie Zsamba
Real Estate Specialist
Crown Castle
3 Corporate Drive, Suite 101
Clifton Park, NY 12065

RE: **EM-AT&T-077-190222** – AT&T notice of intent to modify an existing telecommunications facility located at 53 Slater Street, Manchester, Connecticut.

Dear Ms. Zsamba:

The Connecticut Siting Council (Council) is in receipt of your correspondence of March 14, 2019 submitted in response to the Council's March 1, 2019 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/IN/emr



CONNECTICUT SITING COUNCIL
Affirmative Action / Equal Opportunity Employer

Robidoux, Evan

From: Zsamba, Anne Marie <AnneMarie.Zsamba@crowncastle.com>
Sent: Thursday, March 14, 2019 9:11 AM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-AT&T-077-190222-SlaterSt-Manchester
Attachments: CSC AT&T 876347 Response to Notice of Incomplete 3.14.19.pdf

Good morning,

Attached please find AT&T's response to the Council's incomplete letter dated March 1, 2019.

Thank you,
Anne Marie

ANNE MARIE ZSAMBA

Real Estate Specialist
T: (201) 236-9224
F: (724) 416-6112

CROWN CASTLE

3 Corporate Park Drive, Suite 101,
Clifton Park, NY 12065
CrownCastle.com

From: Robidoux, Evan <Evan.Robidoux@ct.gov>
Sent: Wednesday, March 6, 2019 9:22 AM
To: Zsamba, Anne Marie <AnneMarie.Zsamba@crowncastle.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: Council Incomplete Letter for EM-AT&T-077-190222-SlaterSt-Manchester

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Please see the attached correspondence.

Evan Robidoux
Clerk Typist
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

This email may contain confidential or privileged material. Use or disclosure of it by anyone other than the recipient is unauthorized. If you are not an intended recipient, please delete this email.



Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

March 14, 2019

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

RE: Notice of Exempt Modification for Crown Site BU: 876347
AT&T Site ID: 10071100 – Manchester North
53 Slater Street, Manchester, CT 06040
Latitude: 41° 48' 18.00"/ Longitude: -72° 32' 1.00"

Dear Ms. Bachman:

I am in receipt of the Council's Notice of Incomplete Letter dated March 1, 2019. Attached please find a structural analysis that speaks to AT&T's intended scope of work on this application. This structural analysis has also been revised per the Council's request to reflect the 2018 Connecticut State Building Code. It is our hope that submission of this report will deem our application complete. Please confirm. Thank you kindly.

Sincerely,

Anne Marie Zsamba, Esq.
Real Estate Specialist
3 Corporate Park Drive, Suite 101, Clifton Park, NY 12065
(201) 236-9224
annemarie.zsamba@crowncastle.com

Enclosure

Date: **March 13, 2019**

Denice Nicholson
Crown Castle
3 Corporate Park Drive Suite 101
Clifton Park, NY 12065

Paul J. Ford and Company
250 East Broad St., Suite 600
Columbus, OH 43215
(614) 221-6679

Subject: Structural Analysis Report

Carrier Designation: AT&T Mobility Co-Locate
Carrier Site Number: 10071100
Carrier Site Name: MANCHESTER NORTH

Crown Castle Designation: **Crown Castle BU Number:** 876347
Crown Castle Site Name: BUCKLAND MALL
Crown Castle JDE Job Number: 546297
Crown Castle Work Order Number: 1666739
Crown Castle Order Number: 469372 Rev. 1

Engineering Firm Designation: Paul J. Ford and Company Project Number: 37518-2720.002.7805

Site Data: 53 Slater Street, MANCHESTER, Hartford County, CT
Latitude 41° 48' 18", Longitude -72° 32' 1"
155 Foot - Monopole Tower

Dear Denice Nicholson,

Paul J. Ford and Company is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower.

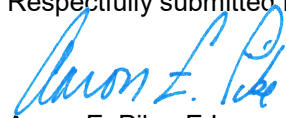
The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Proposed Equipment Configuration

Sufficient Capacity

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code per section 1609.3 and Appendix N. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:



Aaron E. Pike, E.I.
Structural Designer
apike@pauljford.com

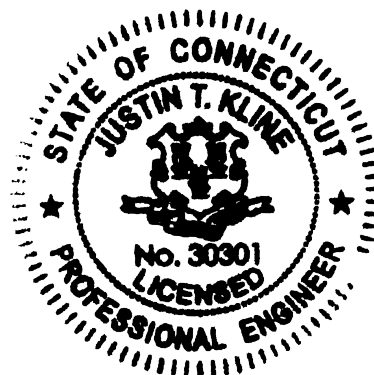


TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Table 2 - Other Considered Equipment

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Table 5 – Tower Component Stresses vs. Capacity

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 155 ft Monopole tower designed by SUMMIT.

2) ANALYSIS CRITERIA

TIA-222 Revision: TIA-222-H
Risk Category: II
Wind Speed: 125 mph
Exposure Category: C
Topographic Factor: 1
Ice Thickness: 2 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)
145.0	147.0	3	ericsson	RRUS 11	--	--
	145.0	1	tower mounts	Pipe Mount [PM 601-3]		
143.0	145.0	3	cci antennas	OPA-65R-LCUU-H6 w/ MP	6 2 6	1-1/4 3/8 3/4
		6	cci antennas	TPX-070821		
		3	ericsson	RRUS 32		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 8843 B2/B66A		
		3	ericsson	RRUS E2 B29		
		3	kathrein	782 10253		
		3	kathrein	80010965 w/ Mount Pipe		
		3	quintel technology	QS66512-2 w/ Mount Pipe		
	3	raycap	DC6-48-60-18-8F			
143.0	1	tower mounts	T-Arm Mount [TA 702-3]			

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)
155.0	155.0	3	alcatel lucent	TD-RRH8X20-25	2 3 5 3	5/8 5/16 1/2 1-1/4
		3	argus technologies	LPX310R w/ Mount Pipe		
		3	dragonwave	HORIZON COMPACT		
		3	rfs celwave	APXVSP18-C-A20 w/ MP		
		3	rfs celwave	APXVTM14-C-120 w/ Mount Pipe		
		3	samsung telecom.	WIMAX DAP HEAD		
		1	tower mounts	Miscellaneous [NA 510-1]		
		1	tower mounts	Platform Mount [LP 1201-1]		
	151.0	1	andrew	VHLP1-23		
		1	andrew	VHLP2-11		
1		andrew	VHLP2.5-18			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
153.0	153.0	3	alcatel lucent	TME-800MHz 2X50W RRH W/FILTER	--	--
		3	alcatel lucent	TME-PCS 1900MHz 4x45W-65MHz		
		1	tower mounts	Pipe Mount [PM 601-3]		
		1	tower mounts	Side Arm Mount [SO 104-3]		
133.0	133.0	3	ericsson	AIR -32 B2A/B66AA w/ Mount Pipe	1 7 1	1-1/4 1-5/8 1-3/8
		3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe		
		3	ericsson	KRY 112 144/1		
		3	ericsson	RADIO 4449 B12/B71		
		3	rfs celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
		1	tower mounts	Platform Mount [LP 302-1]		
113.0	113.0	3	alcatel lucent	RRH2X60-700	12 2	1-5/8 1-1/4
		3	alcatel lucent	RRH2X60-AWS		
		3	andrew	LNX-6512DS-T0M w/ Mount Pipe		
		3	antel	BXA-70063/6CFX2 w/ Mount Pipe		
		6	commscope	SBNHH-1D65B w/ Mount Pipe		
		1	rfs celwave	DB-T1-6Z-8AB-0Z		
		1	tower mounts	Platform Mount [LP 1201-1]		
60.0	60.0	1	tower mounts	Side Arm Mount [SO 701-1]	--	--

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	FDH, 1204605EG1, 06/12/2012	1533476	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	PJF, 329298-597, 09/11/1998	1615406	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PJF, A02-T0021, 02/18/2002	2068033	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. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	155 - 115.5	Pole	TP29.31x22x0.25	1	-12.56	1563.40	60.2	Pass
L2	115.5 - 79.25	Pole	TP35.51x28.11x0.31	2	-22.69	2559.85	88.0	Pass
L3	79.25 - 43.75	Pole	TP41.46x34.06x0.38	3	-32.50	3613.13	93.4	Pass
L4	43.75 - 0	Pole	TP48.8x39.73x0.44	4	-50.06	5035.56	92.9	Pass
							Summary	
						Pole (L3)	93.4	Pass
						Rating =	93.4	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	97.4	Pass
1	Base Plate	0	75.3	Pass
1	Base Foundation Steel	0	61.5	Pass
1	Base Foundation Soil Interaction	0	58.8	Pass

Structure Rating (max from all components) =	97.4%
-----------------------------------------------------	--------------

- All structural ratings are per TIA-222-H Section 15.5

Notes:

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

4.1) Recommendations

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

APPENDIX A
TNXTOWER OUTPUT

Tower Input Data

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 Hartford County, Connecticut.
- 2) Tower base elevation above sea level: 195.50 ft.
- 3) Basic wind speed of 125.0 mph.
- 4) Risk Category II.
- 5) Exposure Category C.
- 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 1.70 in.
- 10) Ice thickness is considered to increase with height.
- 11) Ice density of 56 pcf.
- 12) A wind speed of 50.0 mph is used in combination with ice.
- 13) Temperature drop of 50 °F.
- 14) Deflections calculated using a wind speed of 60.0 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) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets 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
L1	155.00-115.50	39.50	3.75	18	22.00	29.31	0.25	1.00	A607-60 (60 ksi)
L2	115.50-79.25	40.00	4.50	18	28.11	35.51	0.31	1.25	A607-65 (65 ksi)
L3	79.25-43.75	40.00	5.25	18	34.06	41.46	0.38	1.50	A607-65 (65 ksi)
L4	43.75-0.00	49.00		18	39.73	48.80	0.44	1.75	A607-65 (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	22.30	17.26	1031.48	7.72	11.18	92.29	2064.32	8.63	3.43	13.728
	29.72	23.06	2459.70	10.32	14.89	165.21	4922.63	11.53	4.72	18.873
L2	29.20	27.58	2692.83	9.87	14.28	188.55	5389.20	13.79	4.40	14.074
	36.01	34.92	5466.10	12.50	18.04	302.98	10939.40	17.46	5.70	18.241
L3	35.37	40.09	5745.80	11.96	17.30	332.11	11499.17	20.05	5.33	14.224
	42.04	48.90	10425.54	14.58	21.06	495.05	20864.80	24.45	6.64	17.697
L4	41.27	54.57	10646.61	13.95	20.19	527.44	21307.22	27.29	6.22	14.225
	49.49	67.16	19844.89	17.17	24.79	800.51	39715.89	33.59	7.82	17.872

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in	Double Angle Stitch Bolt Spacing Redundants in
L1 155.00-115.50				1	1	1			
L2 115.50-79.25				1	1	1			
L3 79.25-43.75				1	1	1			
L4 43.75-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
2" (Nominal) Conduit	C	No	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.24	0.72
							1/2" Ice	0.34	2.48
							1" Ice	0.44	4.84
							2" Ice	0.64	11.41
2" (Nominal) Conduit	C	No	No	CaAa (Out Of Face)	155.00 - 0.00	1	No Ice	0.00	0.72
							1/2" Ice	0.00	2.48
							1" Ice	0.00	4.84
							2" Ice	0.00	11.41
ATCB-B01-005(5/16)	C	No	No	Inside Pole	0.00 - 155.00	3	No Ice	0.00	0.07
							1/2" Ice	0.00	0.07
							1" Ice	0.00	0.07
							2" Ice	0.00	0.07
FSJ4-50B(1/2)	C	No	No	CaAa (Out Of Face)	0.00 - 155.00	5	No Ice	0.00	0.14
							1/2" Ice	0.00	0.77
							1" Ice	0.00	2.01
							2" Ice	0.00	6.32
* HB114-1-08U4-M5J(1-1/4)	C	No	No	Inside Pole	0.00 - 155.00	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
HB058-M12-XXXF(5/8)	C	No	No	Inside Pole	0.00 - 155.00	1	No Ice	0.00	0.24
							1/2" Ice	0.00	0.24
							1" Ice	0.00	0.24
							2" Ice	0.00	0.24
9776(5/8)	C	No	No	Inside Pole	0.00 - 155.00	1	No Ice	0.00	0.28
							1/2" Ice	0.00	0.28
							1" Ice	0.00	0.28
							2" Ice	0.00	0.28
*** 2" (Nominal) Conduit	C	No	No	Inside Pole	143.00 - 0.00	1	No Ice	0.00	0.72
							1/2" Ice	0.00	0.72
							1" Ice	0.00	0.72
							2" Ice	0.00	0.72
FB-L98B-002-75000(3/8)	C	No	No	Inside Pole	0.00 - 143.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	0.00 - 143.00	2	2" Ice	0.00	0.06
							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	0.00 - 143.00	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
							No Ice	0.00	0.58
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	0.00 - 143.00	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
							No Ice	0.08	0.58
WR-VG86ST-BRD(3/4)	C	No	No	CaAa (Out Of Face)	0.00 - 143.00	1	1/2" Ice	0.18	1.38
							1" Ice	0.28	2.78
							2" Ice	0.48	7.41
							No Ice	0.00	0.58
							1/2" Ice	0.00	1.38
WR-VG86ST-BRD(3/4)	C	No	No	CaAa (Out Of Face)	0.00 - 143.00	1	1" Ice	0.00	2.78
							2" Ice	0.00	7.41
							No Ice	0.00	0.58
							1/2" Ice	0.00	1.38
							1" Ice	0.00	2.78
LDF6-50A(1-1/4)	C	No	No	Inside Pole	0.00 - 143.00	6	2" Ice	0.00	7.41
							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
***	HB114-21U3M12-XXXF(1-1/4)	C	No	No	Inside Pole	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	
No Ice							0.00	0.80	
LCF158-50JA-A0(1-5/8)	C	No	No	Inside Pole	0.00 - 133.00	6	1/2" Ice	0.00	0.80
							1" Ice	0.00	0.80
							2" Ice	0.00	0.80
							No Ice	0.00	1.70
							1/2" Ice	0.00	1.70
HCS 6X12 6AWG(1-3/8)	C	No	No	Inside Pole	0.00 - 133.00	1	1" Ice	0.00	1.70
							2" Ice	0.00	1.70
							No Ice	0.00	2.40
							1/2" Ice	0.00	2.40
							1" Ice	0.00	2.40
HCS 6X12 4AWG(1-5/8)	C	No	No	Inside Pole	0.00 - 133.00	1	2" Ice	0.00	2.40
							No Ice	0.00	2.40
							1/2" Ice	0.00	2.40
							1" Ice	0.00	2.40
							2" Ice	0.00	2.40
***	561(1-5/8)	C	No	No	Inside Pole	12	No Ice	0.00	1.35
1/2" Ice							0.00	1.35	
1" Ice							0.00	1.35	
2" Ice							0.00	1.35	
No Ice							0.00	0.46	
AVA6-50(1-1/4)	C	No	No	Inside Pole	0.00 - 113.00	2	1/2" Ice	0.00	0.46
							1" Ice	0.00	0.46
							2" Ice	0.00	0.46
							No Ice	0.00	0.46
							1/2" Ice	0.00	0.46

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	155.00-115.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.568	0.61
L2	115.50-79.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.491	1.43
L3	79.25-43.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.254	1.44

Tower Sectio n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L4	43.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	13.869	1.78

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Sectio n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	155.00-115.50	A	1.956	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	37.783	2.57
L2	115.50-79.25	A	1.893	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	39.859	3.37
L3	79.25-43.75	A	1.808	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	38.139	3.26
L4	43.75-0.00	A	1.633	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	45.517	3.88

Feed Line Center of Pressure

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
L1	155.00-115.50	-1.75	1.01	-2.73	1.58
L2	115.50-79.25	-1.92	1.11	-3.22	1.86
L3	79.25-43.75	-1.96	1.13	-3.34	1.93
L4	43.75-0.00	-2.00	1.15	-3.39	1.96

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
---------------	----------------------	-------------	-------------------------	--------------------------	-----------------------

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K	
APXVTM14-C-120 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	6.58	4.96	0.08
						1/2" Ice	7.03	5.75	0.13
						Ice	7.47	6.47	0.19
						1" Ice	8.38	7.94	0.34
APXVTM14-C-120 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	6.58	4.96	0.08
						1/2" Ice	7.03	5.75	0.13
						Ice	7.47	6.47	0.19
						1" Ice	8.38	7.94	0.34
APXVTM14-C-120 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	6.58	4.96	0.08
						1/2" Ice	7.03	5.75	0.13
						Ice	7.47	6.47	0.19
						1" Ice	8.38	7.94	0.34

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	8.26	6.95	0.08
						1/2" Ice	8.82	8.13	0.15
						Ice	9.35	9.02	0.23
						1" Ice	10.42	10.84	0.41
						2" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	8.26	6.95	0.08
						1/2" Ice	8.82	8.13	0.15
						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	4.00 0.00 0.00	0.000	155.00	No Ice	8.26	6.95	0.08
						1/2" Ice	8.82	8.13	0.15
						Ice	9.35	9.02	0.23
						1" Ice	10.42	10.84	0.41
						2" Ice			
TD-RRH8X20-25	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	4.05	1.53	0.07
						1/2" Ice	4.30	1.71	0.10
						Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
TD-RRH8X20-25	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	4.05	1.53	0.07
						1/2" Ice	4.30	1.71	0.10
						Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
TD-RRH8X20-25	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	4.05	1.53	0.07
						1/2" Ice	4.30	1.71	0.10
						Ice	4.56	1.90	0.13
						1" Ice	5.10	2.30	0.20
						2" Ice			
* WIMAX DAP HEAD	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	1.55	0.68	0.03
						1/2" Ice	1.70	0.80	0.04
						Ice	1.87	0.92	0.06
						1" Ice	2.22	1.19	0.09
						2" Ice			
WIMAX DAP HEAD	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	1.55	0.68	0.03
						1/2" Ice	1.70	0.80	0.04
						Ice	1.87	0.92	0.06
						1" Ice	2.22	1.19	0.09
						2" Ice			
WIMAX DAP HEAD	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	1.55	0.68	0.03
						1/2" Ice	1.70	0.80	0.04
						Ice	1.87	0.92	0.06
						1" Ice	2.22	1.19	0.09
						2" Ice			
HORIZON COMPACT	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	0.72	0.37	0.01
						1/2" Ice	0.83	0.45	0.02
						Ice	0.94	0.54	0.03
						1" Ice	1.19	0.74	0.05
						2" Ice			
HORIZON COMPACT	B	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	0.72	0.37	0.01
						1/2" Ice	0.83	0.45	0.02
						Ice	0.94	0.54	0.03
						1" Ice	1.19	0.74	0.05
						2" Ice			
HORIZON COMPACT	C	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	0.72	0.37	0.01
						1/2" Ice	0.83	0.45	0.02
						Ice	0.94	0.54	0.03
						1" Ice	1.19	0.74	0.05
						2" Ice			
LPX310R w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	155.00	No Ice	2.31	2.34	0.03
						1/2" Ice	2.64	2.87	0.05
						Ice	2.97	3.41	0.08
						1" Ice	3.65	4.56	0.16
						2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
LPX310R w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	155.00	2" Ice			
						No Ice	2.31	2.34	0.03
						1/2"	2.64	2.87	0.05
						Ice	2.97	3.41	0.08
						1" Ice	3.65	4.56	0.16
LPX310R w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	155.00	2" Ice			
						No Ice	2.31	2.34	0.03
						1/2"	2.64	2.87	0.05
						Ice	2.97	3.41	0.08
						1" Ice	3.65	4.56	0.16
* Miscellaneous [NA 510-1]	C	None		0.000	155.00	No Ice	6.00	6.00	0.26
						1/2"	8.50	8.50	0.34
						Ice	11.00	11.00	0.42
						1" Ice	16.00	16.00	0.59
						2" Ice			
Platform Mount [LP 1201-1]	C	None		0.000	155.00	No Ice	23.10	23.10	2.10
						1/2"	26.80	26.80	2.50
						Ice	30.50	30.50	2.90
						1" Ice	37.90	37.90	3.70
						2" Ice			
*** TME-800MHz 2X50W RRH W/FILTER	A	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice	2.15	2.29	0.07
						1/2"	2.36	2.61	0.10
						Ice	2.58	2.93	0.13
						1" Ice	3.06	3.64	0.21
						2" Ice			
TME-800MHz 2X50W RRH W/FILTER	B	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice	2.15	2.29	0.07
						1/2"	2.36	2.61	0.10
						Ice	2.58	2.93	0.13
						1" Ice	3.06	3.64	0.21
						2" Ice			
TME-800MHz 2X50W RRH W/FILTER	C	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice	2.15	2.29	0.07
						1/2"	2.36	2.61	0.10
						Ice	2.58	2.93	0.13
						1" Ice	3.06	3.64	0.21
						2" Ice			
TME-PCS 1900MHz 4x45W-65MHz	A	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice	2.32	2.24	0.06
						1/2"	2.53	2.44	0.08
						Ice	2.74	2.65	0.11
						1" Ice	3.19	3.09	0.17
						2" Ice			
TME-PCS 1900MHz 4x45W-65MHz	B	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice	2.32	2.24	0.06
						1/2"	2.53	2.44	0.08
						Ice	2.74	2.65	0.11
						1" Ice	3.19	3.09	0.17
						2" Ice			
TME-PCS 1900MHz 4x45W-65MHz	C	From Leg	4.00 0.00 0.00	0.000	153.00	No Ice	2.32	2.24	0.06
						1/2"	2.53	2.44	0.08
						Ice	2.74	2.65	0.11
						1" Ice	3.19	3.09	0.17
						2" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	153.00	No Ice	4.39	4.39	0.20
						1/2"	5.48	5.48	0.24
						Ice	6.57	6.57	0.28
						1" Ice	8.75	8.75	0.36
						2" Ice			
Side Arm Mount [SO 104-3]	C	None		0.000	153.00	No Ice	3.30	3.30	0.29
						1/2"	4.13	4.13	0.32
						Ice	4.96	4.96	0.35
						1" Ice	6.62	6.62	0.41
						2" Ice			
*** RRUS 11	A	From Leg	4.00	0.000	145.00	No Ice	2.79	1.19	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			0.00			1/2"	3.00	1.34	0.07
			2.00			Ice	3.21	1.50	0.10
						1" Ice	3.67	1.84	0.15
						2" Ice			
RRUS 11	B	From Leg	4.00	0.000	145.00	No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			2.00			Ice	3.21	1.50	0.10
						1" Ice	3.67	1.84	0.15
						2" Ice			
RRUS 11	C	From Leg	4.00	0.000	145.00	No Ice	2.79	1.19	0.05
			0.00			1/2"	3.00	1.34	0.07
			2.00			Ice	3.21	1.50	0.10
						1" Ice	3.67	1.84	0.15
						2" Ice			
Pipe Mount [PM 601-3]	C	None		0.000	145.00	No Ice	4.39	4.39	0.20
						1/2"	5.48	5.48	0.24
						Ice	6.57	6.57	0.28
						1" Ice	8.75	8.75	0.36
						2" Ice			

OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Leg	4.00	0.000	143.00	No Ice	9.90	7.18	0.10
			0.00			1/2"	10.47	8.36	0.18
			2.00			Ice	11.01	9.26	0.26
						1" Ice	12.11	11.09	0.46
						2" Ice			
OPA-65R-LCUU-H6 w/ Mount Pipe	B	From Leg	4.00	0.000	143.00	No Ice	9.90	7.18	0.10
			0.00			1/2"	10.47	8.36	0.18
			2.00			Ice	11.01	9.26	0.26
						1" Ice	12.11	11.09	0.46
						2" Ice			
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Leg	4.00	0.000	143.00	No Ice	9.90	7.18	0.10
			0.00			1/2"	10.47	8.36	0.18
			2.00			Ice	11.01	9.26	0.26
						1" Ice	12.11	11.09	0.46
						2" Ice			
80010965 w/ Mount Pipe	A	From Leg	4.00	0.000	143.00	No Ice	14.05	7.63	0.13
			0.00			1/2"	14.69	8.90	0.22
			2.00			Ice	15.30	9.96	0.33
						1" Ice	16.53	11.92	0.57
						2" Ice			
80010965 w/ Mount Pipe	B	From Leg	4.00	0.000	143.00	No Ice	14.05	7.63	0.13
			0.00			1/2"	14.69	8.90	0.22
			2.00			Ice	15.30	9.96	0.33
						1" Ice	16.53	11.92	0.57
						2" Ice			
80010965 w/ Mount Pipe	C	From Leg	4.00	0.000	143.00	No Ice	14.05	7.63	0.13
			0.00			1/2"	14.69	8.90	0.22
			2.00			Ice	15.30	9.96	0.33
						1" Ice	16.53	11.92	0.57
						2" Ice			
QS66512-2 w/ Mount Pipe	A	From Leg	4.00	0.000	143.00	No Ice	2.60	5.00	0.14
			0.00			1/2"	9.29	9.66	0.21
			2.00			Ice	9.91	10.62	0.30
						1" Ice	11.18	12.61	0.49
						2" Ice			
QS66512-2 w/ Mount Pipe	B	From Leg	4.00	0.000	143.00	No Ice	2.60	5.00	0.14
			0.00			1/2"	9.29	9.66	0.21
			2.00			Ice	9.91	10.62	0.30
						1" Ice	11.18	12.61	0.49
						2" Ice			
QS66512-2 w/ Mount Pipe	C	From Leg	4.00	0.000	143.00	No Ice	2.60	5.00	0.14
			0.00			1/2"	9.29	9.66	0.21
			2.00			Ice	9.91	10.62	0.30
						1" Ice	11.18	12.61	0.49
						2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(2) TPX-070821	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	0.47	0.10	0.01
						1/2" Ice	0.56	0.15	0.01
						Ice	0.66	0.20	0.02
						1" Ice	0.87	0.33	0.03
						2" Ice			
(2) TPX-070821	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	0.47	0.10	0.01
						1/2" Ice	0.56	0.15	0.01
						Ice	0.66	0.20	0.02
						1" Ice	0.87	0.33	0.03
						2" Ice			
(2) TPX-070821	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	0.47	0.10	0.01
						1/2" Ice	0.56	0.15	0.01
						Ice	0.66	0.20	0.02
						1" Ice	0.87	0.33	0.03
						2" Ice			
782 10253	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	0.11	0.06	0.00
						1/2" Ice	0.15	0.10	0.00
						Ice	0.20	0.14	0.01
						1" Ice	0.33	0.25	0.01
						2" Ice			
782 10253	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	0.11	0.06	0.00
						1/2" Ice	0.15	0.10	0.00
						Ice	0.20	0.14	0.01
						1" Ice	0.33	0.25	0.01
						2" Ice			
782 10253	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	0.11	0.06	0.00
						1/2" Ice	0.15	0.10	0.00
						Ice	0.20	0.14	0.01
						1" Ice	0.33	0.25	0.01
						2" Ice			
(3) RRUS 4449 B5/B12	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	1.97	1.41	0.07
						1/2" Ice	2.14	1.56	0.09
						Ice	2.33	1.73	0.11
						1" Ice	2.72	2.07	0.16
						2" Ice			
RRUS 8843 B2/B66A	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	1.64	1.35	0.07
						1/2" Ice	1.80	1.50	0.09
						Ice	1.97	1.65	0.11
						1" Ice	2.32	1.99	0.16
						2" Ice			
(2) RRUS 8843 B2/B66A	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	1.64	1.35	0.07
						1/2" Ice	1.80	1.50	0.09
						Ice	1.97	1.65	0.11
						1" Ice	2.32	1.99	0.16
						2" Ice			
DC6-48-60-18-8F	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	1.21	1.21	0.03
						1/2" Ice	1.89	1.89	0.05
						Ice	2.11	2.11	0.08
						1" Ice	2.57	2.57	0.14
						2" Ice			
DC6-48-60-18-8F	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	1.21	1.21	0.03
						1/2" Ice	1.89	1.89	0.05
						Ice	2.11	2.11	0.08
						1" Ice	2.57	2.57	0.14
						2" Ice			
DC6-48-60-18-8F	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	1.21	1.21	0.03
						1/2" Ice	1.89	1.89	0.05
						Ice	2.11	2.11	0.08
						1" Ice	2.57	2.57	0.14
						2" Ice			
RRUS 32	A	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	2.86	1.78	0.06
						1/2" Ice	3.08	1.97	0.08
						Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
RRUS 32	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	2.86	1.78	0.06
						1/2"	3.08	1.97	0.08
						Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			
RRUS 32	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	2.86	1.78	0.06
						1/2"	3.08	1.97	0.08
						Ice	3.32	2.17	0.10
						1" Ice	3.81	2.58	0.16
						2" Ice			
RRUS E2 B29	B	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	3.15	1.29	0.06
						1/2"	3.36	1.44	0.08
						Ice	3.59	1.60	0.11
						1" Ice	4.07	1.95	0.17
						2" Ice			
(2) RRUS E2 B29	C	From Leg	4.00 0.00 2.00	0.000	143.00	No Ice	3.15	1.29	0.06
						1/2"	3.36	1.44	0.08
						Ice	3.59	1.60	0.11
						1" Ice	4.07	1.95	0.17
						2" Ice			
T-Arm Mount [TA 702-3]	C	None		0.000	143.00	No Ice	5.64	5.64	0.34
						1/2"	6.55	6.55	0.43
						Ice	7.46	7.46	0.52
						1" Ice	9.28	9.28	0.70
						2" Ice			
*** AIR -32 B2A/B66AA w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	6.75	6.07	0.15
						1/2"	7.20	6.87	0.21
						Ice	7.65	7.58	0.28
						1" Ice	8.57	9.06	0.44
						2" Ice			
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	6.75	6.07	0.15
						1/2"	7.20	6.87	0.21
						Ice	7.65	7.58	0.28
						1" Ice	8.57	9.06	0.44
						2" Ice			
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	6.75	6.07	0.15
						1/2"	7.20	6.87	0.21
						Ice	7.65	7.58	0.28
						1" Ice	8.57	9.06	0.44
						2" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	6.33	5.64	0.11
						1/2"	6.78	6.43	0.17
						Ice	7.21	7.13	0.23
						1" Ice	8.12	8.59	0.38
						2" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	6.33	5.64	0.11
						1/2"	6.78	6.43	0.17
						Ice	7.21	7.13	0.23
						1" Ice	8.12	8.59	0.38
						2" Ice			
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	6.33	5.64	0.11
						1/2"	6.78	6.43	0.17
						Ice	7.21	7.13	0.23
						1" Ice	8.12	8.59	0.38
						2" Ice			
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	20.48	11.02	0.16
						1/2"	21.23	12.55	0.30
						Ice	21.99	14.10	0.44
						1" Ice	23.44	16.45	0.78
						2" Ice			
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	20.48	11.02	0.16
						1/2"	21.23	12.55	0.30
						Ice	21.99	14.10	0.44
						1" Ice	23.44	16.45	0.78
						2" Ice			

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	133.00	2" Ice			
						No Ice	20.48	11.02	0.16
						1/2"	21.23	12.55	0.30
						Ice	21.99	14.10	0.44
RADIO 4449 B12/B71	A	From Leg	4.00 0.00 0.00	0.000	133.00	1" Ice	23.44	16.45	0.78
						2" Ice			
						No Ice	1.65	1.16	0.07
						1/2"	1.81	1.30	0.09
RADIO 4449 B12/B71	B	From Leg	4.00 0.00 0.00	0.000	133.00	Ice	1.98	1.45	0.11
						1" Ice	2.34	1.76	0.16
						2" Ice			
						No Ice	1.65	1.16	0.07
RADIO 4449 B12/B71	C	From Leg	4.00 0.00 0.00	0.000	133.00	1/2"	1.81	1.30	0.09
						Ice	1.98	1.45	0.11
						1" Ice	2.34	1.76	0.16
						2" Ice			
KRY 112 144/1	A	From Leg	4.00 0.00 0.00	0.000	133.00	No Ice	0.35	0.17	0.01
						1/2"	0.43	0.23	0.01
						Ice	0.51	0.30	0.02
						1" Ice	0.70	0.46	0.03
KRY 112 144/1	B	From Leg	4.00 0.00 0.00	0.000	133.00	2" Ice			
						No Ice	0.35	0.17	0.01
						1/2"	0.43	0.23	0.01
						Ice	0.51	0.30	0.02
KRY 112 144/1	C	From Leg	4.00 0.00 0.00	0.000	133.00	1" Ice	0.70	0.46	0.03
						2" Ice			
						No Ice	0.35	0.17	0.01
						1/2"	0.43	0.23	0.01
Platform Mount [LP 302-1]	C	From Leg	0.00 0.00 0.00	0.000	133.00	Ice	56.17	56.17	2.68
						1" Ice	79.31	79.31	3.65
						2" Ice			
						No Ice	33.03	33.03	1.71

LNx-6512DS-T0M w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice	5.33	4.53	0.05
						1/2"	5.72	5.15	0.09
						Ice	6.12	5.77	0.15
						1" Ice	6.94	7.07	0.28
LNx-6512DS-T0M w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice			
						No Ice	5.33	4.53	0.05
						1/2"	5.72	5.15	0.09
						Ice	6.12	5.77	0.15
LNx-6512DS-T0M w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	1" Ice	6.94	7.07	0.28
						2" Ice			
						No Ice	5.33	4.53	0.05
						1/2"	5.72	5.15	0.09
(2) SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	113.00	Ice	6.12	5.77	0.15
						1" Ice	6.94	7.07	0.28
						2" Ice			
						No Ice	8.40	7.07	0.07
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	113.00	1/2"	8.96	8.26	0.14
						Ice	9.49	9.18	0.21
						1" Ice	10.57	11.01	0.39
						2" Ice			
(2) SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	113.00	No Ice	8.40	7.07	0.07
						1/2"	8.96	8.26	0.14
						Ice	9.49	9.18	0.21

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
						1" Ice	10.57	11.01	0.39
(2) SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	8.40	7.07	0.07
						No Ice	8.96	8.26	0.14
						1/2" Ice	9.49	9.18	0.21
						1" Ice	10.57	11.01	0.39
BXA-70063/6CFX2 w/ Mount Pipe	A	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	7.81	5.40	0.04
						No Ice	8.36	6.55	0.10
						1/2" Ice	8.87	7.41	0.17
						1" Ice	9.93	9.18	0.33
BXA-70063/6CFX2 w/ Mount Pipe	B	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	7.81	5.40	0.04
						No Ice	8.36	6.55	0.10
						1/2" Ice	8.87	7.41	0.17
						1" Ice	9.93	9.18	0.33
BXA-70063/6CFX2 w/ Mount Pipe	C	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	7.81	5.40	0.04
						No Ice	8.36	6.55	0.10
						1/2" Ice	8.87	7.41	0.17
						1" Ice	9.93	9.18	0.33
RRH2X60-700	A	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	3.50	1.82	0.06
						No Ice	3.76	2.05	0.08
						1/2" Ice	4.03	2.29	0.11
						1" Ice	4.58	2.79	0.17
RRH2X60-700	B	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	3.50	1.82	0.06
						No Ice	3.76	2.05	0.08
						1/2" Ice	4.03	2.29	0.11
						1" Ice	4.58	2.79	0.17
RRH2X60-700	C	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	3.50	1.82	0.06
						No Ice	3.76	2.05	0.08
						1/2" Ice	4.03	2.29	0.11
						1" Ice	4.58	2.79	0.17
RRH2X60-AWS	A	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	1.88	1.24	0.04
						No Ice	2.06	1.39	0.06
						1/2" Ice	2.24	1.54	0.08
						1" Ice	2.63	1.89	0.13
RRH2X60-AWS	B	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	1.88	1.24	0.04
						No Ice	2.06	1.39	0.06
						1/2" Ice	2.24	1.54	0.08
						1" Ice	2.63	1.89	0.13
RRH2X60-AWS	C	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	1.88	1.24	0.04
						No Ice	2.06	1.39	0.06
						1/2" Ice	2.24	1.54	0.08
						1" Ice	2.63	1.89	0.13
DB-T1-6Z-8AB-0Z	A	From Leg	4.00 0.00 0.00	0.000	113.00	2" Ice	4.80	2.00	0.04
						No Ice	5.07	2.19	0.08
						1/2" Ice	5.35	2.39	0.12
						1" Ice	5.93	2.81	0.21
Platform Mount [LP 1201-1]	C	None		0.000	113.00	2" Ice	23.10	23.10	2.10
						No Ice	26.80	26.80	2.50
						1/2" Ice	30.50	30.50	2.90
						1" Ice	37.90	37.90	3.70

Side Arm Mount [SO 701-1]	C	None		0.000	60.00	2" Ice	0.85	1.67	0.07
						No Ice	1.14	2.34	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
						1/2" Ice 1.43	3.01	0.09
						2.01	4.35	0.12
						1" Ice		
						2" Ice		

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
VHLP1-23	A	Paraboloid w/o Radome	From Leg	4.00 0.00 -4.00	-64.000		155.00	1.27	No Ice 1.28 1/2" Ice 1.45 1" Ice 1.62 2" Ice 1.97	0.01 0.02 0.03 0.04
VHLP2.5-18	B	Paraboloid w/Shroud (HP)	From Leg	4.00 0.00 -4.00	21.000		155.00	2.92	No Ice 6.68 1/2" Ice 7.07 1" Ice 7.46 2" Ice 8.23	0.05 0.08 0.12 0.19
VHLP2-11	C	Paraboloid w/o Radome	From Leg	4.00 0.00 -4.00	13.000		155.00	2.17	No Ice 3.72 1/2" Ice 4.01 1" Ice 4.30 2" Ice 4.88	0.03 0.05 0.07 0.11

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 155.00-115.50	134.46	1.347	48	85.620	A	0.000	85.620	85.620	100.00	0.000	0.000
					B	0.000	85.620	85.620	100.00	0.000	0.000
					C	0.000	85.620	85.620	100.00	0.000	11.568
L2 115.50-79.25	96.92	1.257	45	98.506	A	0.000	98.506	98.506	100.00	0.000	0.000
					B	0.000	98.506	98.506	100.00	0.000	0.000
					C	0.000	98.506	98.506	100.00	0.000	11.491
L3 79.25-43.75	61.26	1.142	41	114.498	A	0.000	114.498	114.498	100.00	0.000	0.000
					B	0.000	114.498	114.498	100.00	0.000	0.000
					C	0.000	114.498	114.498	100.00	0.000	11.254
L4 43.75-0.00	22.10	0.921	33	165.433	A	0.000	165.433	165.433	100.00	0.000	0.000
					B	0.000	165.433	165.433	100.00	0.000	0.000
					C	0.000	165.433	165.433	100.00	0.000	13.869

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 155.00-115.50	134.46	1.347	8	1.96	98.500	A	0.000	98.500	98.500	100.00	0.000	0.000
						B	0.000	98.500	98.500	100.00	0.000	0.000
						C	0.000	98.500	98.500	100.00	0.000	37.783
L2 115.50-79.25	96.92	1.257	7	1.89	110.326	A	0.000	110.326	110.326	100.00	0.000	0.000
						B	0.000	110.326	110.326	100.00	0.000	0.000
						C	0.000	110.326	110.326	100.00	0.000	39.859
L3 79.25-43.75	61.26	1.142	7	1.81	125.700	A	0.000	125.700	125.700	100.00	0.000	0.000

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft ²	F a c e	A_F ft ²	A_R ft ²	A_{leg} ft ²	Leg %	$C_A A_A$ In Face ft ²	$C_A A_A$ Out Face ft ²
L4 43.75-0.00	22.10	0.921	5	1.63	178.620	B	0.000	125.700	178.620	100.00	0.000	0.000
						C	0.000	125.700		100.00	0.000	38.139
						A	0.000	178.620		100.00	0.000	0.000
						B	0.000	178.620		100.00	0.000	0.000
						C	0.000	178.620	100.00	0.000	45.517	

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	A_G ft ²	F a c e	A_F ft ²	A_R ft ²	A_{leg} ft ²	Leg %	C_{AA} In Face ft ²	C_{AA} Out Face ft ²
L1 155.00- 115.50	134.46	1.347	10	85.620	A	0.000	85.620	85.620	100.00	0.000	0.000
					B	0.000	85.620	85.620	100.00	0.000	0.000
					C	0.000	85.620	85.620	100.00	0.000	11.568
L2 115.50- 79.25	96.92	1.257	9	98.506	A	0.000	98.506	98.506	100.00	0.000	0.000
					B	0.000	98.506	98.506	100.00	0.000	0.000
					C	0.000	98.506	98.506	100.00	0.000	11.491
L3 79.25- 43.75	61.26	1.142	8	114.49	A	0.000	114.498	114.498	100.00	0.000	0.000
					B	0.000	114.498	114.498	100.00	0.000	0.000
					C	0.000	114.498	114.498	100.00	0.000	11.254
L4 43.75-0.00	22.10	0.921	7	165.43	A	0.000	165.433	165.433	100.00	0.000	0.000
					B	0.000	165.433	165.433	100.00	0.000	0.000
					C	0.000	165.433	165.433	100.00	0.000	13.869

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
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

Comb. No.	Description
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	155 - 115.5	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-37.44	5	-3
			Max. Mx	8	-12.55	-537	-4
			Max. My	2	-12.58	1	533
			Max. Vy	8	22.47	-537	-4
			Max. Vx	2	-22.33	1	533
			Max. Torque	25			1
L2	115.5 - 79.25	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-58.17	8	-3
			Max. Mx	8	-22.69	-1569	-7
			Max. My	2	-22.70	0	1564
			Max. Vy	8	31.99	-1569	-7
			Max. Vx	2	-31.96	0	1564
			Max. Torque	25			2
L3	79.25 - 43.75	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-72.10	12	-5
			Max. Mx	8	-32.50	-2746	-11
			Max. My	2	-32.51	-1	2740
			Max. Vy	8	35.64	-2746	-11
			Max. Vx	2	-35.61	-1	2740
			Max. Torque	25			3
L4	43.75 - 0	Pole	Max Tension	1	0.00	0	0
			Max. Compression	26	-95.13	16	-8
			Max. Mx	8	-50.06	-4591	-15
			Max. My	2	-50.06	-2	4585
			Max. Vy	8	39.30	-4591	-15
			Max. Vx	2	-39.28	-2	4585
			Max. Torque	25			4

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	95.13	-0.00	0.00
	Max. H _x	20	50.11	39.14	0.21
	Max. H _z	3	37.58	-0.03	39.22
	Max. M _x	2	4585	-0.03	39.21
	Max. M _z	8	4591	-39.24	-0.09
	Max. Torsion	25	4	19.66	33.92
	Min. Vert	21	37.58	39.14	0.21
	Min. H _x	9	37.58	-39.24	-0.09
	Min. H _z	14	50.11	-0.15	-39.12
	Min. M _x	14	-4570	-0.15	-39.12
	Min. M _z	20	-4580	39.14	0.21
	Min. Torsion	13	-4	-19.77	-33.81

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	41.76	0.00	-0.00	1	2	0
1.2 Dead+1.0 Wind 0 deg - No Ice	50.11	0.03	-39.21	-4585	-2	-3
0.9 Dead+1.0 Wind 0 deg - No Ice	37.58	0.03	-39.22	-4506	-2	-3
1.2 Dead+1.0 Wind 30 deg - No Ice	50.11	19.61	-33.89	-3958	-2294	-1
0.9 Dead+1.0 Wind 30 deg - No Ice	37.58	19.61	-33.89	-3891	-2255	-1
1.2 Dead+1.0 Wind 60 deg - No Ice	50.11	34.06	-19.43	-2262	-3989	0
0.9 Dead+1.0 Wind 60 deg - No Ice	37.58	34.06	-19.43	-2224	-3921	0
1.2 Dead+1.0 Wind 90 deg - No Ice	50.11	39.24	0.09	15	-4591	2
0.9 Dead+1.0 Wind 90 deg - No Ice	37.58	39.24	0.09	15	-4513	2
1.2 Dead+1.0 Wind 120 deg - No Ice	50.11	34.07	19.50	2275	-3990	3
0.9 Dead+1.0 Wind 120 deg - No Ice	37.58	34.07	19.50	2236	-3922	3
1.2 Dead+1.0 Wind 150 deg - No Ice	50.11	19.77	33.81	3948	-2319	4
0.9 Dead+1.0 Wind 150 deg - No Ice	37.58	19.77	33.81	3880	-2280	4
1.2 Dead+1.0 Wind 180 deg - No Ice	50.11	0.15	39.12	4570	-22	3
0.9 Dead+1.0 Wind 180 deg - No Ice	37.58	0.15	39.11	4492	-23	3
1.2 Dead+1.0 Wind 210 deg - No Ice	50.11	-19.42	33.88	3959	2267	2
0.9 Dead+1.0 Wind 210 deg - No Ice	37.58	-19.42	33.88	3891	2228	2
1.2 Dead+1.0 Wind 240 deg - No Ice	50.11	-33.84	19.51	2277	3957	0
0.9 Dead+1.0 Wind 240 deg - No Ice	37.58	-33.84	19.51	2238	3889	0
1.2 Dead+1.0 Wind 270 deg - No Ice	50.11	-39.14	-0.21	-33	4580	-2
0.9 Dead+1.0 Wind 270 deg - No Ice	37.58	-39.14	-0.21	-32	4501	-2
1.2 Dead+1.0 Wind 300 deg - No Ice	50.11	-33.91	-19.70	-2307	3968	-3
0.9 Dead+1.0 Wind 300 deg - No Ice	37.58	-33.91	-19.70	-2268	3900	-3
1.2 Dead+1.0 Wind 330 deg - No Ice	50.11	-19.66	-33.92	-3963	2306	-4
0.9 Dead+1.0 Wind 330 deg - No Ice	37.58	-19.66	-33.92	-3896	2266	-4
1.2 Dead+1.0 Ice+1.0 Temp	95.13	0.00	-0.00	8	16	0
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	95.13	0.01	-11.92	-1514	15	-2
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	95.13	5.96	-10.30	-1307	-746	-1
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	95.13	10.34	-5.92	-746	-1308	0
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	95.13	11.92	0.02	11	-1508	1
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	95.13	10.34	5.93	765	-1308	2
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	95.13	5.99	10.29	1320	-752	2
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	95.13	0.03	11.90	1526	10	2
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	95.13	-5.92	10.30	1323	771	1

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
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	95.13	-10.30	5.94	765	1331	0
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	95.13	-11.90	-0.04	0	1537	-1
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	95.13	-10.31	-5.98	-757	1333	-2
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	95.13	-5.97	-10.31	-1309	780	-2
Dead+Wind 0 deg - Service	41.76	0.01	-8.08	-938	1	-1
Dead+Wind 30 deg - Service	41.76	4.04	-6.98	-809	-468	0
Dead+Wind 60 deg - Service	41.76	7.02	-4.00	-462	-815	0
Dead+Wind 90 deg - Service	41.76	8.09	0.02	4	-938	0
Dead+Wind 120 deg - Service	41.76	7.02	4.02	466	-815	1
Dead+Wind 150 deg - Service	41.76	4.07	6.97	808	-473	1
Dead+Wind 180 deg - Service	41.76	0.03	8.06	936	-3	1
Dead+Wind 210 deg - Service	41.76	-4.00	6.98	810	465	0
Dead+Wind 240 deg - Service	41.76	-6.97	4.02	466	811	0
Dead+Wind 270 deg - Service	41.76	-8.07	-0.04	-6	939	0
Dead+Wind 300 deg - Service	41.76	-6.99	-4.06	-472	813	-1
Dead+Wind 330 deg - Service	41.76	-4.05	-6.99	-810	473	-1

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-41.76	0.00	-0.00	41.76	0.00	0.002%
2	0.03	-50.11	-39.22	-0.03	50.11	39.21	0.005%
3	0.03	-37.58	-39.22	-0.03	37.58	39.22	0.004%
4	19.61	-50.11	-33.89	-19.61	50.11	33.89	0.000%
5	19.61	-37.58	-33.89	-19.61	37.58	33.89	0.000%
6	34.06	-50.11	-19.43	-34.06	50.11	19.43	0.000%
7	34.06	-37.58	-19.43	-34.06	37.58	19.43	0.000%
8	39.24	-50.11	0.09	-39.24	50.11	-0.09	0.005%
9	39.24	-37.58	0.09	-39.24	37.58	-0.09	0.004%
10	34.07	-50.11	19.50	-34.07	50.11	-19.50	0.000%
11	34.07	-37.58	19.50	-34.07	37.58	-19.50	0.000%
12	19.77	-50.11	33.81	-19.77	50.11	-33.81	0.000%
13	19.77	-37.58	33.81	-19.77	37.58	-33.81	0.000%
14	0.15	-50.11	39.12	-0.15	50.11	-39.12	0.005%
15	0.15	-37.58	39.12	-0.15	37.58	-39.11	0.009%
16	-19.42	-50.11	33.88	19.42	50.11	-33.88	0.000%
17	-19.42	-37.58	33.88	19.42	37.58	-33.88	0.000%
18	-33.84	-50.11	19.51	33.84	50.11	-19.51	0.000%
19	-33.84	-37.58	19.51	33.84	37.58	-19.51	0.000%
20	-39.15	-50.11	-0.21	39.14	50.11	0.21	0.005%
21	-39.15	-37.58	-0.21	39.14	37.58	0.21	0.009%
22	-33.91	-50.11	-19.70	33.91	50.11	19.70	0.000%
23	-33.91	-37.58	-19.70	33.91	37.58	19.70	0.000%
24	-19.66	-50.11	-33.92	19.66	50.11	33.92	0.000%
25	-19.66	-37.58	-33.92	19.66	37.58	33.92	0.000%
26	0.00	-95.13	0.00	-0.00	95.13	0.00	0.001%
27	0.01	-95.13	-11.92	-0.01	95.13	11.92	0.002%
28	5.96	-95.13	-10.30	-5.96	95.13	10.30	0.001%
29	10.34	-95.13	-5.92	-10.34	95.13	5.92	0.001%
30	11.92	-95.13	0.02	-11.92	95.13	-0.02	0.002%
31	10.35	-95.13	5.93	-10.34	95.13	-5.93	0.001%
32	5.99	-95.13	10.29	-5.99	95.13	-10.29	0.001%
33	0.03	-95.13	11.90	-0.03	95.13	-11.90	0.002%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
34	-5.92	-95.13	10.30	5.92	95.13	-10.30	0.001%
35	-10.30	-95.13	5.94	10.30	95.13	-5.94	0.001%
36	-11.90	-95.13	-0.04	11.90	95.13	0.04	0.002%
37	-10.31	-95.13	-5.98	10.31	95.13	5.98	0.001%
38	-5.97	-95.13	-10.31	5.97	95.13	10.31	0.000%
39	0.01	-41.76	-8.08	-0.01	41.76	8.08	0.003%
40	4.04	-41.76	-6.99	-4.04	41.76	6.98	0.003%
41	7.02	-41.76	-4.00	-7.02	41.76	4.00	0.003%
42	8.09	-41.76	0.02	-8.09	41.76	-0.02	0.003%
43	7.02	-41.76	4.02	-7.02	41.76	-4.02	0.003%
44	4.08	-41.76	6.97	-4.07	41.76	-6.97	0.003%
45	0.03	-41.76	8.06	-0.03	41.76	-8.06	0.003%
46	-4.00	-41.76	6.98	4.00	41.76	-6.98	0.003%
47	-6.98	-41.76	4.02	6.97	41.76	-4.02	0.003%
48	-8.07	-41.76	-0.04	8.07	41.76	0.04	0.003%
49	-6.99	-41.76	-4.06	6.99	41.76	4.06	0.003%
50	-4.05	-41.76	-6.99	4.05	41.76	6.99	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000512
2	Yes	16	0.00005571	0.00012537
3	Yes	16	0.00003425	0.00009299
4	Yes	21	0.00000001	0.00010711
5	Yes	21	0.00000001	0.00006504
6	Yes	21	0.00000001	0.00010688
7	Yes	21	0.00000001	0.00006490
8	Yes	16	0.00005566	0.00012423
9	Yes	16	0.00003421	0.00009056
10	Yes	21	0.00000001	0.00010911
11	Yes	21	0.00000001	0.00006628
12	Yes	21	0.00000001	0.00010690
13	Yes	21	0.00000001	0.00006484
14	Yes	16	0.00005578	0.00007951
15	Yes	15	0.00007651	0.00013212
16	Yes	21	0.00000001	0.00010701
17	Yes	21	0.00000001	0.00006502
18	Yes	21	0.00000001	0.00010690
19	Yes	21	0.00000001	0.00006490
20	Yes	16	0.00005569	0.00008589
21	Yes	15	0.00007640	0.00013639
22	Yes	21	0.00000001	0.00010731
23	Yes	21	0.00000001	0.00006505
24	Yes	21	0.00000001	0.00010996
25	Yes	21	0.00000001	0.00006679
26	Yes	13	0.00000001	0.00002138
27	Yes	18	0.00009921	0.00009534
28	Yes	19	0.00005095	0.00013581
29	Yes	19	0.00005095	0.00013762
30	Yes	18	0.00009922	0.00009252
31	Yes	19	0.00005093	0.00014570
32	Yes	19	0.00005094	0.00013703
33	Yes	18	0.00009921	0.00009563
34	Yes	19	0.00005092	0.00014876
35	Yes	19	0.00005092	0.00014647
36	Yes	18	0.00009921	0.00009425
37	Yes	19	0.00005093	0.00014117
38	Yes	20	0.00000001	0.00007917
39	Yes	15	0.00010427	0.00004560
40	Yes	15	0.00010402	0.00011538
41	Yes	15	0.00010403	0.00011613
42	Yes	15	0.00010427	0.00004415
43	Yes	15	0.00010404	0.00012744
44	Yes	15	0.00010403	0.00011024
45	Yes	15	0.00010428	0.00004488
46	Yes	15	0.00010405	0.00012236
47	Yes	15	0.00010406	0.00011884
48	Yes	15	0.00010431	0.00004380
49	Yes	15	0.00010406	0.00011271
50	Yes	15	0.00010404	0.00013117

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	35.67	49	1.966	0.002
L2	119.25 - 79.25	21.52	49	1.728	0.002
L3	83.75 - 43.75	10.42	49	1.201	0.001
L4	49 - 0	3.52	49	0.665	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	APXVTM14-C-120 w/ Mount Pipe	49	35.67	1.966	0.003	31846
153.00	TME-800MHz 2X50W RRH W/FILTER	49	34.84	1.957	0.003	31846
151.00	VHLP1-23	49	34.02	1.948	0.003	31846
145.00	RRUS 11	49	31.56	1.919	0.003	15922
143.00	OPA-65R-LCUU-H6 w/ Mount Pipe	49	30.75	1.908	0.003	13269
133.00	AIR -32 B2A/B66AA w/ Mount Pipe	49	26.74	1.848	0.003	7237
113.00	LNx-6512DS-T0M w/ Mount Pipe	49	19.30	1.653	0.002	4306
60.00	Side Arm Mount [SO 701-1]	49	5.23	0.827	0.001	3270

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	155 - 115.5	173.73	8	9.598	0.014
L2	119.25 - 79.25	104.97	8	8.437	0.013
L3	83.75 - 43.75	50.90	8	5.871	0.007
L4	49 - 0	17.19	10	3.250	0.004

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
155.00	APXVTM14-C-120 w/ Mount Pipe	8	173.73	9.598	0.014	6893
153.00	TME-800MHz 2X50W RRH W/FILTER	8	169.73	9.554	0.014	6893
151.00	VHLP1-23	8	165.73	9.509	0.014	6893
145.00	RRUS 11	8	153.78	9.368	0.014	3444
143.00	OPA-65R-LCUU-H6 w/ Mount Pipe	8	149.82	9.318	0.014	2869
133.00	AIR -32 B2A/B66AA w/ Mount Pipe	8	130.36	9.025	0.014	1561
113.00	LNx-6512DS-T0M w/ Mount Pipe	8	94.17	8.073	0.012	920
60.00	Side Arm Mount [SO 701-1]	10	25.58	4.046	0.005	676

Compression Checks Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	39.50	0.00	0.0	22.51	-12.56	1488.95	0.008
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	40.00	0.00	0.0	34.09	-22.69	2437.95	0.009
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	40.00	0.00	0.0	47.74	-32.50	3441.08	0.009
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	49.00	0.00	0.0	67.16	-50.06	4795.77	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio
					$\frac{M_{ux}}{\phi M_{nx}}$			$\frac{M_{uy}}{\phi M_{ny}}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	538	868	0.620	0	868	0.000
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	1570	1721	0.912	0	1721	0.000
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	2747	2834	0.969	0	2834	0.000
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	4593	4764	0.964	0	4764	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio	Actual T_u kip-ft	ϕT_n kip-ft	Ratio
					$\frac{V_u}{\phi V_n}$			$\frac{T_u}{\phi T_n}$
L1	155 - 115.5 (1)	TP29.31x22x0.25	22.42	364.61	0.061	1	890	0.001
L2	115.5 - 79.25 (2)	TP35.51x28.11x0.31	32.01	598.28	0.054	1	1768	0.001
L3	79.25 - 43.75 (3)	TP41.46x34.06x0.38	35.65	837.85	0.043	2	2888	0.001
L4	43.75 - 0 (4)	TP48.8x39.73x0.44	39.32	1178.61	0.033	3	4902	0.001

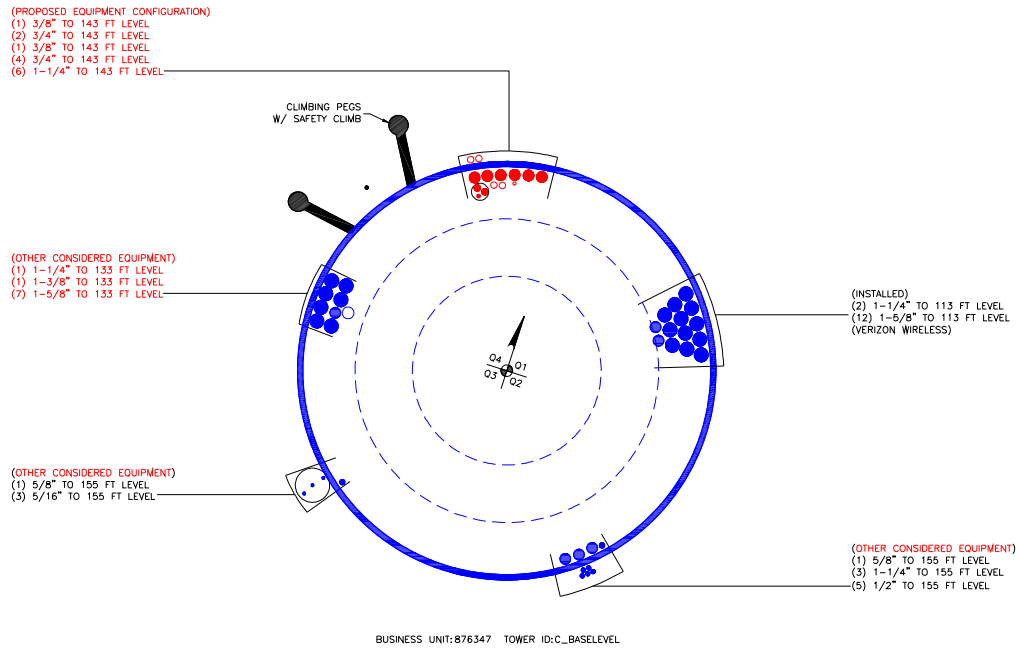
Pole Interaction Design Data

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$\frac{P_u}{\phi P_n}$	$\frac{M_{ux}}{\phi M_{nx}}$	$\frac{M_{uy}}{\phi M_{ny}}$	$\frac{V_u}{\phi V_n}$	$\frac{T_u}{\phi T_n}$			
L1	155 - 115.5 (1)	0.008	0.620	0.000	0.061	0.001	0.632	1.050	4.8.2
L2	115.5 - 79.25 (2)	0.009	0.912	0.000	0.054	0.001	0.924	1.050	4.8.2
L3	79.25 - 43.75 (3)	0.009	0.969	0.000	0.043	0.001	0.981	1.050	4.8.2
L4	43.75 - 0 (4)	0.010	0.964	0.000	0.033	0.001	0.976	1.050	4.8.2

Section Capacity Table

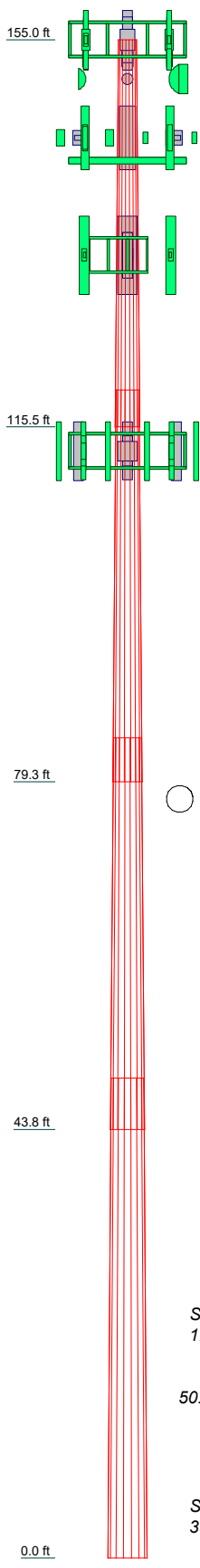
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	155 - 115.5	Pole	TP29.31x22x0.25	1	-12.56	1563.40	60.2	Pass
L2	115.5 - 79.25	Pole	TP35.51x28.11x0.31	2	-22.69	2559.85	88.0	Pass
L3	79.25 - 43.75	Pole	TP41.46x34.06x0.38	3	-32.50	3613.13	93.4	Pass
L4	43.75 - 0	Pole	TP48.8x39.73x0.44	4	-50.06	5035.56	92.9	Pass
Summary								
Pole (L3)							93.4	Pass
RATING =							93.4	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Section	1	2	3	4	
Length (ft)	39.50	40.00	40.00	49.00	
Number of Sides	18	18	18	18	
Thickness (in)	0.25	0.31	0.38	0.44	
Socket Length (ft)	3.75	4.50	5.25	5.97	
Top Dia (in)	22.00	28.11	34.06	39.73	
Bot Dia (in)	29.31	35.51	41.46	48.80	
Grade	A607-60		A607-65		
Weight (K)	2.7	4.3	6.1	10.1	23.2



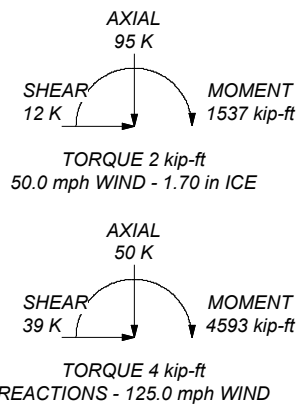
MATERIAL STRENGTH


GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi	A607-65	65 ksi	80 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125.0 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50.0 mph basic wind with 1.70 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.0 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: 93.4%

ALL REACTIONS ARE FACTORED



 Paul J. Ford and Company 250 East Broad st., Suite 600 Columbus, OH 43215 Phone: (614) 221-6679 FAX:	Job: 155 ft Monopole / Buckland Mall		
	Project: PJF 37518-2720 / BU 876347		
Client: Crown Castle	Drawn by: apike	App'd:	
Code: TIA-222-H	Date: 12/05/18	Scale: NTS	
Path:		Dwg No. E-1	

Monopole Base Plate Connection

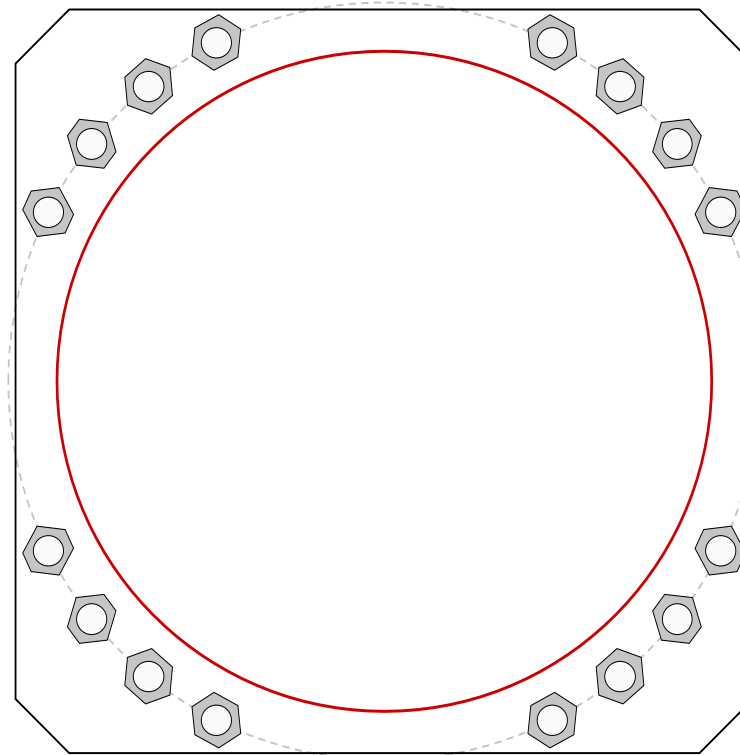


Site Info	
BU #	876347
Site Name	Buckland Mall
Order #	

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	0.5

Applied Loads	
Moment (kip-ft)	4593.47
Axial Force (kips)	50.06
Shear Force (kips)	39.32

*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

Anchor Rod Data
(16) 2-1/4" ϕ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 56" BC
Base Plate Data
55" OD x 3.25" Plate (A572-50; $F_y=50$ ksi, $F_u=65$ ksi)
Stiffener Data
N/A
Pole Data
48.8" x 0.4375" 18-sided pole (A607-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary		<i>(units of kips, kip-in)</i>
$P_{u_c} = 249.05$	$\phi P_{n_c} = 243.75$	Stress Rating
$V_u = 2.46$	$\phi V_n = 73.13$	97.4%
$M_u = n/a$	$\phi M_n = n/a$	Pass
Base Plate Summary		
Max Stress (ksi):	35.6	(Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	75.3%	Pass

Pier and Pad Foundation



BU #: 876347
 Site Name: Buckland Mall
 App. Number:

TIA-222 Revision: H
 Tower Type: Monopole

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

Superstructure Analysis Reactions		
Compression, P_{comp} :	50.06	kips
Base Shear, Vu_{comp} :	39.32	kips
Moment, M_u :	4593.47	ft-kips
Tower Height, H :	155	ft
BP Dist. Above Fdn, bp_{dist} :	3	in

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
<i>Lateral (Sliding) (kips)</i>	361.42	39.32	10.4%	Pass
<i>Bearing Pressure (ksf)</i>	22.50	3.49	15.5%	Pass
<i>Overtuning (kip*ft)</i>	8532.29	5016.16	58.8%	Pass
<i>Pier Flexure (Comp.) (kip*ft)</i>	7573.14	4888.37	61.5%	Pass
<i>Pier Compression (kip)</i>	18370.97	102.01	0.5%	Pass
<i>Pad Flexure (kip*ft)</i>	4568.38	1980.07	41.3%	Pass
<i>Pad Shear - 1-way (kips)</i>	709.93	331.98	44.5%	Pass
<i>Pad Shear - 2-way (Comp) (ksi)</i>	0.164	0.049	28.5%	Pass
<i>Flexural 2-way (Comp) (kip*ft)</i>	6333.75	2933.02	44.1%	Pass

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, d_{pier} :	7	ft
Ext. Above Grade, E :	0.5	ft
Pier Rebar Size, S_c :	11	
Pier Rebar Quantity, m_c :	32	
Pier Tie/Spiral Size, S_t :	5	
Pier Tie/Spiral Quantity, m_t :	12	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

*Rating per TIA-222-H Section 15.5

Soil Rating*:	58.8%
Structural Rating*:	61.5%

Pad Properties		
Depth, D :	10	ft
Pad Width, W :	23	ft
Pad Thickness, T :	3	ft
Pad Rebar Size (Bottom), S_p :	9	
Pad Rebar Quantity (Bottom), m_p :	34	
Pad Clear Cover, cc_{pad} :	3	in

Material Properties		
Rebar Grade, F_y :	60000	psi
Concrete Compressive Strength, F'_c :	3000	psi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	115	pcf
Ultimate Gross Bearing, Q_{ult} :	30.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	30	degrees
SPT Blow Count, N_{blows} :		
Base Friction, μ :		
Neglected Depth, N :	3.50	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	99	ft

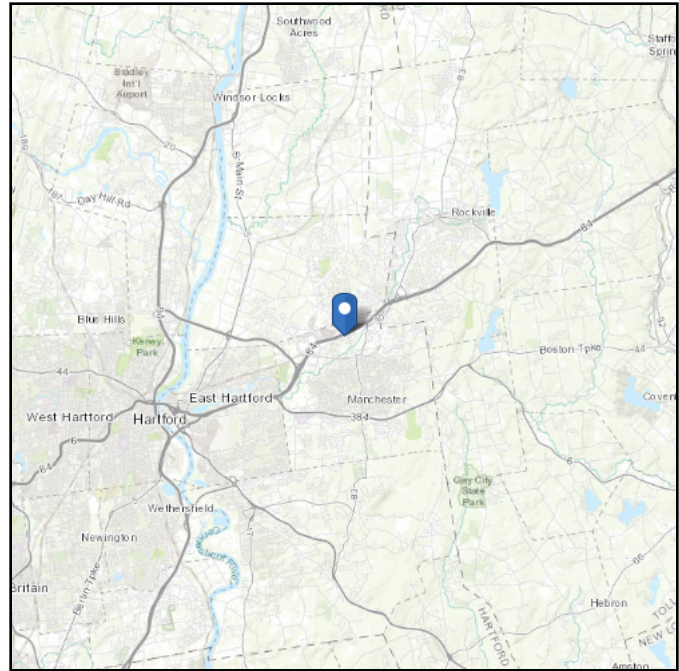
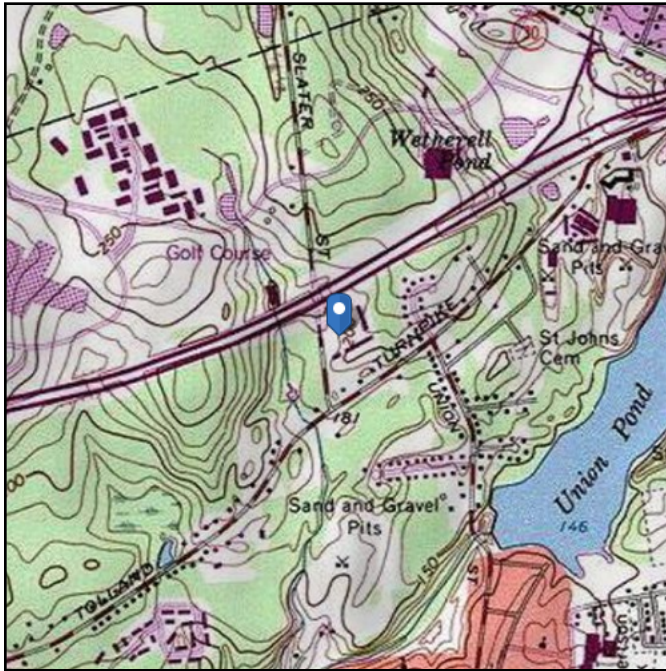
<--Toggle between Gross and Net

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 195.5 ft (NAVD 88)
Latitude: 41.805
Longitude: -72.533611



Wind

Results:	77 Vmph
Wind Speed:	123 Vmph
10-year MRI	77 Vmph
25-year MRI	87 Vmph
50-year MRI	93 Vmph
100-year MRI	101 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: Wed Dec 05 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).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

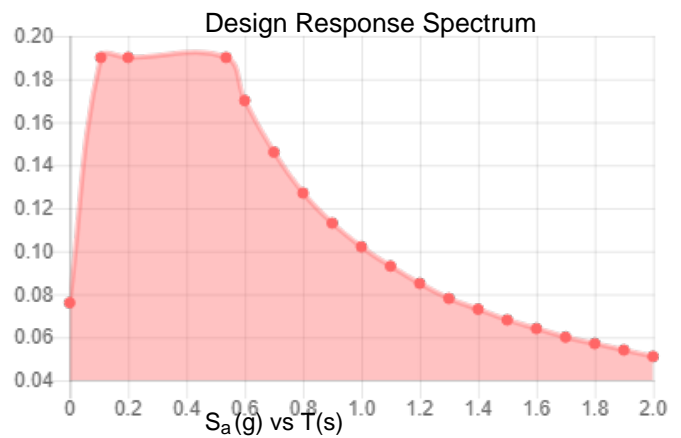
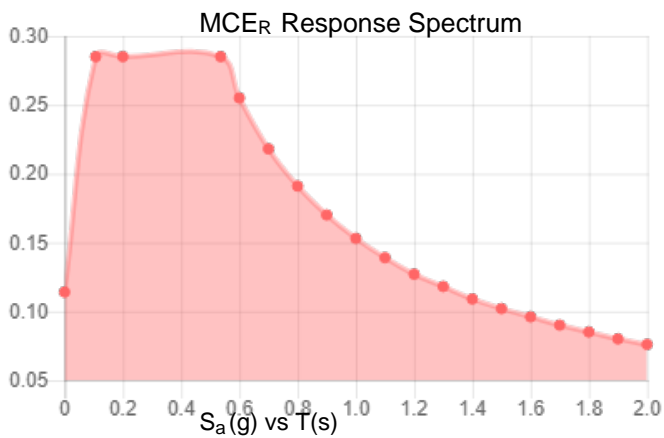
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.178	S_{DS} :	0.190
S_1 :	0.064	S_{D1} :	0.102
F_a :	1.600	T_L :	6.000
F_v :	2.400	PGA :	0.089
S_{MS} :	0.285	PGA _M :	0.143
S_{M1} :	0.153	F _{PGA} :	1.600
		I_e :	1

Seismic Design Category B



Data Accessed:

Wed Dec 05 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: 1.00 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

Data Source: Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

Date Accessed: Wed Dec 05 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.

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.