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

February 21, 2019

Jeffrey Barbadora
Real Estate Specialist
Crown Castle
12 Gill Street, Suite 5800
Woburn, MA 01801

RE: **EM-VER-089-181221** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 167 Coccomo Circle, New Britain, Connecticut.

Dear Mr. Barbadora:

The Connecticut Siting Council (Council) is in receipt of your correspondence of January 17, 2019 and February 14, 2019, submitted in response to the Council's December 27, 2018 and January 18, 2019 notifications of an incomplete request for exempt modification with regard to the above-referenced matter.

The submissions render 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

Robidoux, Evan

From: Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
Sent: Thursday, January 17, 2019 12:35 PM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council Incomplete Letter for EM-VER-089-181221-CoccomoCircle-NewBritain
Attachments: 803175_450305_MountAnalysis_Sufficient_Verizon_146ft_01-15-19.pdf

Good afternoon,

Attached is a passing mount analysis as requested.

Thanks,

Jeffrey Barbadora
781-970-0053
12 Gill Street, Suite 5800, Woburn, MA 01801
CrownCastle.com

From: Robidoux, Evan <Evan.Robidoux@ct.gov>
Sent: Friday, December 28, 2018 1:57 PM
To: Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: RE: Council Incomplete Letter for EM-VER-089-181221-CoccomoCircle-NewBritain

Hi Jeff – Subject line for the previous email should refer to Coccomo Circle in New Britain, not the Madison address.

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

From: Robidoux, Evan
Sent: Friday, December 28, 2018 1:55 PM
To: 'Jeff.Barbadora@crowncastle.com' <Jeff.Barbadora@crowncastle.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: Council Incomplete Letter for EM-VER-089-181221-OldRoute79-Madison

Please see the attached correspondence.

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

Robidoux, Evan

From: Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
Sent: Thursday, February 14, 2019 2:44 PM
To: Robidoux, Evan
Cc: CSC-DL Siting Council
Subject: RE: Council 2nd Incomplete Letter for EM-VER-089-181221_CoccomoCircle_NewBritain
Attachments: FCD.pdf; SA.pdf; MA.pdf

Good afternoon Evan,

Please see attached construction drawings, structural analysis and mount analysis.

Please let me know if the Council would like hard copies of each to be sent.

Thanks,

Jeffrey Barbadora
781-970-0053
12 Gill Street, Suite 5800, Woburn, MA 01801
CrownCastle.com

From: Robidoux, Evan <Evan.Robidoux@ct.gov>
Sent: Friday, January 18, 2019 4:20 PM
To: Barbadora, Jeff <Jeff.Barbadora@crowncastle.com>
Cc: CSC-DL Siting Council <Siting.Council@ct.gov>
Subject: Council 2nd Incomplete Letter for EM-VER-089-181221_CoccomoCircle_NewBritain

Please see the attached correspondence.

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

Date: **January 15, 2019**

Williams Gate
Crown Castle
3 Corporate Dr., St 101
Clifton Park, NY 12065

INFINIGY
FROM ZERO TO INFINIGY
the solutions are endless
Infinigy Engineering, PLLC
1033 Watervliet Shaker Road
Albany, NY 12205
518-690-0790
structural@infinigy.com

Subject:	**Mount Analysis Report**	
Carrier Designation:	**Verizon Upgrade**	
	Carrier Site Number:	34002
	Carrier Site Name:	New Britain 3 CT
Crown Castle Designation:	**Crown Castle BU Number:**	803175
	Crown Castle Site Name:	CT New Britain 3 CAC 803175
	Crown Castle JDE Job Number:	518913
	Crown Castle Order Number:	450305, Rev 1
Engineering Firm Designation:	**Infinigy Report Designation:**	1039-D0001-B
Site Data:	**167 Coccomo, New Britain, CT, 06051** **Latitude 41°41'11.80" Longitude 72°45'27.80"**	
Structure Information:	**Tower Height & Type:**	**188.0 ft Monopole**
	Mount Elevation:	**146.0 ft**
	Mount Type:	**12 ft Sector Frame**

Dear Williams Gate,

Infinigy is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of Verizon's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

Sector Frame (typical)	**Sufficient**

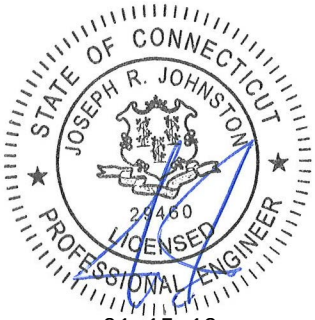
.

The analysis has been performed in accordance with the TIA-222-H Standard. This analysis utilizes an ultimate 3-second gust wind speed of 125 mph from the 2012 International Building Code with 2018 Connecticut State Building Code. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II was/were used in this analysis.

We at Infinigy Engineering, PLLC appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Mount analysis prepared by: Christopher Kudlacik
Respectfully Submitted by:

Joseph R. Johnston, P.E.
VP Structural Engineering / Principal



01-15-19

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a proposed 12 ft CSOTF Sector Framedesigned by Armor Tower. This mount is installed at the 146.0 ft elevation on 3 sector(s) of the 188.0 ft Monopole**.**

2) ANALYSIS CRITERIA

Building Code:	2012 IBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	125 mph
Exposure Category:	C
Topographic Factor at Base:	1.0
Topographic Factor at Mount:	1.0
Ice Thickness:	2.0 in
Wind Speed with Ice:	50 mph
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Final Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
146	149	3	Amphenol	BXA-80063-6BF-EDIN-4	Sector Frame
		3	Andrew	LNX-6512DS-A1M	
		6	Andrew	SBNHH-1D65B	
		1	GPS	GPS_A	
	145	2	Raycap	RHSDC-3315-PF-48	
	149	3	Samsung	RFV01U-D1A	
		3	Samsung	RFV01U-D2A	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Crown Application	Verizon Application	803175	CCI Sites
Mount Design	September 11 2018	CSOTF	CCI Sites
TIA Inspection	April 3, 2018	803175	CCI Sites

3.1) Analysis Method

RISA-3D (Version 17.0.2), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision B).

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
4) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM A53 (GR 35)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Infinigy should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Sector Frame, Typical)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1,2	Mount Pipe	MP4	146.0	25.9%	Pass
	Main Horizontal	H2	146.0	30.6%	Pass
	Standoff	S2	146.0	33.3%	Pass
	Solid Round	B9	146.0	42.9%	Pass
	Bolt Check	--	146.0	4.2%	Pass

Structure Rating (max from all components) =	42.9%

Notes:
1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
2) All sectors are typical

Table 4 - Tieback Connection Data Table

Tower Connection Node No.	Existing / Proposed	Resultant End Reaction (lb)	Connected Member Type	Connected Member Size	Member Compressive Capacity (lb)[3]	Notes
N102	Proposed	639	Sector Frame	N/A	N/A	4

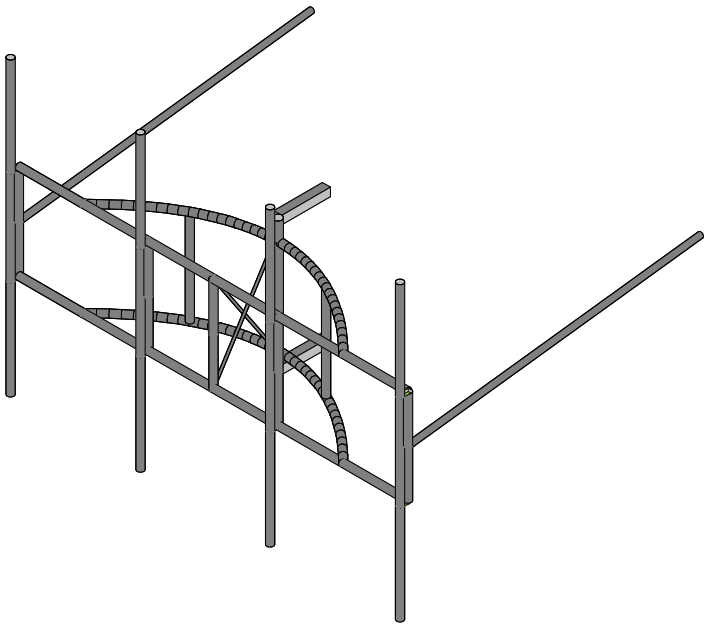
Notes:
1) Tieback connection point is within 25% of either end of the connected tower member
2) Tieback connection point is NOT within 25% of either end of the connected tower member
3) Reduced member compressive capacity according to CED-STD-10294 *Standard for Installation of Mounts and Appurtenances*
4) Tieback connects to adjacent sector frames

4.1) Recommendations

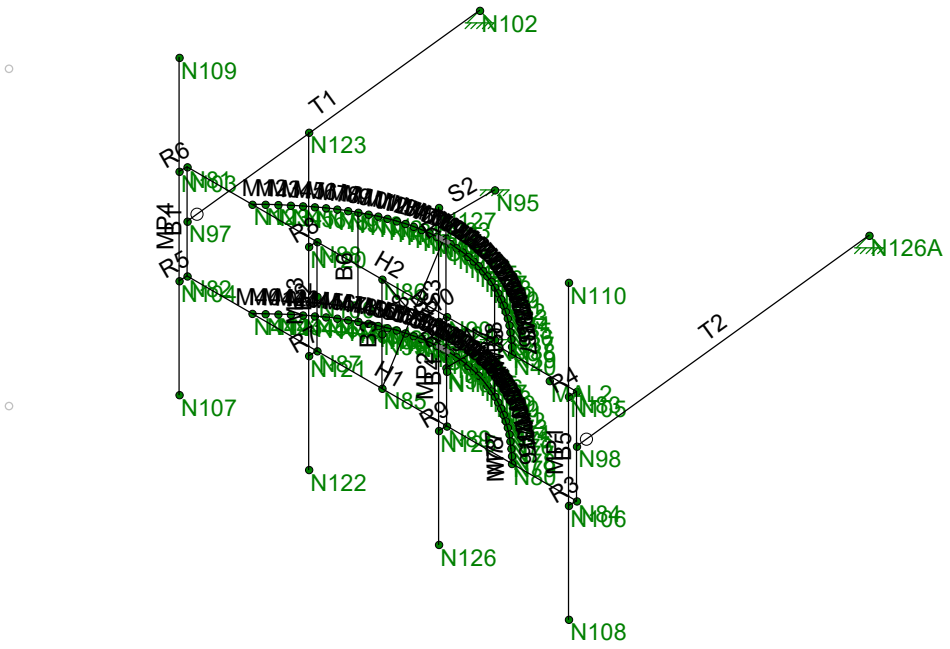
The Sector Frame Mount has sufficient capacity to support the proposed loading. No modifications are needed at this time.

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Infinigy Engineering, PLLC	803175	Final Configuration
CLK		Jan 15, 2019 at 10:25 AM
1039-D0001-B		CSOTF - 803175.r3d



Infinigy Engineering, PLLC	803175	Wireframe
CLK		Jan 15, 2019 at 10:25 AM
1039-D0001-B		CSOTF - 803175.r3d

APPENDIX B

SOFTWARE INPUT CALCULATIONS

Site Name:	803175
Client:	Crown Castle
Carrier:	Verizon
Engineer:	CLK
Date:	1/15/2019

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INFINIGY WIND LOAD CALCULATOR 3.0.2

Site Information Inputs:

Adopted Building Code:	2012 IBC
Structure Load Standard:	TIA-222-H
Antenna Load Standard:	TIA-222-H
Structure Risk Category:	II
Structure Type:	Mount - Sector
Number of Sectors:	3
Structure Shape 1:	Round

Rooftop Inputs:

Rooftop Wind Speed-Up?:	No

Wind Loading Inputs:

Design Wind Velocity:	125	mph (ultimate 3-second gust)
Wind Centerline 1 (z_1):	146.0	ft
Side Face Angle (θ):	60	degrees
Exposure Category:	C	
Topographic Category:	1	

Wind with No Ice		
q_z (psf)	Gh	F_{ST} (psf)
51.92	1.00	**62.30**

Wind with Ice		
q_z (psf)	Gh	F_{ST} (psf)
8.31	1.00	**29.53**

Ice Loading Inputs:

Is Ice Loading Needed?:	Yes	
Ice Wind Velocity:	50	mph (ultimate 3-second gust)
Base Ice Thickness:	2.00	in

Input Appurtenance Information and Load Placements:

Appurtenance Name	Elevation (ft)	Total Quantity	Ka	Front Shape	Side Shape	q_z (psf)	EPA (ft^2)	Fz (lbs)	Fx (lbs)	Fz(60) (lbs)	Fx(30) (lbs)
Amphenol BXA-80063-6BF-EDIN-4	149.0	3	1.00	Flat	Flat	52.14	7.26	378.66	210.39	252.46	336.59
Andrew LNX-6512DS-A1M	149.0	3	1.00	Flat	Flat	52.14	5.09	265.41	173.62	196.57	242.46
Andrew SBNHH-1D65B	149.0	3	1.00	Flat	Flat	52.14	8.08	421.24	278.52	314.20	385.56
Andrew SBNHH-1D65B	149.0	3	1.00	Flat	Flat	52.14	8.08	421.24	278.52	314.20	385.56
GPS / GPS_A	149.0	1	1.00	Flat	Flat	52.14	0.26	13.30	13.30	13.30	13.30
Raycap RHSDC-3315-PF-48	145.0	2	1.00	Flat	Flat	51.84	3.36	174.38	113.64	128.83	159.20
Samsung RFV01U-D1A	149.0	3	1.00	Flat	Flat	52.14	1.88	97.76	65.18	73.32	89.62
Samsung RFV01U-D2A	149.0	3	1.00	Flat	Flat	52.14	1.88	97.76	52.79	64.04	86.52

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	B1	N82	N81			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
2	B2	N87	N88			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
3	B3	N85	N86			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
4	B4	N89	N90			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
5	B5	N84	N83			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
6	B6	N50	N10			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
7	B7	N70	N30			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
8	B8	CP	N85			3/4" SR	Beam	None	A572 Gr.50	Typical
9	B9	N86	CP2			3/4" SR	Beam	None	A572 Gr.50	Typical
10	H1	N84	N82			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
11	H2	N83	N81			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
12	M1	N1	N2			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
13	M2	N2	N3			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
14	M3	N3	N4			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
15	M4	N4	N5			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
16	M5	N5	N6			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
17	M6	N6	N7			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
18	M7	N7	N8			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
19	M8	N8	N9			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
20	M9	N9	N10			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
21	M10	N10	N11			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
22	M11	N11	N12			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
23	M12	N12	N13			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
24	M13	N13	N14			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
25	M14	N14	N15			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
26	M15	N15	N16			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
27	M16	N16	N17			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
28	M17	N17	N18			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
29	M18	N18	N19			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
30	M19	N19	CP			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
31	M20	CP	N21			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
32	M21	N21	N22			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
33	M22	N22	N23			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
34	M23	N23	N24			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
35	M24	N24	N25			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
36	M25	N25	N26			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
37	M26	N26	N27			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
38	M27	N27	N28			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
39	M28	N28	N29			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
40	M29	N29	N30			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
41	M30	N30	N31			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
42	M31	N31	N32			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
43	M32	N32	N33			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
44	M33	N33	N34			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
45	M34	N34	N35			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
46	M35	N35	N36			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
47	M36	N36	N37			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
48	M37	N37	N38			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
49	M38	N38	N39			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
50	M39	N39	N40			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
51	M40	N41	N42			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
52	M41	N42	N43			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
53	M42	N43	N44			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
54	M43	N44	N45			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
55	M44	N45	N46			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
56	M45	N46	N47			2.0 Std Pipe	Beam	None	ASTM A5...	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
57	M46	N47	N48			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
58	M47	N48	N49			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
59	M48	N49	N50			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
60	M49	N50	N51			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
61	M50	N51	N52			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
62	M51	N52	N53			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
63	M52	N53	N54			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
64	M53	N54	N55			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
65	M54	N55	N56			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
66	M55	N56	N57			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
67	M56	N57	N58			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
68	M57	N58	N59			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
69	M58	N59	CP2			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
70	M59	CP2	N61			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
71	M60	N61	N62			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
72	M61	N62	N63			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
73	M62	N63	N64			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
74	M63	N64	N65			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
75	M64	N65	N66			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
76	M65	N66	N67			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
77	M66	N67	N68			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
78	M67	N68	N69			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
79	M68	N69	N70			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
80	M69	N70	N71			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
81	M70	N71	N72			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
82	M71	N72	N73			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
83	M72	N73	N74			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
84	M73	N74	N75			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
85	M74	N75	N76			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
86	M75	N76	N77			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
87	M76	N77	N78			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
88	M77	N78	N79			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
89	M78	N79	N80			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
90	R1	N92	CP2			RIGID	None	None	RIGID	Typical
91	R2	N91	CP			RIGID	None	None	RIGID	Typical
92	R3	N84	N106			RIGID	None	None	RIGID	Typical
93	R4	N83	N105			RIGID	None	None	RIGID	Typical
94	R5	N82	N104			RIGID	None	None	RIGID	Typical
95	R6	N81	N103			RIGID	None	None	RIGID	Typical
96	R7	N87	N121			RIGID	None	None	RIGID	Typical
97	R8	N88	N120			RIGID	None	None	RIGID	Typical
98	R9	N89	N125			RIGID	None	None	RIGID	Typical
99	R10	N90	N124			RIGID	None	None	RIGID	Typical
100	MP4	N107	N109			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
101	MP3	N122	N123			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
102	MP2	N126	N127			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
103	MP1	N108	N110			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
104	S1	N96	N94			HSS 3x3x3/16	Beam	None	ASTM A5...	Typical
105	S2	N95	N93			HSS 3x3x3/16	Beam	None	ASTM A5...	Typical
106	S3	N94	N93			2.5 Sch. 80 Pipe	Beam	None	ASTM A5...	Typical
107	T1	N97	N102			1.5 Std Pipe	Beam	None	ASTM A5...	Typical
108	T2	N98	N126A			1.5 Std Pipe	Beam	None	ASTM A5...	Typical

Material Takeoff

	Material	Size	Pieces	Length[in]	Weight[LB]
1	General				
2	RIGID		10	26	0
3	Total General		10	26	0
4					
5	Hot Rolled Steel				
6	A572 Gr.50	SR 3/4"	2	84.9	10.6
7	ASTM A500 Gr. 50	PIPE_1.5	2	244.8	55.9
8	ASTM A500 Gr. 50	PIPE_2.0	91	1178.1	366.5
9	ASTM A500 Gr. 50	PIPE_2.5X	1	48	30.7
10	ASTM A500 Gr. C	HSS3X3X3	2	36	20.8
11	Total HR Steel		98	1591.8	484.5

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Self Weight	DL		-1			13			
2	Wind Load AZI 000	WLZ					13		1	
3	Wind Load AZI 090	WLX					13		1	
4	Ice Weight	OL1					13	108		
5	Wind + Ice Load AZI ...	OL2					13		1	
6	Wind + Ice Load AZI ...	OL3					13		1	
7	Service Live 1	LL				2				
8	BLC 2 Transient Area...	None						96		
9	BLC 3 Transient Area...	None						104		
10	BLC 5 Transient Area...	None						96		
11	BLC 6 Transient Area...	None						104		

Load Combinations

	Description	S...	PD...	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	F...	.....	F.....	F.....	F.....	F...
1	1.4D	Yes	Y		DL	1.4											
2	1.2D + 1W AZI 000	Yes	Y		DL	1.2	WLZ	1									
3	1.2D + 1W AZI 030	Yes	Y		DL	1.2	WLZ	.866	WLX	.5							
4	1.2D + 1W AZI 060	Yes	Y		DL	1.2	WLZ	.5	WLX	.866							
5	1.2D + 1W AZI 090	Yes	Y		DL	1.2			WLX	1							
6	1.2D + 1W AZI 120	Yes	Y		DL	1.2	WLZ	-.5	WLX	.866							
7	1.2D + 1W AZI 150	Yes	Y		DL	1.2	WLZ	-.866	WLX	.5							
8	1.2D + 1W AZI 180	Yes	Y		DL	1.2	WLZ	-1									
9	1.2D + 1W AZI 210	Yes	Y		DL	1.2	WLZ	-.866	WLX	-.5							
10	1.2D + 1W AZI 240	Yes	Y		DL	1.2	WLZ	-.5	WLX	-.866							
11	1.2D + 1W AZI 270	Yes	Y		DL	1.2			WLX	-1							
12	1.2D + 1W AZI 300	Yes	Y		DL	1.2	WLZ	.5	WLX	-.866							
13	1.2D + 1W AZI 330	Yes	Y		DL	1.2	WLZ	.866	WLX	-.5							
14	0.9D + 1W AZI 000	Yes	Y		DL	.9	WLZ	1									
15	0.9D + 1W AZI 030	Yes	Y		DL	.9	WLZ	.866	WLX	.5							
16	0.9D + 1W AZI 060	Yes	Y		DL	.9	WLZ	.5	WLX	.866							
17	0.9D + 1W AZI 090	Yes	Y		DL	.9			WLX	1							
18	0.9D + 1W AZI 120	Yes	Y		DL	.9	WLZ	-.5	WLX	.866							
19	0.9D + 1W AZI 150	Yes	Y		DL	.9	WLZ	-.866	WLX	.5							
20	0.9D + 1W AZI 180	Yes	Y		DL	.9	WLZ	-1									
21	0.9D + 1W AZI 210	Yes	Y		DL	.9	WLZ	-.866	WLX	-.5							
22	0.9D + 1W AZI 240	Yes	Y		DL	.9	WLZ	-.5	WLX	-.866							
23	0.9D + 1W AZI 270	Yes	Y		DL	.9			WLX	-1							
24	0.9D + 1W AZI 300	Yes	Y		DL	.9	WLZ	.5	WLX	-.866							
25	0.9D + 1W AZI 330	Yes	Y		DL	.9	WLZ	.866	WLX	-.5							

Load Combinations (Continued)

	Description	S...	PD...	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	F...	.....	F.....	F.....	F.....	F...
26	1.2D + 1.0Di	Yes	Y		DL	1.2	OL1	1									
27	1.2D + 1.0Di + 1.0Wi AZI 000	Yes	Y		DL	1.2	OL1	1	OL2	1							
28	1.2D + 1.0Di + 1.0Wi AZI 030	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	.5					
29	1.2D + 1.0Di + 1.0Wi AZI 060	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	.8...					
30	1.2D + 1.0Di + 1.0Wi AZI 090	Yes	Y		DL	1.2	OL1	1			OL3	1					
31	1.2D + 1.0Di + 1.0Wi AZI 120	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	.8...					
32	1.2D + 1.0Di + 1.0Wi AZI 150	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	.5					
33	1.2D + 1.0Di + 1.0Wi AZI 180	Yes	Y		DL	1.2	OL1	1	OL2	-1							
34	1.2D + 1.0Di + 1.0Wi AZI 210	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	-.5					
35	1.2D + 1.0Di + 1.0Wi AZI 240	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	-....					
36	1.2D + 1.0Di + 1.0Wi AZI 270	Yes	Y		DL	1.2	OL1	1			OL3	-1					
37	1.2D + 1.0Di + 1.0Wi AZI 300	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	-....					
38	1.2D + 1.0Di + 1.0Wi AZI 330	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	-.5					
39	1.2D + 1.5L + 1.0WL (30 mph) AZI 000	Yes	Y		DL	1.2	LL	1.5	WLZ	.058							
40	1.2D + 1.5L + 1.0WL (30 mph) AZI 030	Yes	Y		DL	1.2	LL	1.5	WLZ	.05	WLX	.0...					
41	1.2D + 1.5L + 1.0WL (30 mph) AZI 060	Yes	Y		DL	1.2	LL	1.5	WLZ	.029	WLX	.05					
42	1.2D + 1.5L + 1.0WL (30 mph) AZI 090	Yes	Y		DL	1.2	LL	1.5			WLX	.0...					
43	1.2D + 1.5L + 1.0WL (30 mph) AZI 120	Yes	Y		DL	1.2	LL	1.5	WLZ	-.029	WLX	.05					
44	1.2D + 1.5L + 1.0WL (30 mph) AZI 150	Yes	Y		DL	1.2	LL	1.5	WLZ	-.05	WLX	.0...					
45	1.2D + 1.5L + 1.0WL (30 mph) AZI 180	Yes	Y		DL	1.2	LL	1.5	WLZ	-.058							
46	1.2D + 1.5L + 1.0WL (30 mph) AZI 210	Yes	Y		DL	1.2	LL	1.5	WLZ	-.05	WLX	-....					
47	1.2D + 1.5L + 1.0WL (30 mph) AZI 240	Yes	Y		DL	1.2	LL	1.5	WLZ	-.029	WLX	-.05					
48	1.2D + 1.5L + 1.0WL (30 mph) AZI 270	Yes	Y		DL	1.2	LL	1.5			WLX	-....					
49	1.2D + 1.5L + 1.0WL (30 mph) AZI 300	Yes	Y		DL	1.2	LL	1.5	WLZ	.029	WLX	-.05					
50	1.2D + 1.5L + 1.0WL (30 mph) AZI 330	Yes	Y		DL	1.2	LL	1.5	WLZ	.05	WLX	-....					

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-in]	LC	MY [lb-in]	LC	MZ [lb-in]	LC
1	N96	max	658.457	17	1998.666	27	2583.899	27	-999.198	20	10844.602	17	2369.758	23
2		min	-683.09	11	3.702	20	71.995	20	-21737.027	27	-11213.356	11	-2427.758	5
3	N95	max	1439.801	5	2005.191	33	1241.652	14	-2807.635	14	21504.552	5	1730.384	17
4		min	-1415.765	23	4.257	14	-2880.78	33	-21305.315	33	-21155.178	23	-1789.756	11
5	N102	max	110.15	16	72.76	34	639.6	15	0	50	0	50	0	50
6		min	-110.514	22	11.893	16	-638.784	21	0	1	0	1	0	1
7	N126A	max	54.241	14	72.8	32	614.279	25	0	50	0	50	0	50
8		min	-54.195	20	11.978	24	-613.369	19	0	1	0	1	0	1
9	Totals:	max	2200.262	17	3912.289	32	2981.314	14						
10		min	-2200.262	11	692.303	25	-2981.316	8						

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc.....		LC	phi*Pnc [lb]	phi*Pn...	phi*M...	phi*M...	...	Eqn
1	B9	SR 3/4"	.429	42.447	27	.004	0		10	3974.429	19880...	2982.1...	2982.1...	1...	H1-1a
2	M19	PIPE_2.0	.345	.652	32	.172	.652		32	45898.862	45900	32085	32085	1...	H1-1b
3	M20	PIPE_2.0	.335	0	34	.170	0		34	45898.873	45900	32085	32085	1...	H1-1b
4	S2	HSS3X3X3	.333	0	30	.092	0	y	35	83516.02	85050	88650	88650	2...	H1-1b
5	M18	PIPE_2.0	.329	2.474	32	.155	2.474		32	45883.623	45900	32085	32085	1...	H1-1b
6	M21	PIPE_2.0	.320	0	34	.154	0		34	45883.751	45900	32085	32085	1...	H1-1b
7	M58	PIPE_2.0	.306	.652	37	.154	.652		35	45898.862	45900	32085	32085	1...	H1-1b
8	H2	PIPE_2.0	.306	120	7	.123	120		30	6830.97	45900	32085	32085	1...	H1-1b
9	H1	PIPE_2.0	.305	72	33	.118	120		31	6830.97	45900	32085	32085	1...	H1-1b
10	S1	HSS3X3X3	.303	0	36	.094	0	y	29	83516.02	85050	88650	88650	2...	H1-1b
11	M59	PIPE_2.0	.297	0	30	.153	0		31	45898.873	45900	32085	32085	1...	H1-1b
12	M57	PIPE_2.0	.293	2.474	37	.139	2.474		35	45883.623	45900	32085	32085	1...	H1-1b
13	B6	PIPE_2.0	.293	35	30	.080	0		34	42737.097	45900	32085	32085	2...	H1-1b

Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc.....	LC	phi*Pnc [lb]	phi*Pn...	phi*M...	phi*M...	...	Eqn
14	M60	PIPE_2.0	.284	0	30	.139	0	31	45883.751	45900	32085	32085	1...	H1-1b
15	B7	PIPE_2.0	.269	35	36	.081	35	33	42737.097	45900	32085	32085	2...	H1-1b
16	M17	PIPE_2.0	.265	2.49	32	.139	2.49	32	45883.41	45900	32085	32085	1...	H1-1b
17	MP3	PIPE_2.0	.259	72	8	.117	70....	32	12143.947	45900	32085	32085	4...	H1-1b
18	MP4	PIPE_2.0	.259	72	8	.039	70....	8	12143.947	45900	32085	32085	4...	H1-1b
19	M22	PIPE_2.0	.257	0	34	.139	0	34	45883.623	45900	32085	32085	1...	H1-1b
20	M9	PIPE_2.0	.239	2.826	32	.051	2.826	33	45878.637	45900	32085	32085	1...	H1-1b
21	M56	PIPE_2.0	.239	2.49	37	.125	2.49	35	45883.41	45900	32085	32085	1...	H1-1b
22	M48	PIPE_2.0	.236	2.826	31	.046	2.826	33	45878.637	45900	32085	32085	1...	H1-1b
23	MP1	PIPE_2.0	.234	72	8	.039	70....	8	12143.947	45900	32085	32085	4...	H1-1b
24	M61	PIPE_2.0	.230	0	30	.126	0	32	45883.623	45900	32085	32085	1...	H1-1b
25	M30	PIPE_2.0	.230	0	34	.050	0	33	45879.532	45900	32085	32085	1...	H1-1b
26	M69	PIPE_2.0	.226	0	35	.045	0	33	45879.532	45900	32085	32085	1...	H1-1b
27	M8	PIPE_2.0	.214	2.89	32	.041	2.89	33	45877.657	45900	32085	32085	1...	H1-1b
28	M31	PIPE_2.0	.210	0	34	.040	0	33	45878.637	45900	32085	32085	1...	H1-1b
29	M47	PIPE_2.0	.209	2.89	31	.037	2.89	33	45877.657	45900	32085	32085	1...	H1-1b
30	M16	PIPE_2.0	.207	2.513	32	.126	2.513	32	45883.111	45900	32085	32085	1...	H1-1b
31	M70	PIPE_2.0	.204	0	35	.036	0	33	45878.637	45900	32085	32085	1...	H1-1b
32	M23	PIPE_2.0	.199	0	34	.127	0	34	45883.41	45900	32085	32085	1...	H1-1b
33	S3	PIPE_2.5X	.190	48	33	.121	48	6	85959.338	94500	79650	79650	1...	H1-1b
34	M32	PIPE_2.0	.190	0	34	.033	0	7	45877.657	45900	32085	32085	1...	H1-1b
35	M7	PIPE_2.0	.190	2.958	32	.035	2.958	8	45876.592	45900	32085	32085	1...	H1-1b
36	M55	PIPE_2.0	.188	2.513	37	.113	2.513	35	45883.111	45900	32085	32085	1...	H1-1b
37	M46	PIPE_2.0	.183	2.958	31	.030	2.958	33	45876.592	45900	32085	32085	1...	H1-1b
38	M71	PIPE_2.0	.182	0	35	.028	0	33	45877.657	45900	32085	32085	1...	H1-1b
39	M62	PIPE_2.0	.181	0	30	.115	0	32	45883.41	45900	32085	32085	1...	H1-1b
40	MP2	PIPE_2.0	.171	72	8	.116	70....	34	12143.947	45900	32085	32085	4...	H1-1b
41	M33	PIPE_2.0	.170	0	34	.031	0	8	45876.592	45900	32085	32085	1...	H1-1b
42	M6	PIPE_2.0	.166	3.03	33	.035	0	8	45875.442	45900	32085	32085	1...	H1-1b
43	B2	PIPE_2.0	.163	35	31	.122	35	32	42737.097	45900	32085	32085	2...	H1-1b
44	M72	PIPE_2.0	.161	0	35	.025	0	37	45876.592	45900	32085	32085	1...	H1-1b
45	B4	PIPE_2.0	.160	35	35	.121	35	34	42737.097	45900	32085	32085	2...	H1-1b
46	M45	PIPE_2.0	.158	3.03	30	.029	3.03	29	45875.442	45900	32085	32085	1...	H1-1b
47	M15	PIPE_2.0	.156	2.541	31	.115	2.541	33	45882.728	45900	32085	32085	1...	H1-1b
48	M34	PIPE_2.0	.150	0	33	.032	3.03	8	45875.442	45900	32085	32085	1...	H1-1b
49	M24	PIPE_2.0	.149	0	35	.116	0	33	45883.111	45900	32085	32085	1...	H1-1b
50	B1	PIPE_2.0	.148	35	30	.055	17.5	9	42737.097	45900	32085	32085	2...	H1-1b
51	T1	PIPE_1.5	.146	122.376	15	.007	122...	36	4419.892	33705	18945	18945	1...	H1-1b*
52	B5	PIPE_2.0	.145	35	37	.054	17.5	8	42737.097	45900	32085	32085	2...	H1-1b
53	T2	PIPE_1.5	.143	61.188	37	.007	0	36	4419.892	33705	18945	18945	1...	H1-1b
54	M54	PIPE_2.0	.143	2.541	37	.104	2.541	34	45882.728	45900	32085	32085	1...	H1-1b
55	M5	PIPE_2.0	.143	3.106	33	.036	0	2	45874.206	45900	32085	32085	1...	H1-1b
56	M73	PIPE_2.0	.140	0	36	.029	0	37	45875.442	45900	32085	32085	1...	H1-1b
57	B8	SR 3/4"	.139	0	14	.003	42....	5	3974.429	19880...	2982.1...	2982.1...	1...	H1-1b*
58	M63	PIPE_2.0	.137	0	30	.105	0	32	45883.111	45900	32085	32085	1...	H1-1b
59	M10	PIPE_2.0	.136	0	32	.090	2.766	33	45879.532	45900	32085	32085	1...	H1-1b
60	M44	PIPE_2.0	.134	3.106	30	.032	3.106	29	45874.206	45900	32085	32085	1...	H1-1b
61	M1	PIPE_2.0	.131	0	12	.045	0	7	45868.412	45900	32085	32085	1...	H1-1b
62	M35	PIPE_2.0	.130	0	33	.034	0	38	45874.206	45900	32085	32085	1...	H1-1b
63	M29	PIPE_2.0	.129	2.711	34	.089	0	33	45880.342	45900	32085	32085	1...	H1-1b
64	M39	PIPE_2.0	.127	3.437	4	.042	3.437	9	45868.412	45900	32085	32085	1...	H1-1b
65	M4	PIPE_2.0	.121	3.184	34	.038	0	2	45872.885	45900	32085	32085	1...	H1-1b
66	M74	PIPE_2.0	.120	0	36	.031	0	37	45874.206	45900	32085	32085	1...	H1-1b
67	M49	PIPE_2.0	.120	0	37	.084	2.766	34	45879.532	45900	32085	32085	1...	H1-1b
68	M43	PIPE_2.0	.112	3.184	30	.034	3.184	29	45872.885	45900	32085	32085	1...	H1-1b
69	M68	PIPE_2.0	.112	2.711	30	.083	0	32	45880.342	45900	32085	32085	1...	H1-1b
70	M14	PIPE_2.0	.111	2.575	31	.106	2.575	33	45882.259	45900	32085	32085	1...	H1-1b

Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc.....		LC	phi*Pnc [lb]	phi*Pn...	phi*M...	phi*M...	...	Eqn
71	M36	PIPE_2.0	.111	0	32	.036	0		38	45872.885	45900	32085	32085	1...	H1-1b
72	M11	PIPE_2.0	.109	0	32	.091	2.711		33	45880.342	45900	32085	32085	1...	H1-1b
73	M25	PIPE_2.0	.107	0	35	.107	0		33	45882.728	45900	32085	32085	1...	H1-1b
74	M28	PIPE_2.0	.106	2.661	34	.090	0		33	45881.066	45900	32085	32085	1...	H1-1b
75	M2	PIPE_2.0	.105	0	11	.042	0		7	45869.988	45900	32085	32085	1...	H1-1b
76	M40	PIPE_2.0	.103	0	30	.034	3.437		29	45868.412	45900	32085	32085	1...	H1-1b
77	M75	PIPE_2.0	.103	0	36	.033	0		37	45872.885	45900	32085	32085	1...	H1-1b
78	M53	PIPE_2.0	.102	2.575	36	.096	2.575		34	45882.259	45900	32085	32085	1...	H1-1b
79	M3	PIPE_2.0	.102	3.266	34	.039	0		7	45871.479	45900	32085	32085	1...	H1-1b
80	M64	PIPE_2.0	.098	0	30	.097	0		32	45882.728	45900	32085	32085	1...	H1-1b
81	M38	PIPE_2.0	.097	3.35	4	.039	3.35		9	45869.988	45900	32085	32085	1...	H1-1b
82	M42	PIPE_2.0	.096	3.266	30	.035	3.266		29	45871.479	45900	32085	32085	1...	H1-1b
83	M37	PIPE_2.0	.094	0	32	.037	3.266		8	45871.479	45900	32085	32085	1...	H1-1b
84	M50	PIPE_2.0	.093	0	37	.084	2.711		34	45880.342	45900	32085	32085	1...	H1-1b
85	M78	PIPE_2.0	.091	3.437	36	.032	0		37	45868.412	45900	32085	32085	1...	H1-1b
86	B3	PIPE_2.0	.090	0	33	.014	0		30	42737.097	45900	32085	32085	2...	H1-1b
87	M67	PIPE_2.0	.090	2.661	30	.083	0		32	45881.066	45900	32085	32085	1...	H1-1b
88	M41	PIPE_2.0	.089	0	30	.035	3.35		29	45869.988	45900	32085	32085	1...	H1-1b
89	M76	PIPE_2.0	.088	0	36	.034	0		37	45871.479	45900	32085	32085	1...	H1-1b
90	M12	PIPE_2.0	.082	0	32	.094	2.661		33	45881.066	45900	32085	32085	2...	H1-1b
91	M27	PIPE_2.0	.081	2.615	34	.094	0		33	45881.705	45900	32085	32085	1...	H1-1b
92	M77	PIPE_2.0	.081	3.35	36	.033	0		37	45869.988	45900	32085	32085	1...	H1-1b
93	M13	PIPE_2.0	.077	2.615	31	.099	2.615		33	45881.705	45900	32085	32085	1...	H1-1b
94	M26	PIPE_2.0	.075	0	35	.100	0		33	45882.259	45900	32085	32085	1...	H1-1b
95	M52	PIPE_2.0	.070	2.615	36	.090	2.615		34	45881.705	45900	32085	32085	1...	H1-1b
96	M65	PIPE_2.0	.069	0	31	.091	0		32	45882.259	45900	32085	32085	1...	H1-1b
97	M66	PIPE_2.0	.068	2.615	31	.086	0		32	45881.705	45900	32085	32085	1...	H1-1b
98	M51	PIPE_2.0	.068	0	36	.086	2.661		34	45881.066	45900	32085	32085	2...	H1-1b

APPENDIX D

ADDITIONAL CALCUATIONS

Date:	1/15/2019
Client	Crown Castle
Carrier	Verizon
Engineer:	CLK
Site:	803175
Job #:	1039-D0001-B

Code:	LRFD	
Axial:	2005.00	lbs
Shear:	2880.00	lbs

Bolt Capacity (1/2" A307 Bolt)				
	Ult Load / Bolt	Factored Load (ϕ=0.75)	# of Bolts	Factor Joint Capacity
Axial (lb)	8226.7	6170.0	4	24680
Shear(lb)	5133.3	3850.0	4	15400

Interaction Check	
T /ϕT_n	8.1%
V /ϕVn	18.7%
≤1.0	4.2%
	OK

verizon

NEW BRITAIN 3 CT
175 COCCOMO CIR
NEW BRITAIN, CT 06051

PROJECT SUMMARY

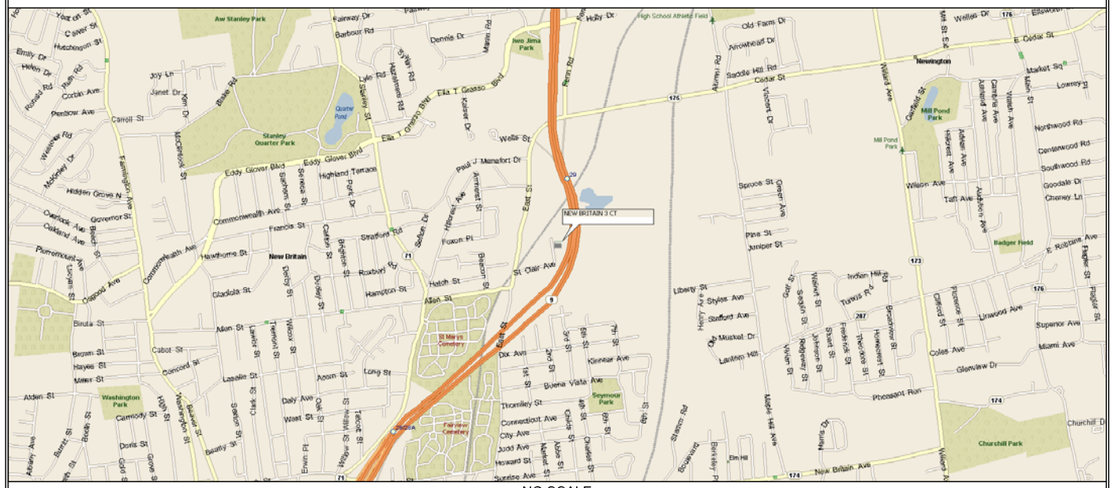
SITE NAME:	NEW BRITAIN 3 CT
SITE ADDRESS:	175 COCCOMO CIR NEW BRITAIN, CT 06051
TOWER OWNER:	CROWN CASTLE 2000 CORPORATE DR CANONSBURG, PA 15317
BU NUMBER:	881364
MAP NUMBER:	A5D
LOT NUMBER:	23
CUSTOMER/APPLICANT:	VERIZON WIRELESS 20 ALEXANDER DRIVE, 2ND FLOOR WALLINGFORD, CT 06492
CONTACT:	JIM O'DONNELL (203) 741-7338
NAD83	
LATITUDE:	41° 41' 10.35" N
LONGITUDE:	72° 45' 25.35" W
ELEVATION:	90'
CURRENT ZONING:	1
A&E FIRM:	B+T GROUP 1717 S. BOULDER, SUITE 300 TULSA, OK 74119 STEVE THORNHILL (918) 587-4630
OCCUPANCY TYPE:	UNMANNED
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

CODE COMPLIANCE

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES:

CODE TYPE	CODE
BUILDING	IBC 2012
STRUCTURAL	IBC 2012
MECHANICAL	IMC 2012
ELECTRICAL	NEC 2014

LOCATION MAP



NO SCALE

DRIVING DIRECTIONS

DEPART FROM BRADLEY INTERNATIONAL: HEAD NORTH ON NORTH ST TOWARD LIGHT LN. TURN RIGHT ONTO ELLA GRASSO TURNPIKE. TURN LEFT ONTO ELM ST. TURN RIGHT ONTO OLD COUNTY RD. CONTINUE ONTO KENNEDY RD. CONTINUE STRAIGHT TO STAY ON KENNEDY RD. TURN RIGHT TO MERGE ONTO I-91 S TOWARD HARTFORD. TAKE EXIT 32A-32B FOR I-84 W TOWARD WATERBURY. MERGE ONTO I-84. KEEP LEFT TO STAY ON I-84. TAKE EXIT 39A FOR CT-9 S TOWARD NEWINGTON/NEW BRITAIN. CONTINUE ONTO CT-9 S. TAKE EXIT 29 FOR ELLA GRASSO BLVD TOWARD CT-175/NEWINGTON. TURN LEFT ONTO ELLA GRASSO RD. TURN RIGHT ONTO FENN RD. TURN RIGHT ONTO CEDAR ST. CONTINUE ONTO EAST ST PASS BY DOLLAR GENERAL (ON THE RIGHT). TURN LEFT ONTO ST CLAIR AVE. ST CLAIR AVE TURNS SLIGHTLY LEFT AND BECOMES COCCOMO CIR/LESTER ST DESTINATION WILL BE ON THE RIGHT. ARRIVE AT NEW BRITAIN 3 CT.

DRAWING INDEX

SHEET #	SHEET DESCRIPTION	REV. #
T-1	TITLE SHEET	3
A-1	COMPOUND PLAN AND TOWER ELEVATION	3
A-2	EQUIPMENT DETAILS	3

A/E DOCUMENT REVIEW STATUS

TITLE	SIGNATURE	DATE
OWNER:		
R.F. ENGINEER:		
CONSTRUCTION MGR.:		
LEASING & ZONING:		
VERIZON WIRELESS:		

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.

DO NOT SCALE DRAWINGS

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR 11x17. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CALL CONNECTICUT ONE CALL
(800) 922-4455
CALL 3 WORKING DAYS
BEFORE YOU DIG!

811

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WESTBOROUGH, MA 01581
PH: (508) 330-3300

NEW BRITAIN 3 CT
175 COCCOMO CIR
NEW BRITAIN, CT 06051
EXISTING MONOPOLE

PROJECT NO:	85519.001.01
CHECKED BY:	RPS

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
A	8/17/18	JDP	PRELIMINARY REVIEW
0	1/8/19	GEH	CONSTRUCTION
1	1/15/19	FWP	CLIENT COMMENTS
2	1/22/19	JJD	CLIENT COMMENTS
3	2/6/19	JJD	CLIENT COMMENTS

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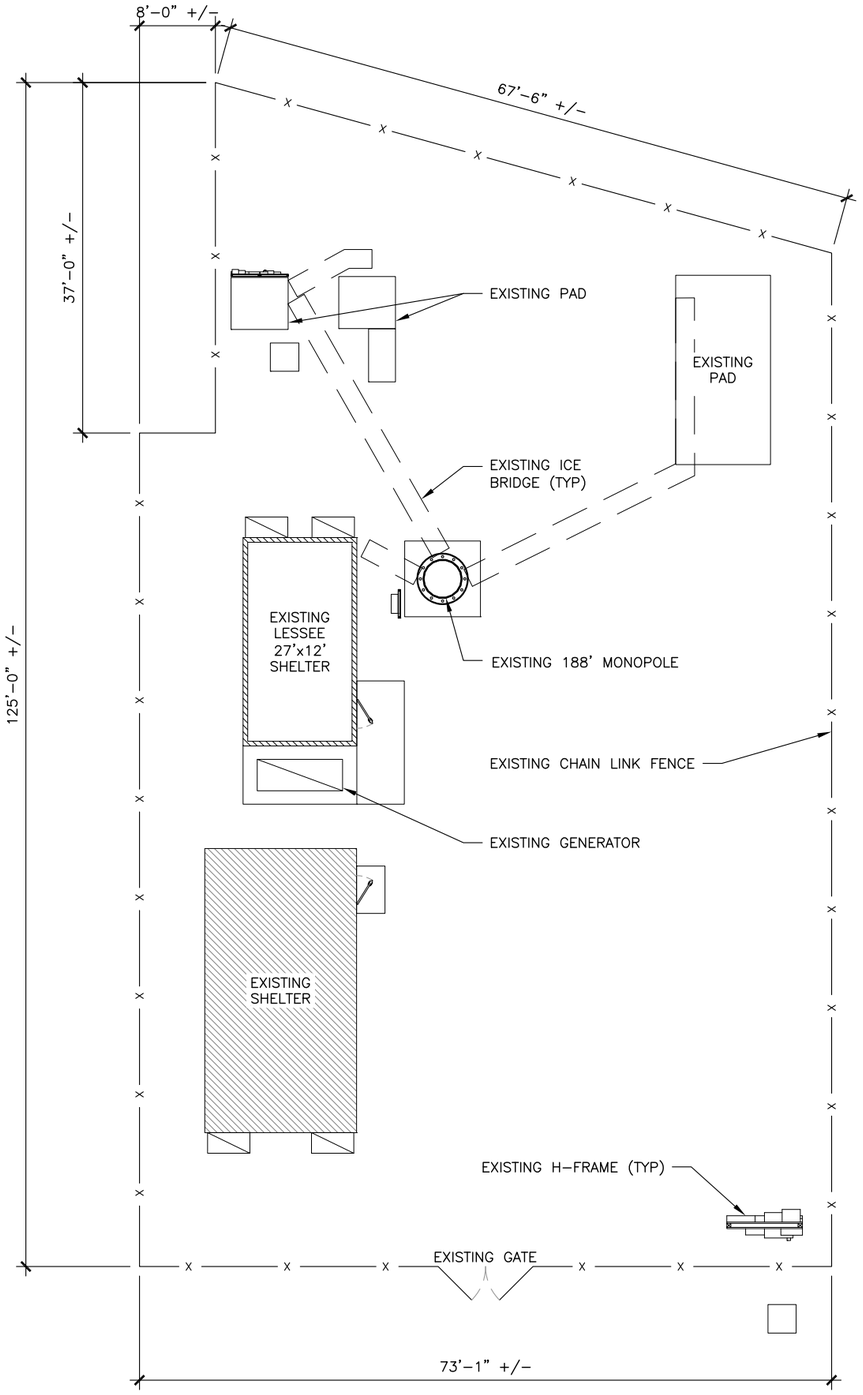
Expires 2/10/19

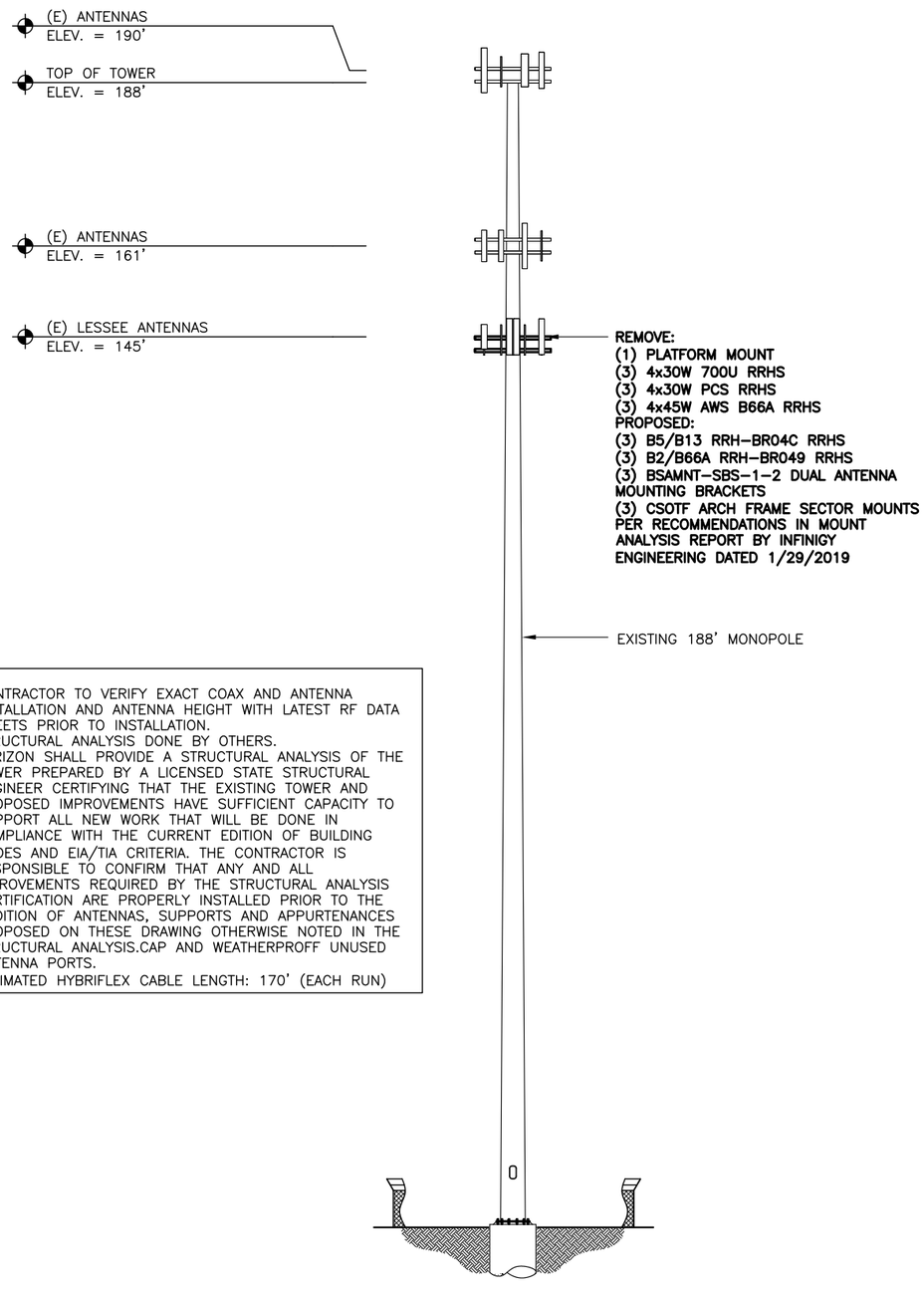
STATE OF CONNECTICUT
31627
LICENSED
PROFESSIONAL ENGINEER
2/6/19

SHEET NUMBER: T-1
REVISION: 3



1 COMPOUND PLAN
SCALE: 0' 8' 16' 32' 48'

N



2 FINAL TOWER ELEVATION
SCALE: 0' 4' 8' 16' 32'

NOTES:
1. CONTRACTOR TO VERIFY EXACT COAX AND ANTENNA INSTALLATION AND ANTENNA HEIGHT WITH LATEST RF DATA SHEETS PRIOR TO INSTALLATION.
2. STRUCTURAL ANALYSIS DONE BY OTHERS.
3. VERIZON SHALL PROVIDE A STRUCTURAL ANALYSIS OF THE TOWER PREPARED BY A LICENSED STATE STRUCTURAL ENGINEER CERTIFYING THAT THE EXISTING TOWER AND PROPOSED IMPROVEMENTS HAVE SUFFICIENT CAPACITY TO SUPPORT ALL NEW WORK THAT WILL BE DONE IN COMPLIANCE WITH THE CURRENT EDITION OF BUILDING CODES AND EIA/TIA CRITERIA. THE CONTRACTOR IS RESPONSIBLE TO CONFIRM THAT ANY AND ALL IMPROVEMENTS REQUIRED BY THE STRUCTURAL ANALYSIS CERTIFICATION ARE PROPERLY INSTALLED PRIOR TO THE ADDITION OF ANTENNAS, SUPPORTS AND APPURTENANCES PROPOSED ON THESE DRAWING OTHERWISE NOTED IN THE STRUCTURAL ANALYSIS.CAP AND WEATHERPROFF UNUSED ANTENNA PORTS.
4. ESTIMATED HYBRIFLEX CABLE LENGTH: 170' (EACH RUN)

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WESTBOROUGH, MA 01581
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NEW BRITAIN 3 CT

175 COCCOMO CIR
NEW BRITAIN, CT 06051

EXISTING MONOPOLE

PROJECT NO:	85519.001.01
CHECKED BY:	RPS

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STATE OF CONNECTICUT
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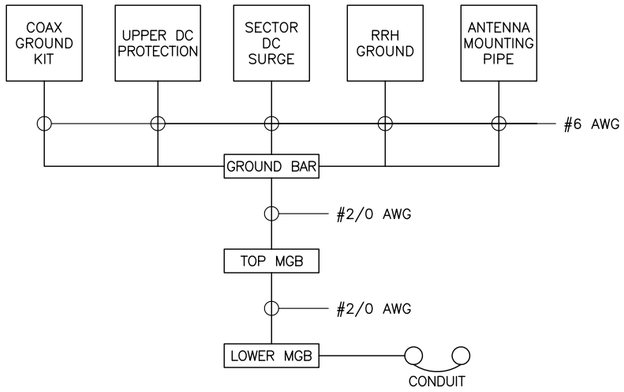
PROFESSIONAL ENGINEER
2/6/19

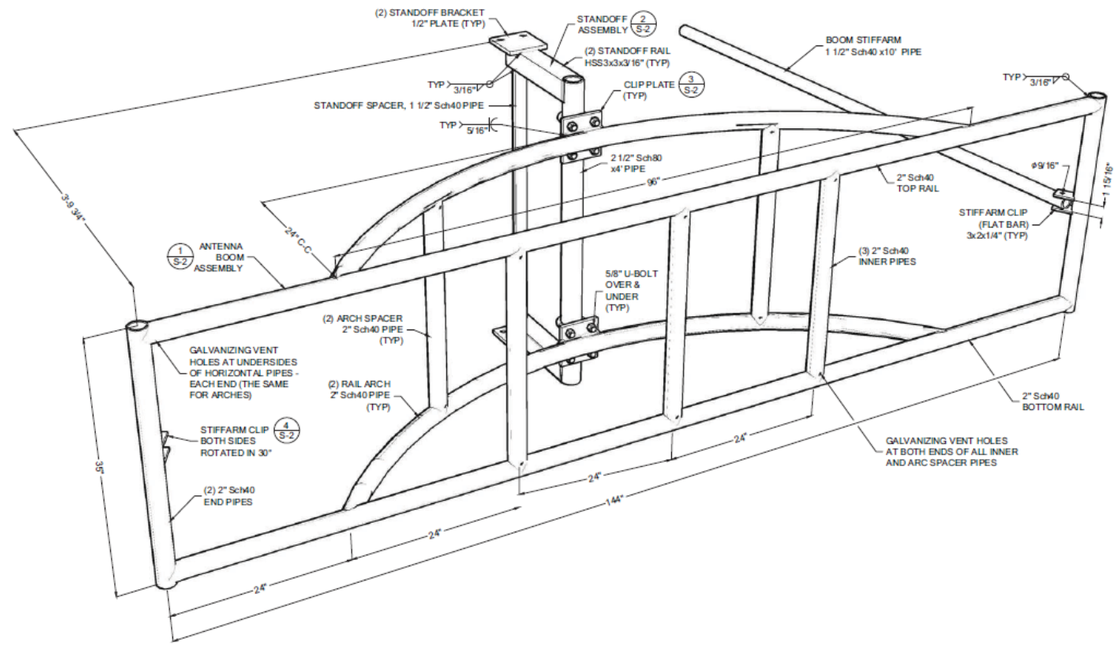
SHEET NUMBER:	REVISION:
A-1	3

NOTE:
1. INSTALL ALL EQUIPMENT, MOUNTING BRACKETS AND HARDWARE ACCORDING WITH MANUFACTURE'S RECOMMENDATIONS.
2. GROUND DISTRIBUTION BOXES, MOUNTING PIPES AND RRHs IN ACCORDANCE WITH MANUFACTURE'S RECOMMENDATIONS.
3. INSTALLED EQUIPMENT AND MOUNTING BRACKETS SHALL NOT INTERFERE WITH CLIMBING ACCESS NOR ANT INSTALLED SAFETY DEVICES.
4. EQUIPMENT TO BE INSTALLED AT VERIZON'S RAD. CENTER IN ACCORDANCE WITH TOWER STRUCTURAL ANALYSIS (ANALYSIS BY OTHERS).



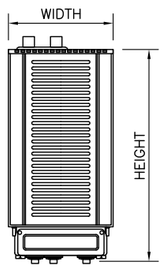
NOTE:
1. BOND ANTENNA GROUNDING KIT CABLES TO TOP CIBE.
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIBE.
3. TYPICAL FOR ALL SECTORS.

1 GROUNDING SCHEMATIC DIAGRAM
SCALE: N.T.S.

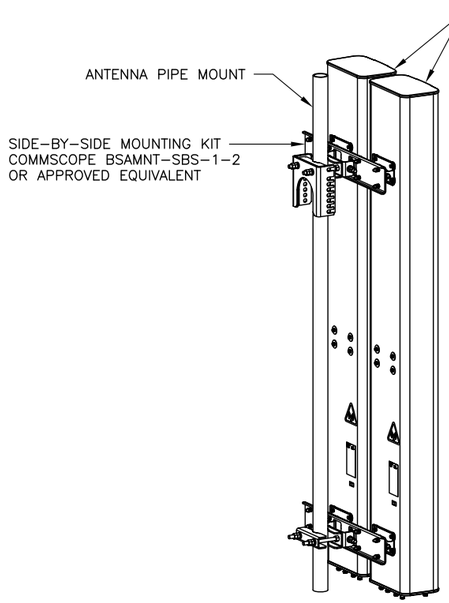


2 SECTOR MOUNT DETAIL
SCALE: N.T.S.

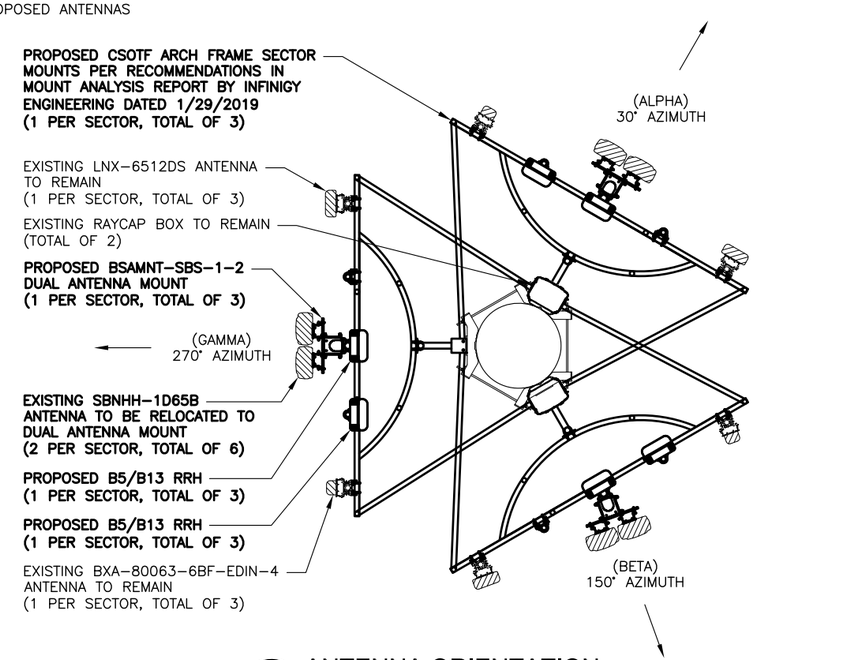
REMOTE RADIO HEAD DIMENSIONS (INCHES)				
MODEL	HEIGHT	WIDTH	DEPTH	WEIGHT
RFV01U-D1A	15.00	15.00	10.00	84.40
RFV01U-D2A	15.00	15.00	8.10	70.30



3 RRH SPECIFICATIONS
SCALE: N.T.S.



4 ANTENNA MOUNTING DETAIL
SCALE: N.T.S.



5 ANTENNA ORIENTATION
SCALE: N.T.S.

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PH: (508) 330-3300

NEW BRITAIN 3 CT

175 COCCOMO CIR
NEW BRITAIN, CT 06051

EXISTING MONOPOLE

PROJECT NO:	85519.001.01
CHECKED BY:	RPS

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
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1	1/15/19	FWP	CLIENT COMMENTS
2	1/22/19	JJD	CLIENT COMMENTS
3	2/6/19	JJD	CLIENT COMMENTS

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PEC.0001564
Expires 2/10/19

SHEET NUMBER: A-2

REVISION: 3

Date: **February 4, 2019**

Holly Haas
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351

Subject: Structural Analysis Report

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	34002
	Carrier Site Name:	New Britain 3 CT
Crown Castle Designation:	**Crown Castle BU Number:**	803175
	Crown Castle Site Name:	CT New Britain 3 CAC 803175
	Crown Castle JDE Job Number:	518913
	Crown Castle Work Order Number:	1689637
	Crown Castle Order Number:	450305 Rev. 1
Engineering Firm Designation:	**TEP Project Number:**	25666.217945
Site Data:	**167 Coccomo, New Britain, Hartford County, CT 06051** **Latitude *41° 41' 11.8"*, Longitude *-72° 45' 27.8"*** **188 Foot - Monopole Tower**	

Dear Holly Haas,

Tower Engineering Professionals 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:

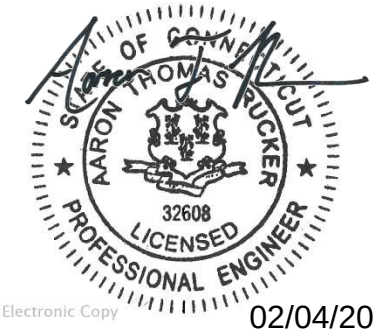
LC7: Proposed Equipment Configuration **Sufficient Capacity**

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

Structural analysis prepared by: Giovanni Palmieri, E.I.T. / PRS

Respectfully submitted by:

Aaron T. Rucker, P.E.



Electronic Copy

02/04/2019

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 188-ft monopole tower designed by Paul J. Ford. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	C
Topographic Factor:	1.0
Ice Thickness:	2.0 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)
146.0	149.0	3	Amphenol	BXA-80063-6BF-EDIN-4 w/ Mount Pipe	1 13	1-1/2 1-5/8
		3	Andrew	LNX-6512DS-A1M w/ Mount Pipe		
		6	Andrew	SBNHH-1D65B w/ Mount Pipe		
		1	GPS	GPS_A		
		3	Samsung Telecommunications	RFV01U-D1A		
		3	Samsung Telecommunications	RFV01U-D2A		
	146.0	3	Amor Tower Engineering	12-ft Arch Frame Mount		
	145.0	2	Raycap	RHSDC-3315-PF-48		

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)
190.0	190.0	1	Tower Mounts	Miscellaneous [NA 507-1]	2 6 6	3/8 3/4 1-5/8
		1	Tower Mounts	Miscellaneous [NA 509-3]		
		1	Tower Mounts	Platform Mount [LP 1201-1]		
	189.0	1	CCI Antennas	OPA-65R-LCUU-H4 w/ Mount Pipe		
		2	CCI Antennas	OPA-65R-LCUU-H6 w/ Mount Pipe		
		3	Ericsson	RRUS 12		
		3	Ericsson	RRUS 32 B2		
		3	Ericsson	RRUS 32 B30		
		3	Ericsson	RRUS 32 B66		
		3	Ericsson	RRUS-11		
		3	Kathrein	800 10121 w/ Mount Pipe		
		6	Kathrein	860 10025		
		6	Powerwave Technologies	LGP21401		
		1	Quintel Technology	QS46512-2 w/ Mount Pipe		
		2	Quintel Technology	QS66512-2 w/ Mount Pipe		
		1	Raycap	DC6-48-60-0-8F		
		2	Raycap	DC6-48-60-18-8F		
161.0	161.0	3	Ericsson	AIR -32 B2A/B66AA w/ Mount Pipe	1 12	1-1/2 1-5/8
		3	Ericsson	AIR 21 B2A B4P w/ Mount Pipe		
		3	Ericsson	RADIO 4449 B12/B71		
		3	RFS Celwave	ATMAA1412D-1A20		
		3	RFS Celwave	APXVAARR24_43-U-NA20 w/ Mount Pipe		
		1	Tower Mounts	Platform Mount [LP 601-1]		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Report	Clough, Harbour & Associates LLP	679661	CCISites
Tower Foundation Drawings	Paul J. Ford and Company	679660	CCISites
Foundation Mapping Report	Tower Engineering Professionals	679660	CCISites
Tower Manufacturer Drawings	Paul J. Ford and Company	679659	CCISites

3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

1) The tower and foundation were built and maintained in accordance with the manufacturer's specification.
2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2, and the referenced drawings.
3) All tower components are in sufficient condition to carry their full design capacity.
4) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
5) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals 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)	ϕP_{allow} (K)	% Capacity	Pass / Fail
L1	188 - 137	Pole	TP32.711x22x0.25	1	-13.29	1538.67	62.0	Pass
L2	137 - 90.25	Pole	TP42.03x31.3184x0.3125	2	-23.44	2474.49	86.3	Pass
L3	90.25 - 44.5	Pole	TP51.014x40.3023x0.375	3	-37.17	3602.47	86.0	Pass
L4	44.5 - 0	Pole	TP59.61x48.8988x0.5	4	-60.16	5762.13	68.1	Pass
							Summary	
						Pole (L2)	86.3	Pass
						RATING =	**86.3**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity – LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	-	79.7	Pass
1,2	Base Plate	-	73.0	Pass
1,2	Base Foundation Soil Interaction	-	89.5	Pass
1,2	Base Foundation Structural	-	55.8	Pass

Structure Rating (max from all components) =	89.5%

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

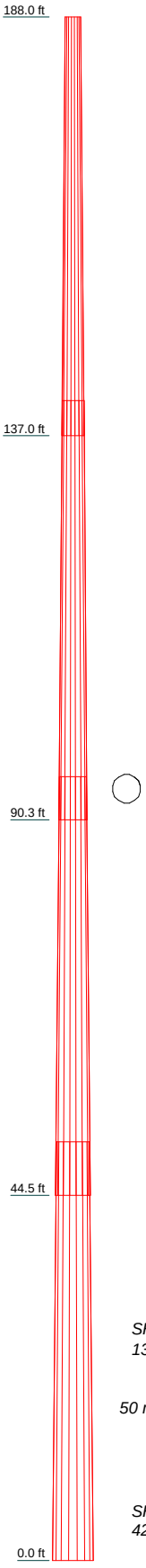
4.1) Recommendations

1) If the load differs from that described in Tables 1 and 2 of this report, the referenced drawings, or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
2) The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

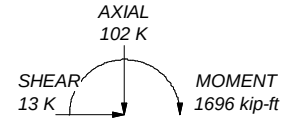
APPENDIX A

TNXTOWER OUTPUT

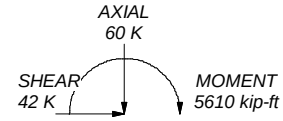
Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	51.00	18	0.2500	4.25	22.0000	32.7110	A607-65	3.7
2	51.00	18	0.3125	5.25	31.3184	42.0300		6.3
3	51.00	18	0.3750	6.50	40.3023	51.0140		9.4
4	51.00	18	0.5000		48.8988	59.6100		14.8
								34.1



ALL REACTIONS ARE FACTORED



TORQUE 0 kip-ft
50 mph WIND - 2.0000 in ICE



TORQUE 1 kip-ft
REACTIONS - 125 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
800 10121 w/ Mount Pipe	190	APXVAARR24_43-U-NA20 w/ Mount Pipe	161
800 10121 w/ Mount Pipe	190	APXVAARR24_43-U-NA20 w/ Mount Pipe	161
800 10121 w/ Mount Pipe	190	APXVAARR24_43-U-NA20 w/ Mount Pipe	161
OPA-65R-LCUU-H6 w/ Mount Pipe	190	ATMAA1412D-1A20	161
OPA-65R-LCUU-H4 w/ Mount Pipe	190	ATMAA1412D-1A20	161
OPA-65R-LCUU-H6 w/ Mount Pipe	190	ATMAA1412D-1A20	161
QS66512-2 w/ Mount Pipe	190	RADIO 4449 B12/B71	161
QS46512-2 w/ Mount Pipe	190	RADIO 4449 B12/B71	161
QS66512-2 w/ Mount Pipe	190	RADIO 4449 B12/B71	161
(2) LGP21401	190	2.4" Dia x 8-ft Mount Pipe	161
(2) LGP21401	190	2.4" Dia x 8-ft Mount Pipe	161
(2) LGP21401	190	2.4" Dia x 8-ft Mount Pipe	161
RRUS 32 B30	190	Platform Mount [LP 601-1]	161
RRUS 32 B30	190	GPS_A	146
RRUS 32 B30	190	(2) SBNHH-1D65B w/ Mount Pipe	146
RRUS-11	190	(2) SBNHH-1D65B w/ Mount Pipe	146
RRUS-11	190	(2) SBNHH-1D65B w/ Mount Pipe	146
RRUS-11	190	BXA-80063-6BF-EDIN-4 w/ Mount Pipe	146
DC6-48-60-18-8F	190	BXA-80063-6BF-EDIN-4 w/ Mount Pipe	146
DC6-48-60-18-8F	190	BXA-80063-6BF-EDIN-4 w/ Mount Pipe	146
DC6-48-60-0-8F	190	LNX-6512DS-A1M w/ Mount Pipe	146
(2) 860 10025	190	LNX-6512DS-A1M w/ Mount Pipe	146
(2) 860 10025	190	LNX-6512DS-A1M w/ Mount Pipe	146
(2) 860 10025	190	(2) RFV01U-D2A	146
RRUS 12	190	RFV01U-D2A	146
RRUS 12	190	RFV01U-D1A	146
RRUS 12	190	(2) RFV01U-D1A	146
RRUS 32 B2	190	RHSDC-3315-PF-48	146
RRUS 32 B2	190	RHSDC-3315-PF-48	146
RRUS 32 B2	190	Side Arm Mount [SO 102-3]	146
RRUS 32 B66	190	Sector Mount [SM 802-3]	146
RRUS 32 B66	190	Side Arm Mount [SO 701-3]	133
RRUS 32 B66	190	1" Dia x 3.5-ft	100
2.4" Dia x 6-ft Pipe	190	1" Dia x 3.5-ft	100
2.4" Dia x 6-ft Pipe	190	1" Dia x 3.5-ft	100
2.4" Dia x 6-ft Pipe	190	1" Dia x 3.5-ft	70
Platform Mount [LP 1201-1]	190	1" Dia x 3.5-ft	70
Miscellaneous [NA 507-1]	190	1" Dia x 3.5-ft	70
Miscellaneous [NA 509-3]	190	1" Dia x 3.5-ft	40
Lighting Rod 3/4" x 8'	188	1" Dia x 3.5-ft	40
AIR -32 B2A/B66AA w/ Mount Pipe	161	1" Dia x 3.5-ft	40
AIR -32 B2A/B66AA w/ Mount Pipe	161	1" Dia x 3.5-ft	10
AIR -32 B2A/B66AA w/ Mount Pipe	161	1" Dia x 3.5-ft	10
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	161	1" Dia x 3.5-ft	10
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	161		
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	161		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
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 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 2.00 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. TOWER RATING: 86.3%

Tower Engineering Professionals

Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

Job:	***CT New Britain 3 CAC 803175 (BU 803175)***		
Project:	***TEP No. 25666.217945***		
Client: Crown Castle	Drawn by: gpalmieri	App'd:	
Code: TIA-222-H	Date: 01/31/19	Scale: NTS	
Path: C:\Users\gpalmieri\Documents\25666 - CT New Britain 3 CAC 803175\803175_LC7.eri		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 Hartford County, Connecticut.
Tower base elevation above sea level: 88.00 ft.
Basic wind speed of 125 mph.
Risk Category II.
Exposure Category C.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.00 ft.
Nominal ice thickness of 2.0000 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.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-H Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-H Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	188.00-137.00	51.00	4.25	18	22.0000	32.7110	0.2500	1.0000	A607-65 (65 ksi)
L2	137.00-90.25	51.00	5.25	18	31.3184	42.0300	0.3125	1.2500	A607-65 (65 ksi)
L3	90.25-44.50	51.00	6.50	18	40.3023	51.0140	0.3750	1.5000	A607-65 (65 ksi)
L4	44.50-0.00	51.00		18	48.8988	59.6100	0.5000	2.0000	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	22.3008	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	33.1771	25.7578	3429.0204	11.5237	16.6172	206.3538	6862.5527	12.8813	5.3171	21.269
L2	32.6597	30.7540	3735.3226	11.0071	15.9098	234.7819	7475.5603	15.3799	4.9620	15.879
	42.6302	41.3785	9098.0688	14.8097	21.3512	426.1143	18208.1091	20.6932	6.8473	21.911
L3	41.9859	47.5235	9571.6471	14.1742	20.4736	467.5120	19155.8888	23.7663	6.4332	17.155
	51.7431	60.2731	19526.7966	17.9768	25.9151	753.4907	39079.2871	30.1423	8.3185	22.183
L4	50.9622	76.8089	22730.9631	17.1816	24.8406	915.0736	45491.8362	38.4117	7.7262	15.452
	60.4524	93.8076	41409.2395	20.9841	30.2819	1367.4593	82872.9664	46.9127	9.6114	19.223

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 188.00-137.00				1	1	1			
L2 137.00-90.25				1	1	1			
L3 90.25-44.50				1	1	1			
L4 44.50-0.00				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)	188.00 - 0.00	1	1	0.000 0.000	0.3750		0.22

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
*188									
LDF7-50A(1-5/8")	B	No	No	Inside Pole	188.00 - 0.00	6	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
FB-L98B-002-75000 (3/8")	B	No	No	Inside Pole	188.00 - 0.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
FB-L98B-002-75000 (3/8")	B	No	No	Inside Pole	188.00 - 0.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
WR-VG86ST-BRD(3/4")	B	No	No	Inside Pole	188.00 - 0.00	2	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
2" Flex Conduit	B	No	No	Inside Pole	188.00 - 0.00	1	No Ice	0.00	0.36
							1/2" Ice	0.00	0.36
							1" Ice	0.00	0.36
							2" Ice	0.00	0.36
2" Flex Conduit	B	No	No	Inside Pole	188.00 - 0.00	1	No Ice	0.00	0.36
							1/2" Ice	0.00	0.36
							1" Ice	0.00	0.36
							2" Ice	0.00	0.36
WR-VG86ST-BRD(3/4")	B	No	No	Inside Pole	188.00 - 0.00	4	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58
161									
33-597(1-1/2)	C	No	No	Inside Pole	161.00 - 0.00	1	No Ice	0.00	1.61
							1/2" Ice	0.00	1.61
							1" Ice	0.00	1.61
							2" Ice	0.00	1.61
LCF158-50J(1-5/8")	C	No	No	Inside Pole	161.00 - 0.00	10	No Ice	0.00	0.92
							1/2" Ice	0.00	0.92
							1" Ice	0.00	0.92
							2" Ice	0.00	0.92
MLE Hybrid 9Power/18Fiber RL 2(1-5/8")	C	No	No	Inside Pole	161.00 - 0.00	1	No Ice	0.00	1.07
							1/2" Ice	0.00	1.07
							1" Ice	0.00	1.07
							2" Ice	0.00	1.07
HCS 6X12 4AWG(1-5/8")	C	No	No	Inside Pole	161.00 - 0.00	1	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
146									
HB158-1-08U8-S8J 18(1-5/8")	C	No	No	Inside Pole	146.00 - 0.00	1	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
33-597(1-1/2)	C	No	No	Inside Pole	146.00 - 0.00	1	No Ice	0.00	1.61
							1/2" Ice	0.00	1.61
							1" Ice	0.00	1.61
							2" Ice	0.00	1.61
LCF158-50J(1-5/8")	C	No	No	Inside Pole	146.00 - 0.00	11	No Ice	0.00	0.92
							1/2" Ice	0.00	0.92
							1" Ice	0.00	0.92
							2" Ice	0.00	0.92
HB158-1-08U8-S8J	C	No	No	Inside Pole	146.00 - 0.00	1	No Ice	0.00	1.30

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
18(1-5/8")							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
							2" Ice	0.00	1.30
***									
3/8-in Detuner Wire	A	No	No	CaAa (Out Of Face)	133.00 - 0.00	1	No Ice	0.02	0.10
							1/2" Ice	0.12	0.52
							1" Ice	0.22	1.55
							2" Ice	0.42	5.44
3/8-in Detuner Wire	B	No	No	CaAa (Out Of Face)	133.00 - 0.00	1	No Ice	0.02	0.10
							1/2" Ice	0.12	0.52
							1" Ice	0.22	1.55
							2" Ice	0.42	5.44
3/8-in Detuner Wire	C	No	No	CaAa (Out Of Face)	133.00 - 0.00	1	No Ice	0.02	0.10
							1/2" Ice	0.12	0.52
							1" Ice	0.22	1.55
							2" Ice	0.42	5.44

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	188.00-137.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.47
		C	0.000	0.000	1.912	0.000	0.48
L2	137.00-90.25	A	0.000	0.000	0.000	0.802	0.00
		B	0.000	0.000	0.000	0.802	0.44
		C	0.000	0.000	1.753	0.802	1.35
L3	90.25-44.50	A	0.000	0.000	0.000	0.858	0.00
		B	0.000	0.000	0.000	0.858	0.43
		C	0.000	0.000	1.716	0.858	1.32
L4	44.50-0.00	A	0.000	0.000	0.000	0.834	0.00
		B	0.000	0.000	0.000	0.834	0.42
		C	0.000	0.000	1.669	0.834	1.29

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	188.00-137.00	A	1.992	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.47
		C		0.000	0.000	22.231	0.000	0.78
L2	137.00-90.25	A	1.922	0.000	0.000	0.000	17.833	0.23
		B		0.000	0.000	0.000	17.833	0.66
		C		0.000	0.000	20.378	17.833	1.85
L3	90.25-44.50	A	1.825	0.000	0.000	0.000	18.448	0.24
		B		0.000	0.000	0.000	18.448	0.66
		C		0.000	0.000	19.306	18.448	1.80
L4	44.50-0.00	A	1.636	0.000	0.000	0.000	17.075	0.21
		B		0.000	0.000	0.000	17.075	0.62

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
		C		0.000	0.000	17.909	17.075	1.71

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	188.00-137.00	0.0000	0.3014	0.0000	1.6750
L2	137.00-90.25	0.0000	0.2955	0.0000	1.4229
L3	90.25-44.50	0.0000	0.2966	0.0000	1.4664
L4	44.50-0.00	0.0000	0.2978	0.0000	1.4861

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	26	Safety Line 3/8	137.00 - 188.00	1.0000	1.0000
L2	26	Safety Line 3/8	90.25 - 137.00	1.0000	1.0000
L3	26	Safety Line 3/8	44.50 - 90.25	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lighting Rod 3/4" x 8'	C	From Leg	0.00 0.00 4.00	0.0000	188.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.60 1.41 2.25 3.67	0.60 1.41 2.25 3.67	0.03 0.04 0.05 0.09
190									
800 10121 w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.39 5.81 6.23 7.10	4.60 5.35 6.05 7.48	0.07 0.11 0.17 0.30
800 10121 w/ Mount Pipe	B	From Centroid-Fa	4.00 0.00	0.0000	190.00	No Ice 1/2" Ice	5.39 5.81	4.60 5.35	0.07 0.11

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		ce	-1.00			1" Ice	6.23	6.05	0.17
						2" Ice	7.10	7.48	0.30
800 10121 w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	5.39 5.81 6.23	4.60 5.35 6.05	0.07 0.11 0.17
						2" Ice	7.10	7.48	0.30
OPA-65R-LCUU-H6 w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	7.18 8.36 9.26	0.10 0.18 0.26
						2" Ice	12.11	11.09	0.46
OPA-65R-LCUU-H4 w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	6.18 6.57 6.98	4.55 5.16 5.78	0.08 0.13 0.19
						2" Ice	7.82	7.07	0.33
OPA-65R-LCUU-H6 w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	9.90 10.47 11.01	7.18 8.36 9.26	0.10 0.18 0.26
						2" Ice	12.11	11.09	0.46
QS66512-2 w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	8.37 8.93 9.46	8.46 9.66 10.55	0.14 0.21 0.30
						2" Ice	10.53	12.35	0.49
QS46512-2 w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	5.79 6.21 6.62	5.88 6.58 7.25	0.12 0.18 0.24
						2" Ice	7.48	8.65	0.39
QS66512-2 w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	8.37 8.93 9.46	8.46 9.66 10.55	0.14 0.21 0.30
						2" Ice	10.53	12.35	0.49
(2) LGP21401	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.10 1.24 1.38	0.21 0.27 0.35	0.01 0.02 0.03
						2" Ice	1.69	0.52	0.05
(2) LGP21401	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.10 1.24 1.38	0.21 0.27 0.35	0.01 0.02 0.03
						2" Ice	1.69	0.52	0.05
(2) LGP21401	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	1.10 1.24 1.38	0.21 0.27 0.35	0.01 0.02 0.03
						2" Ice	1.69	0.52	0.05
RRUS 32 B30	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	2.74 2.96 3.19	1.67 1.86 2.05	0.05 0.07 0.10
						2" Ice	3.68	2.46	0.16
RRUS 32 B30	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	2.74 2.96 3.19	1.67 1.86 2.05	0.05 0.07 0.10
						2" Ice	3.68	2.46	0.16
RRUS 32 B30	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	2.74 2.96 3.19	1.67 1.86 2.05	0.05 0.07 0.10
						2" Ice	3.68	2.46	0.16
RRUS-11	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice	2.79 3.00 3.21	1.19 1.34 1.50	0.05 0.07 0.10

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
						2" Ice	3.67	1.84	0.15
RRUS-11	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.79 3.00 3.21 3.67	1.19 1.34 1.50 1.84	0.05 0.07 0.10 0.15
RRUS-11	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.79 3.00 3.21 3.67	1.19 1.34 1.50 1.84	0.05 0.07 0.10 0.15
DC6-48-60-18-8F	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.21 1.89 2.11 2.57	1.21 1.89 2.11 2.57	0.03 0.05 0.08 0.14
DC6-48-60-18-8F	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.21 1.89 2.11 2.57	1.21 1.89 2.11 2.57	0.03 0.05 0.08 0.14
DC6-48-60-0-8F	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.20 2.40 2.60 3.04	2.20 2.40 2.60 3.04	0.03 0.06 0.08 0.14
(2) 860 10025	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.14 0.19 0.25 0.40	0.12 0.17 0.23 0.37	0.00 0.00 0.01 0.01
(2) 860 10025	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.14 0.19 0.25 0.40	0.12 0.17 0.23 0.37	0.00 0.00 0.01 0.01
(2) 860 10025	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.14 0.19 0.25 0.40	0.12 0.17 0.23 0.37	0.00 0.00 0.01 0.01
RRUS 12	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.15 3.36 3.59 4.07	1.29 1.44 1.60 1.95	0.06 0.08 0.11 0.17
RRUS 12	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.15 3.36 3.59 4.07	1.29 1.44 1.60 1.95	0.06 0.08 0.11 0.17
RRUS 12	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.15 3.36 3.59 4.07	1.29 1.44 1.60 1.95	0.06 0.08 0.11 0.17
RRUS 32 B2	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.73 2.95 3.18 3.66	1.67 1.86 2.05 2.46	0.05 0.07 0.10 0.16
RRUS 32 B2	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.73 2.95 3.18 3.66	1.67 1.86 2.05 2.46	0.05 0.07 0.10 0.16
RRUS 32 B2	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.73 2.95 3.18 3.66	1.67 1.86 2.05 2.46	0.05 0.07 0.10 0.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
RRUS 32 B66	A	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.74 2.96 3.19 3.68	1.67 1.86 2.05 2.46	0.05 0.07 0.10 0.16
RRUS 32 B66	B	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.74 2.96 3.19 3.68	1.67 1.86 2.05 2.46	0.05 0.07 0.10 0.16
RRUS 32 B66	C	From Centroid-Face	4.00 0.00 -1.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.74 2.96 3.19 3.68	1.67 1.86 2.05 2.46	0.05 0.07 0.10 0.16
2.4" Dia x 6-ft Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.93 2.30 3.06	1.43 1.93 2.30 3.06	0.02 0.03 0.05 0.09
2.4" Dia x 6-ft Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.93 2.30 3.06	1.43 1.93 2.30 3.06	0.02 0.03 0.05 0.09
2.4" Dia x 6-ft Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.43 1.93 2.30 3.06	1.43 1.93 2.30 3.06	0.02 0.03 0.05 0.09
Platform Mount [LP 1201-1]	C	None		0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	23.10 26.80 30.50 37.90	23.10 26.80 30.50 37.90	2.10 2.50 2.90 3.70
Miscellaneous [NA 507-1]	C	None		0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	4.80 6.70 8.60 12.40	4.80 6.70 8.60 12.40	0.25 0.29 0.34 0.44
Miscellaneous [NA 509-3]	C	None		0.0000	190.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.84 16.96 22.08 32.32	11.84 16.96 22.08 32.32	0.28 0.30 0.32 0.36
161									
AIR -32 B2A/B66AA w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.75 7.20 7.65 8.57	6.07 6.87 7.58 9.06	0.15 0.21 0.28 0.44
AIR -32 B2A/B66AA w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.75 7.20 7.65 8.57	6.07 6.87 7.58 9.06	0.15 0.21 0.28 0.44
AIR -32 B2A/B66AA w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.75 7.20 7.65 8.57	6.07 6.87 7.58 9.06	0.15 0.21 0.28 0.44
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	6.33 6.78 7.21 8.12	5.64 6.43 7.13 8.59	0.11 0.17 0.23 0.38
APXVAARR24_43-U-NA20 w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	0.16 0.30 0.44 0.78
APXVAARR24_43-U-NA20 w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	0.16 0.30 0.44 0.78
APXVAARR24_43-U-NA20 w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	20.48 21.23 21.99 23.44	11.02 12.55 14.10 16.45	0.16 0.30 0.44 0.78
ATMAA1412D-1A20	B	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.00 1.13 1.26 1.55	0.41 0.50 0.59 0.81	0.01 0.02 0.03 0.06
ATMAA1412D-1A20	C	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00
ATMAA1412D-1A20	C	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00
RADIO 4449 B12/B71	A	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71	B	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
RADIO 4449 B12/B71	C	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.65 1.81 1.98 2.34	1.16 1.30 1.45 1.76	0.07 0.09 0.11 0.16
2.4" Dia x 8-ft Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
2.4" Dia x 8-ft Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
2.4" Dia x 8-ft Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	161.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.90 2.73 3.40 4.40	1.90 2.73 3.40 4.40	0.03 0.04 0.06 0.12
Platform Mount [LP 601-1]	C	None		0.0000	161.00	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

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
GPS_A	A	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.26 0.32 0.39 0.56	0.26 0.32 0.39 0.56	0.00 0.00 0.01 0.02
(2) SBNHH-1D65B w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.65 9.32 9.90 11.10	7.64 8.93 9.88 11.82	0.09 0.16 0.25 0.44
(2) SBNHH-1D65B w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.65 9.32 9.90 11.10	7.64 8.93 9.88 11.82	0.09 0.16 0.25 0.44
(2) SBNHH-1D65B w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	8.65 9.32 9.90 11.10	7.64 8.93 9.88 11.82	0.09 0.16 0.25 0.44
BXA-80063-6BF-EDIN-4 w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.50 8.03 8.53 9.56	5.63 6.72 7.56 9.29	0.04 0.10 0.17 0.33
BXA-80063-6BF-EDIN-4 w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.50 8.03 8.53 9.56	5.63 6.72 7.56 9.29	0.04 0.10 0.17 0.33
BXA-80063-6BF-EDIN-4 w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	7.50 8.03 8.53 9.56	5.63 6.72 7.56 9.29	0.04 0.10 0.17 0.33
LNX-6512DS-A1M w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.33 5.72 6.12 6.94	4.53 5.15 5.77 7.07	0.05 0.10 0.15 0.28
LNX-6512DS-A1M w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.33 5.72 6.12 6.94	4.53 5.15 5.77 7.07	0.05 0.10 0.15 0.28
LNX-6512DS-A1M w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	5.33 5.72 6.12 6.94	4.53 5.15 5.77 7.07	0.05 0.10 0.15 0.28
(2) RFV01U-D2A	A	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.01 1.14 1.28 1.59	0.07 0.09 0.11 0.15
RFV01U-D2A	B	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.01 1.14 1.28 1.59	0.07 0.09 0.11 0.15
RFV01U-D1A	B	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.25 1.39 1.54 1.86	0.08 0.10 0.12 0.18
(2) RFV01U-D1A	C	From Centroid-Leg	4.00 0.00 3.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.88 2.05 2.22 2.60	1.25 1.39 1.54 1.86	0.08 0.10 0.12 0.18
RHSDC-3315-PF-48	A	From	4.00	0.0000	146.00	No Ice	3.36	2.19	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
		Centroid-Leg	0.00 -1.00			1/2" Ice 1" Ice 2" Ice	3.60 3.84 4.34	2.39 2.61 3.05	0.06 0.09 0.17
RHSDC-3315-PF-48	C	From Centroid-Leg	4.00 0.00 -1.00	0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	3.36 3.60 3.84 4.34	2.19 2.39 2.61 3.05	0.03 0.06 0.09 0.17
Side Arm Mount [SO 102-3]	C	None		0.0000	146.00	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
Sector Mount [SM 802-3]	C	None		0.0000	146.00	No Ice 1/2" Ice 1" Ice 2" Ice	24.41 31.39 38.37 52.33	24.41 31.39 38.37 52.33	0.93 1.36 1.79 2.66
Detuner Side Arm Mount [SO 701-3]	C	None		0.0000	133.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.83 3.92 5.01 7.19	2.83 3.92 5.01 7.19	0.20 0.24 0.28 0.36
***** 1" Dia x 3.5-ft	A	From Leg	1.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.37 0.68 0.90 1.37	0.00 0.01 0.01 0.03
1" Dia x 3.5-ft	B	From Leg	1.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.37 0.68 0.90 1.37	0.00 0.01 0.01 0.03
1" Dia x 3.5-ft	C	From Leg	1.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.37 0.68 0.90 1.37	0.00 0.01 0.01 0.03
***** 1" Dia x 3.5-ft	A	From Leg	1.50 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.37 0.68 0.90 1.37	0.00 0.01 0.01 0.03
1" Dia x 3.5-ft	B	From Leg	1.50 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.37 0.68 0.90 1.37	0.00 0.01 0.01 0.03
1" Dia x 3.5-ft	C	From Leg	1.50 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.37 0.68 0.90 1.37	0.00 0.01 0.01 0.03
***** 1" Dia x 3.5-ft	A	From Leg	1.50 0.00 0.00	0.0000	40.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.37 0.68 0.90 1.37	0.00 0.01 0.01 0.03
1" Dia x 3.5-ft	B	From Leg	1.50 0.00 0.00	0.0000	40.00	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.37 0.68 0.90 1.37	0.00 0.01 0.01 0.03
1" Dia x 3.5-ft	C	From Leg	1.50 0.00	0.0000	40.00	No Ice 1/2" Ice	0.00 0.00	0.37 0.68	0.00 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	0.00	0.90	0.01
						2" Ice	0.00	1.37	0.03
*****									
1" Dia x 3.5-ft	A	From Leg	1.50	0.0000	10.00	No Ice	0.00	0.37	0.00
			0.00			1/2" Ice	0.00	0.68	0.01
			0.00			1" Ice	0.00	0.90	0.01
						2" Ice	0.00	1.37	0.03
1" Dia x 3.5-ft	B	From Leg	1.50	0.0000	10.00	No Ice	0.00	0.37	0.00
			0.00			1/2" Ice	0.00	0.68	0.01
			0.00			1" Ice	0.00	0.90	0.01
						2" Ice	0.00	1.37	0.03
1" Dia x 3.5-ft	C	From Leg	1.50	0.0000	10.00	No Ice	0.00	0.37	0.00
			0.00			1/2" Ice	0.00	0.68	0.01
			0.00			1" Ice	0.00	0.90	0.01
						2" Ice	0.00	1.37	0.03

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

Comb. No.	Description
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	188 - 137	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-39.28	0.39	-0.50
			Max. Mx	20	-13.31	708.61	0.99
			Max. My	14	-13.29	-1.04	-710.17
			Max. Vy	20	-26.15	708.61	0.99
			Max. Vx	14	26.21	-1.04	-710.17
			Max. Torque	24			1.08
L2	137 - 90.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-54.27	0.39	-0.92
			Max. Mx	20	-23.45	2035.00	0.88
			Max. My	14	-23.44	-0.94	-2039.44
			Max. Vy	20	-31.74	2035.00	0.88
			Max. Vx	14	31.80	-0.94	-2039.44
			Max. Torque	24			1.07
L3	90.25 - 44.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-73.14	0.39	-1.40
			Max. Mx	20	-37.17	3568.03	0.78
			Max. My	14	-37.17	-0.86	-3575.25
			Max. Vy	20	-37.04	3568.03	0.78
			Max. Vx	14	37.10	-0.86	-3575.25
			Max. Torque	24			1.07
L4	44.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-102.50	0.39	-2.00
			Max. Mx	20	-60.16	5600.16	0.65
			Max. My	14	-60.16	-0.76	-5610.49
			Max. Vy	20	-42.27	5600.16	0.65
			Max. Vx	14	42.33	-0.76	-5610.49
			Max. Torque	24			1.06

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	33	102.50	0.01	-12.57
	Max. H_x	21	45.15	42.23	-0.00
	Max. H_z	3	45.15	-0.00	42.28
	Max. M_x	2	5610.12	-0.00	42.28
	Max. M_z	8	5600.01	-42.23	0.00
	Max. Torsion	24	1.06	21.11	36.62
	Min. Vert	23	45.15	36.57	21.14
	Min. H_x	9	45.15	-42.23	0.00
	Min. H_z	15	45.15	0.00	-42.28
	Min. M_x	14	-5610.49	0.00	-42.28
	Min. M_z	20	-5600.16	42.23	-0.00
	Min. Torsion	12	-1.05	-21.11	-36.62

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	50.17	0.00	0.00	0.14	0.06	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	60.20	0.00	-42.28	-5610.12	0.88	-0.87
0.9 Dead+1.0 Wind 0 deg - No Ice	45.15	0.00	-42.28	-5535.21	0.84	-0.87
1.2 Dead+1.0 Wind 30 deg - No Ice	60.20	21.11	-36.62	-4858.10	-2799.25	-0.43
0.9 Dead+1.0 Wind 30 deg - No Ice	45.15	21.11	-36.62	-4793.25	-2761.89	-0.44
1.2 Dead+1.0 Wind 60 deg - No Ice	60.20	36.57	-21.14	-2804.30	-4849.33	0.11
0.9 Dead+1.0 Wind 60 deg - No Ice	45.15	36.57	-21.14	-2766.89	-4784.58	0.11
1.2 Dead+1.0 Wind 90 deg - No Ice	60.20	42.23	-0.00	0.99	-5600.01	0.63
0.9 Dead+1.0 Wind 90 deg - No Ice	45.15	42.23	-0.00	0.92	-5525.22	0.63
1.2 Dead+1.0 Wind 120 deg - No Ice	60.20	36.57	21.14	2806.05	-4850.14	0.97
0.9 Dead+1.0 Wind 120 deg - No Ice	45.15	36.57	21.14	2768.51	-4785.36	0.97
1.2 Dead+1.0 Wind 150 deg - No Ice	60.20	21.11	36.62	4859.25	-2800.67	1.05
0.9 Dead+1.0 Wind 150 deg - No Ice	45.15	21.11	36.62	4794.29	-2763.26	1.05
1.2 Dead+1.0 Wind 180 deg - No Ice	60.20	-0.00	42.28	5610.49	-0.76	0.85
0.9 Dead+1.0 Wind 180 deg - No Ice	45.15	-0.00	42.28	5535.47	-0.75	0.85
1.2 Dead+1.0 Wind 210 deg - No Ice	60.20	-21.11	36.62	4858.48	2799.38	0.43
0.9 Dead+1.0 Wind 210 deg - No Ice	45.15	-21.11	36.62	4793.53	2761.99	0.43
1.2 Dead+1.0 Wind 240 deg - No Ice	60.20	-36.57	21.14	2804.66	4849.48	-0.11
0.9 Dead+1.0 Wind 240 deg - No Ice	45.15	-36.57	21.14	2767.16	4784.70	-0.11
1.2 Dead+1.0 Wind 270 deg -	60.20	-42.23	0.00	-0.65	5600.16	-0.62

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
No Ice 0.9 Dead+1.0 Wind 270 deg - No Ice	45.15	-42.23	0.00	-0.67	5525.33	-0.62
1.2 Dead+1.0 Wind 300 deg - No Ice	60.20	-36.57	-21.14	-2805.72	4850.27	-0.97
0.9 Dead+1.0 Wind 300 deg - No Ice	45.15	-36.57	-21.14	-2768.26	4785.46	-0.97
1.2 Dead+1.0 Wind 330 deg - No Ice	60.20	-21.11	-36.62	-4858.91	2800.78	-1.06
0.9 Dead+1.0 Wind 330 deg - No Ice	45.15	-21.11	-36.62	-4794.03	2763.34	-1.06
1.2 Dead+1.0 Ice+1.0 Temp	102.50	-0.00	0.00	2.00	0.39	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	102.50	0.01	-12.57	-1690.59	-0.77	-0.17
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	102.50	6.29	-10.89	-1464.41	-846.86	-0.08
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	102.50	10.89	-6.29	-845.23	-1465.91	0.03
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	102.50	12.57	-0.01	1.03	-1692.04	0.13
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	102.50	10.88	6.28	847.63	-1464.67	0.20
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	102.50	6.28	10.88	1467.71	-844.71	0.21
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	102.50	-0.01	12.57	1695.14	1.72	0.17
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	102.50	-6.29	10.89	1468.96	847.81	0.08
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	102.50	-10.89	6.29	849.78	1466.86	-0.03
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	102.50	-12.57	0.01	3.51	1692.99	-0.13
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	102.50	-10.88	-6.28	-843.08	1465.62	-0.20
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	102.50	-6.28	-10.88	-1463.17	845.66	-0.22
Dead+Wind 0 deg - Service	50.17	0.00	-9.18	-1209.96	0.24	-0.19
Dead+Wind 30 deg - Service	50.17	4.58	-7.95	-1047.75	-603.74	-0.10
Dead+Wind 60 deg - Service	50.17	7.94	-4.59	-604.76	-1045.92	0.03
Dead+Wind 90 deg - Service	50.17	9.16	-0.00	0.33	-1207.83	0.14
Dead+Wind 120 deg - Service	50.17	7.93	4.59	605.36	-1046.10	0.22
Dead+Wind 150 deg - Service	50.17	4.58	7.95	1048.23	-604.04	0.24
Dead+Wind 180 deg - Service	50.17	-0.00	9.18	1210.26	-0.11	0.19
Dead+Wind 210 deg - Service	50.17	-4.58	7.95	1048.06	603.86	0.10
Dead+Wind 240 deg - Service	50.17	-7.94	4.59	605.06	1046.05	-0.02
Dead+Wind 270 deg - Service	50.17	-9.16	0.00	-0.02	1207.95	-0.14
Dead+Wind 300 deg - Service	50.17	-7.93	-4.59	-605.06	1046.21	-0.22
Dead+Wind 330 deg - Service	50.17	-4.58	-7.95	-1047.93	604.16	-0.24

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-50.17	0.00	0.00	50.17	0.00	0.000%
2	0.00	-60.20	-42.28	-0.00	60.20	42.28	0.000%
3	0.00	-45.15	-42.28	-0.00	45.15	42.28	0.000%
4	21.11	-60.20	-36.62	-21.11	60.20	36.62	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
5	21.11	-45.15	-36.62	-21.11	45.15	36.62	0.000%
6	36.57	-60.20	-21.14	-36.57	60.20	21.14	0.000%
7	36.57	-45.15	-21.14	-36.57	45.15	21.14	0.000%
8	42.23	-60.20	-0.00	-42.23	60.20	0.00	0.000%
9	42.23	-45.15	-0.00	-42.23	45.15	0.00	0.000%
10	36.57	-60.20	21.14	-36.57	60.20	-21.14	0.000%
11	36.57	-45.15	21.14	-36.57	45.15	-21.14	0.000%
12	21.11	-60.20	36.62	-21.11	60.20	-36.62	0.000%
13	21.11	-45.15	36.62	-21.11	45.15	-36.62	0.000%
14	-0.00	-60.20	42.28	0.00	60.20	-42.28	0.000%
15	-0.00	-45.15	42.28	0.00	45.15	-42.28	0.000%
16	-21.11	-60.20	36.62	21.11	60.20	-36.62	0.000%
17	-21.11	-45.15	36.62	21.11	45.15	-36.62	0.000%
18	-36.57	-60.20	21.14	36.57	60.20	-21.14	0.000%
19	-36.57	-45.15	21.14	36.57	45.15	-21.14	0.000%
20	-42.23	-60.20	0.00	42.23	60.20	-0.00	0.000%
21	-42.23	-45.15	0.00	42.23	45.15	-0.00	0.000%
22	-36.57	-60.20	-21.14	36.57	60.20	21.14	0.000%
23	-36.57	-45.15	-21.14	36.57	45.15	21.14	0.000%
24	-21.11	-60.20	-36.62	21.11	60.20	36.62	0.000%
25	-21.11	-45.15	-36.62	21.11	45.15	36.62	0.000%
26	0.00	-102.50	0.00	0.00	102.50	-0.00	0.000%
27	0.01	-102.50	-12.57	-0.01	102.50	12.57	0.000%
28	6.29	-102.50	-10.89	-6.29	102.50	10.89	0.000%
29	10.89	-102.50	-6.29	-10.89	102.50	6.29	0.000%
30	12.57	-102.50	-0.01	-12.57	102.50	0.01	0.000%
31	10.88	-102.50	6.28	-10.88	102.50	-6.28	0.000%
32	6.28	-102.50	10.88	-6.28	102.50	-10.88	0.000%
33	-0.01	-102.50	12.57	0.01	102.50	-12.57	0.000%
34	-6.29	-102.50	10.89	6.29	102.50	-10.89	0.000%
35	-10.89	-102.50	6.29	10.89	102.50	-6.29	0.000%
36	-12.57	-102.50	0.01	12.57	102.50	-0.01	0.000%
37	-10.88	-102.50	-6.28	10.88	102.50	6.28	0.000%
38	-6.28	-102.50	-10.88	6.28	102.50	10.88	0.000%
39	0.00	-50.17	-9.18	-0.00	50.17	9.18	0.000%
40	4.58	-50.17	-7.95	-4.58	50.17	7.95	0.000%
41	7.94	-50.17	-4.59	-7.94	50.17	4.59	0.000%
42	9.16	-50.17	-0.00	-9.16	50.17	0.00	0.000%
43	7.93	-50.17	4.59	-7.93	50.17	-4.59	0.000%
44	4.58	-50.17	7.95	-4.58	50.17	-7.95	0.000%
45	-0.00	-50.17	9.18	0.00	50.17	-9.18	0.000%
46	-4.58	-50.17	7.95	4.58	50.17	-7.95	0.000%
47	-7.94	-50.17	4.59	7.94	50.17	-4.59	0.000%
48	-9.16	-50.17	0.00	9.16	50.17	-0.00	0.000%
49	-7.93	-50.17	-4.59	7.93	50.17	4.59	0.000%
50	-4.58	-50.17	-7.95	4.58	50.17	7.95	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00005316
3	Yes	4	0.00000001	0.00070670
4	Yes	6	0.00000001	0.00021771
5	Yes	6	0.00000001	0.00006032

6	Yes	6	0.00000001	0.00021814
7	Yes	6	0.00000001	0.00006049
8	Yes	5	0.00000001	0.00004631
9	Yes	4	0.00000001	0.00065271
10	Yes	6	0.00000001	0.00022096
11	Yes	6	0.00000001	0.00006141
12	Yes	6	0.00000001	0.00021632
13	Yes	6	0.00000001	0.00005978
14	Yes	5	0.00000001	0.00004651
15	Yes	4	0.00000001	0.00065923
16	Yes	6	0.00000001	0.00021951
17	Yes	6	0.00000001	0.00006095
18	Yes	6	0.00000001	0.00021895
19	Yes	6	0.00000001	0.00006076
20	Yes	5	0.00000001	0.00003987
21	Yes	4	0.00000001	0.00061001
22	Yes	6	0.00000001	0.00021637
23	Yes	6	0.00000001	0.00005981
24	Yes	6	0.00000001	0.00022114
25	Yes	6	0.00000001	0.00006146
26	Yes	4	0.00000001	0.00000230
27	Yes	6	0.00000001	0.00017201
28	Yes	6	0.00000001	0.00031046
29	Yes	6	0.00000001	0.00031051
30	Yes	6	0.00000001	0.00017222
31	Yes	6	0.00000001	0.00031292
32	Yes	6	0.00000001	0.00031002
33	Yes	6	0.00000001	0.00017264
34	Yes	6	0.00000001	0.00031340
35	Yes	6	0.00000001	0.00031334
36	Yes	6	0.00000001	0.00017242
37	Yes	6	0.00000001	0.00030889
38	Yes	6	0.00000001	0.00031179
39	Yes	4	0.00000001	0.00011817
40	Yes	5	0.00000001	0.00005985
41	Yes	5	0.00000001	0.00006014
42	Yes	4	0.00000001	0.00011480
43	Yes	5	0.00000001	0.00006243
44	Yes	4	0.00000001	0.00098826
45	Yes	4	0.00000001	0.00011761
46	Yes	5	0.00000001	0.00006124
47	Yes	5	0.00000001	0.00006080
48	Yes	4	0.00000001	0.00011428
49	Yes	4	0.00000001	0.00098825
50	Yes	5	0.00000001	0.00006256

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
L1	188 - 137	39.118	45	1.9533	0.0031
L2	141.25 - 90.25	21.367	45	1.5802	0.0011
L3	95.5 - 44.5	8.966	45	0.9642	0.0004
L4	51 - 0	2.367	45	0.4304	0.0001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.00	800 10121 w/ Mount Pipe	45	39.118	1.9533	0.0031	39404
188.00	Lighting Rod 3/4" x 8'	45	39.118	1.9533	0.0031	39404
161.00	AIR -32 B2A/B66AA w/ Mount Pipe	45	28.466	1.7653	0.0018	7296
146.00	GPS_A	45	22.990	1.6305	0.0012	4689
133.00	Side Arm Mount [SO 701-3]	45	18.697	1.4829	0.0009	4246
100.00	1" Dia x 3.5-ft	45	9.929	1.0270	0.0004	4386
70.00	1" Dia x 3.5-ft	45	4.545	0.6377	0.0002	4557
40.00	1" Dia x 3.5-ft	45	1.521	0.3253	0.0001	5964
10.00	1" Dia x 3.5-ft	45	0.254	0.0767	0.0000	23853

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	188 - 137	181.116	14	9.0611	0.0138
L2	141.25 - 90.25	99.035	14	7.3333	0.0049
L3	95.5 - 44.5	41.588	14	4.4752	0.0018
L4	51 - 0	10.979	14	1.9970	0.0006

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.00	800 10121 w/ Mount Pipe	14	181.116	9.0611	0.0145	8875
188.00	Lighting Rod 3/4" x 8'	14	181.116	9.0611	0.0145	8875
161.00	AIR -32 B2A/B66AA w/ Mount Pipe	14	131.874	8.1910	0.0081	1638
146.00	GPS_A	14	106.548	7.5665	0.0055	1047
133.00	Side Arm Mount [SO 701-3]	14	86.678	6.8825	0.0040	942
100.00	1" Dia x 3.5-ft	14	46.051	4.7669	0.0020	958
70.00	1" Dia x 3.5-ft	14	21.082	2.9592	0.0011	987
40.00	1" Dia x 3.5-ft	14	7.053	1.5090	0.0004	1286
10.00	1" Dia x 3.5-ft	14	1.180	0.3558	0.0001	5142

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	188 - 137 (1)	TP32.711x22x0.25	51.00	0.00	0.0	25.0495	-13.29	1465.40	0.009
L2	137 - 90.25 (2)	TP42.03x31.3184x0.3125	51.00	0.00	0.0	40.2848	-23.44	2356.66	0.010
L3	90.25 - 44.5 (3)	TP51.014x40.3023x0.375	51.00	0.00	0.0	58.6481	-37.17	3430.92	0.011
L4	44.5 - 0 (4)	TP59.61x48.8988x0.5	51.00	0.00	0.0	93.8076	-60.16	5487.74	0.011

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	188 - 137 (1)	TP32.711x22x0.25	710.64	1113.48	0.638	0.00	1113.48	0.000
L2	137 - 90.25 (2)	TP42.03x31.3184x0.3125	2039.43	2281.22	0.894	0.00	2281.22	0.000
L3	90.25 - 44.5 (3)	TP51.014x40.3023x0.375	3575.25	4013.65	0.891	0.00	4013.65	0.000
L4	44.5 - 0 (4)	TP59.61x48.8988x0.5	5610.48	7974.63	0.704	0.00	7974.63	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	188 - 137 (1)	TP32.711x22x0.25	26.20	439.62	0.060	1.07	1215.38	0.001
L2	137 - 90.25 (2)	TP42.03x31.3184x0.3125	31.80	698.57	0.046	0.86	2514.68	0.000
L3	90.25 - 44.5 (3)	TP51.014x40.3023x0.375	37.10	1019.71	0.036	0.85	4441.48	0.000
L4	44.5 - 0 (4)	TP59.61x48.8988x0.5	42.33	1632.62	0.026	0.85	8522.25	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	188 - 137 (1)	0.009	0.638	0.000	0.060	0.001	0.651	1.050	4.8.2
L2	137 - 90.25 (2)	0.010	0.894	0.000	0.046	0.000	0.906	1.050	4.8.2
L3	90.25 - 44.5 (3)	0.011	0.891	0.000	0.036	0.000	0.903	1.050	4.8.2
L4	44.5 - 0 (4)	0.011	0.704	0.000	0.026	0.000	0.715	1.050	4.8.2

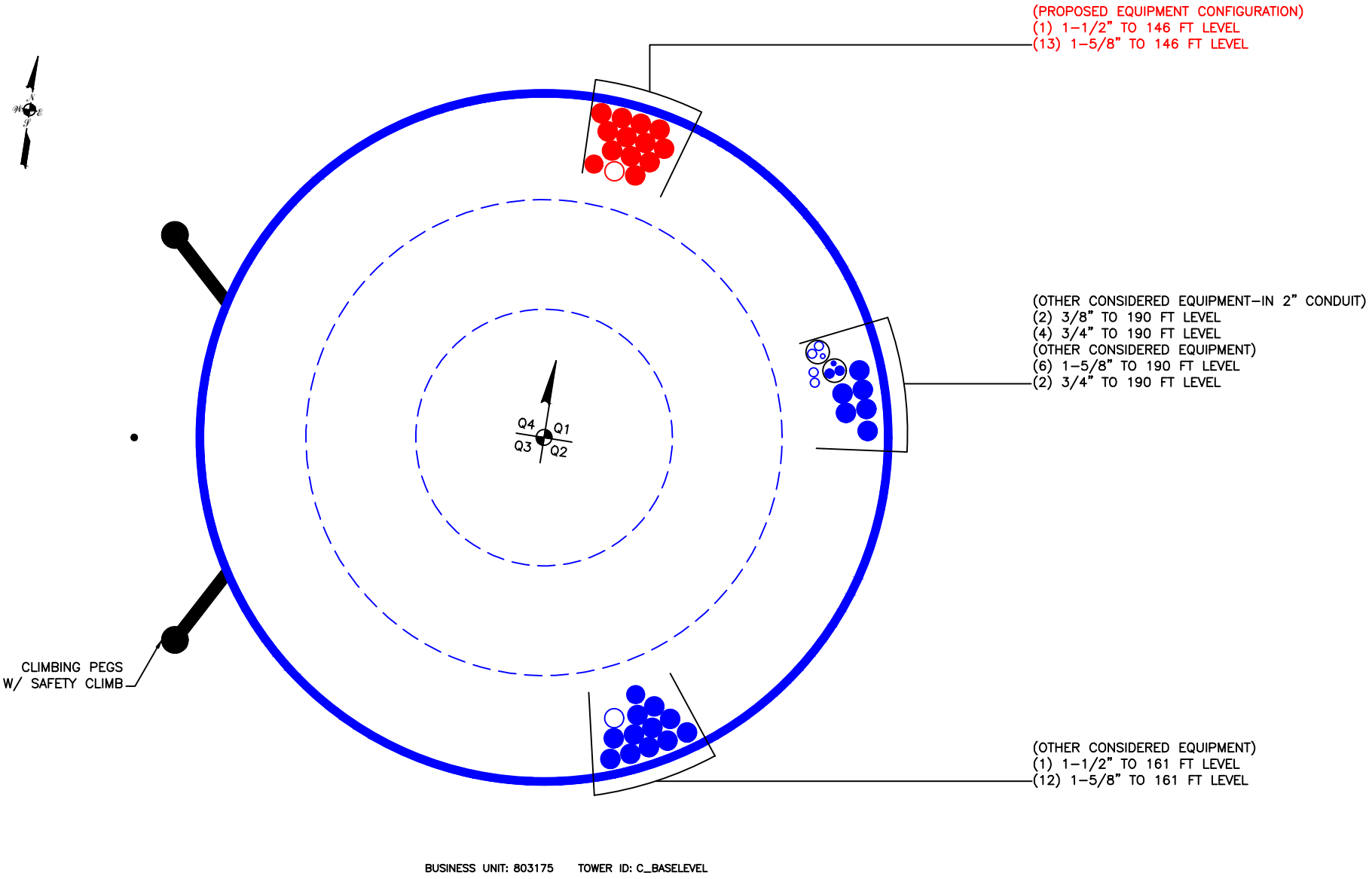
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	188 - 137	Pole	TP32.711x22x0.25	1	-13.29	1538.67	62.0	Pass
L2	137 - 90.25	Pole	TP42.03x31.3184x0.3125	2	-23.44	2474.49	86.3	Pass
L3	90.25 - 44.5	Pole	TP51.014x40.3023x0.375	3	-37.17	3602.47	86.0	Pass
L4	44.5 - 0	Pole	TP59.61x48.8988x0.5	4	-60.16	5762.13	68.1	Pass
							Summary	
						Pole (L2)	86.3	Pass
						RATING =	**86.3**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 803175 TOWER ID: C_BASELEVEL

APPENDIX C

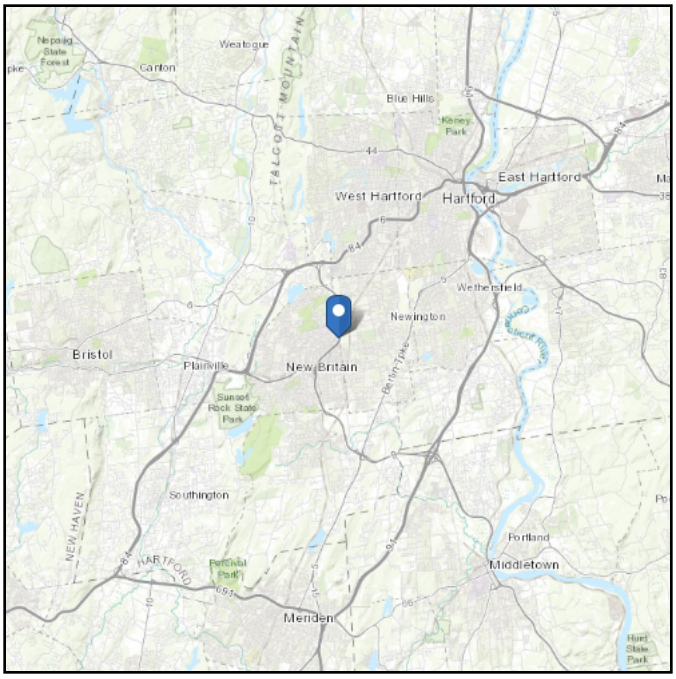
ADDITIONAL CALCULATIONS

ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 88.33 ft (NAVD 88)
Latitude: 41.686611
Longitude: -72.757722



Wind

Results:

Wind Speed:	122 Vmph
10-year MRI	76 Vmph
25-year MRI	86 Vmph
50-year MRI	93 Vmph
100-year MRI	100 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:	Thu Jan 31 2019

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.

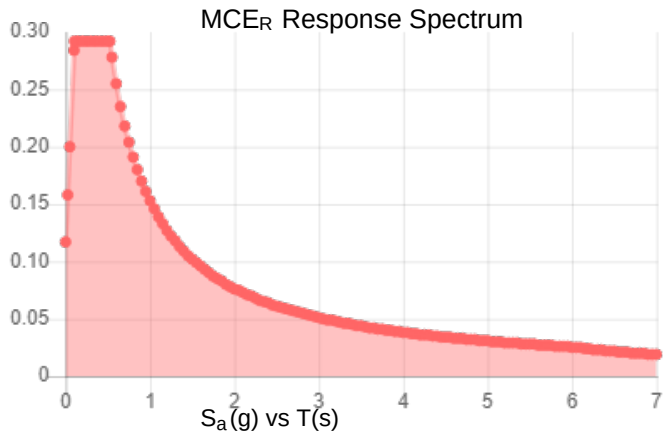
Seismic

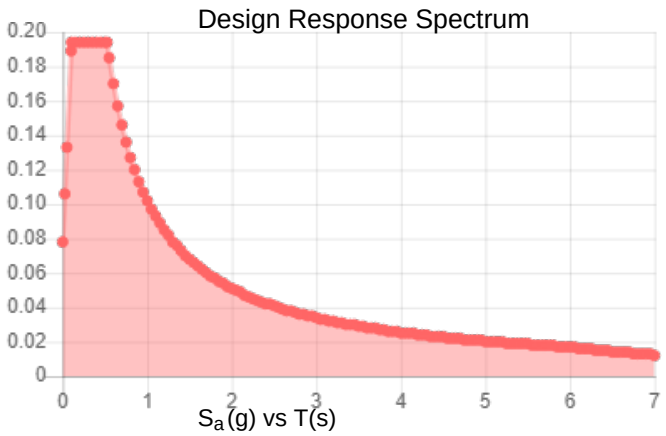
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.182	S_{DS} :	0.194
S_1 :	0.064	S_{D1} :	0.102
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.092
S_{MS} :	0.292	PGA_M :	0.148
S_{M1} :	0.153	F_{PGA} :	1.6
		I_e :	1

Seismic Design Category B





Data Accessed: Thu Jan 31 2019

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:	Thu Jan 31 2019

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.

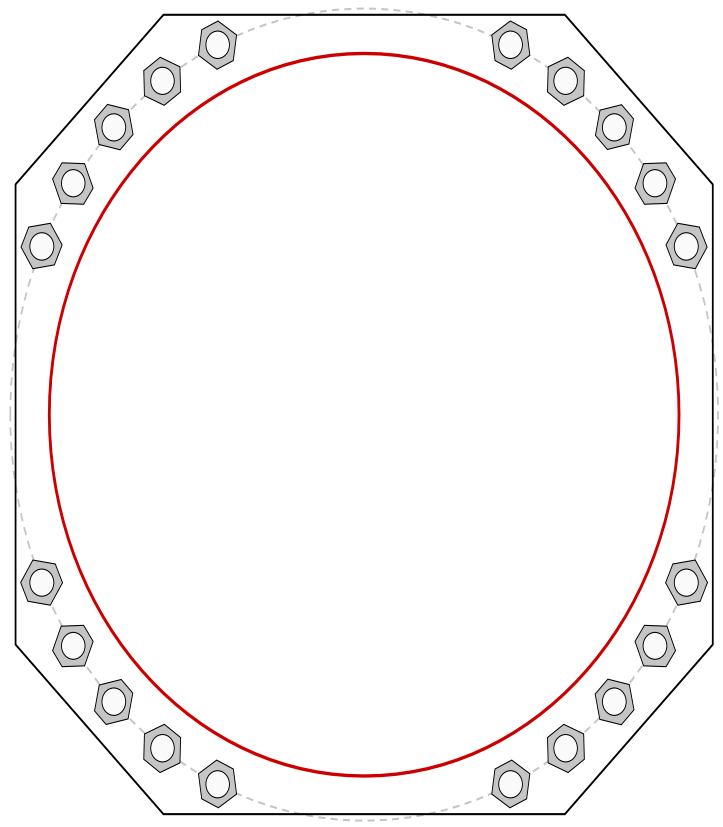
Monopole Base Plate Connection

Site Info	
BU #	803175
Site Name	New Britain 3 CAC 803
Order #	450305 Rev. 1

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

Applied Loads	
Moment (kip-ft)	5610.49
Axial Force (kips)	60.16
Shear Force (kips)	42.33

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(20) 2-1/4" ø bolts (A615-75 N; Fy=75 ksi, Fu=100 ksi) on 67" BC

Base Plate Data

66" OD x 3" Plate (A572-50; Fy=50 ksi, Fu=65 ksi)

Stiffener Data

N/A

Pole Data

59.61" x 0.5" 18-sided pole (A607-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

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

Pu_c = 203.89	ϕPn_c = 243.75	**Stress Rating**
Vu = 2.12	ϕVn = 73.13	**79.7%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	34.5	(Flexural)
Allowable Stress (ksi):	45	
Stress Rating:	**73.0%**	**Pass**

Pier and Pad Foundation

BU # :	803175
Site Name:	CT New Britain 3 C
App. Number:	450305 Rev. 1

TIA-222 Revision:	H
Tower Type:	Monopole

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

Superstructure Analysis Reactions

Compression, P_{comp}:	60	kips
Base Shear, Vu_comp:	42	kips
Moment, M_u:	5610	ft-kips
Tower Height, **H**:	188	ft
BP Dist. Above Fdn, bp_{dist}:	3.5	in

Pier Properties

Pier Shape:	Square	
Pier Diameter, **dpier**:	8	ft
Ext. Above Grade, **E**:	1.0833	ft
Pier Rebar Size, **Sc**:	11	
Pier Rebar Quantity, **mc**:	36	
Pier Tie/Spiral Size, **St**:	5	
Pier Tie/Spiral Quantity, **mt**:	12	
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier}:	4	in

Pad Properties

Depth, **D**:	5.9167	ft
Pad Width, **W**:	26	ft
Pad Thickness, **T**:	3	ft
Pad Rebar Size (Bottom), **Sp**:	11	
Pad Rebar Quantity (Bottom), **mp**:	33	
Pad Clear Cover, cc_{pad}:	4	in

Material Properties

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

Soil Properties

Total Soil Unit Weight, γ:	110	pcf
Ultimate Net Bearing, Qnet:	12.000	ksf
Cohesion, **Cu**:	0.000	ksf
Friction Angle, φ:	30	degrees
SPT Blow Count, N_{blows}:		
Base Friction, μ:		
Neglected Depth, **N**:	3.33	ft
Foundation Bearing on Rock?	No	
Groundwater Depth, **gw**:	17.9	ft

<--Toggle between Gross and Net

Foundation Analysis Checks

	Capacity	Demand	Rating*	Check
Lateral (Sliding) (kips)	221.65	42.00	**18.0%**	**Pass**
Bearing Pressure (ksf)	9.49	4.53	**47.8%**	**Pass**
*Overturning (kip*ft)*	6612.74	5916.25	**89.5%**	**Pass**
*Pier Flexure (Comp.) (kip*ft)*	9854.47	5778.00	**55.8%**	**Pass**
Pier Compression (kip)	30551.04	106.08	**0.3%**	**Pass**
*Pad Flexure (kip*ft)*	6473.47	3065.50	**45.1%**	**Pass**
Pad Shear - 1-way (kips)	766.05	412.64	**51.3%**	**Pass**
Pad Shear - 2-way (Comp) (ksi)	0.164	0.000	**0.0%**	**Pass**
*Flexural 2-way (Comp) (kip*ft)*	8464.14	3466.80	**39.0%**	**Pass**

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

Soil Rating*:	**89.5%**
Structural Rating*:	**55.8%**

Version 3.1.0

Date: **January 29, 2019**

Williams Gate
Crown Castle
3 Corporate Dr., St 101
Clifton Park, NY 12065

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Infinigy Engineering, PLLC
1033 Watervliet Shaker Road
Albany, NY 12205
518-690-0790
structural@infinigy.com

Subject:	**Mount Analysis Report**	
Carrier Designation:	**Verizon Upgrade**	
	Carrier Site Number:	34002
	Carrier Site Name:	New Britain 3 CT
Crown Castle Designation:	**Crown Castle BU Number:**	803175
	Crown Castle Site Name:	CT New Britain 3 CAC 803175
	Crown Castle JDE Job Number:	518913
	Crown Castle Order Number:	450305, Rev 1
Engineering Firm Designation:	**Infinigy Report Designation:**	1039-D0001-B
Site Data:	**167 Coccomo, New Britain, CT, 06051** **Latitude 41°41'11.80" Longitude 72°45'27.80"**	
Structure Information:	**Tower Height & Type:**	**188.0 ft Monopole**
	Mount Elevation:	**146.0 ft**
	Mount Type:	**12 ft Sector Frame**

Dear Williams Gate,

Infinigy is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of Verizon's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

Sector Frame (typical) **Sufficient**

The analysis has been performed in accordance with the TIA-222-H Standard. This analysis utilizes an ultimate 3-second gust wind speed of 125 mph from the 2012 International Building Code with 2018 Connecticut State Building Code. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II was/were used in this analysis.

We at Infinigy Engineering, PLLC appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Mount analysis prepared by: Christopher Kudlacik
Respectfully Submitted by:

Joseph R. Johnston, P.E.
VP Structural Engineering / Principal

TABLE OF CONTENTS

1) INTRODUCTION

This mount is a proposed 12 ft CSOTF Sector Framedesigned by Armor Tower. This mount is installed at the 146.0 ft elevation on 3 sector(s) of the 188.0 ft Monopole**.**

2) ANALYSIS CRITERIA

Building Code:	2012 IBC
TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	125 mph
Exposure Category:	C
Topographic Factor at Base:	1.0
Topographic Factor at Mount:	1.0
Ice Thickness:	2.0 in
Wind Speed with Ice:	50 mph
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Final Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
146.0	149.0	3	Amphenol	BXA-80063-6BF-EDIN-4	Mount-Platform
		3	Andrew	LNX-6512DS-A1M	
		6	Andrew	SBNHH-1D65B	
		1	GPS	GPS_A	
	145.0	2	Raycap	RHSDC-3315-PF-48	Mounted to Monopole
	149.0	3	Samsung	RFV01U-D1A	Mount-Platform
		3	Samsung	RFV01U-D2A	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Crown Application	Verizon Application	803175	CCI Sites
Mount Design	September 11 2018	CSOTF	CCI Sites
TIA Inspection	April 3, 2018	803175	CCI Sites

3.1) Analysis Method

RISA-3D (Version 17.0.2), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision B).

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
4) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM A53 (GR 35)
Pipe	ASTM A53 (GR 35)
Connection Bolts	ASTM A325

This analysis may be affected if any assumptions are not valid or have been made in error. Infinigy should be notified to determine the effect on the structural integrity of the antenna mounting system.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Sector Frame, Typical)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1,2	Mount Pipe	MP4	146.0	25.9%	Pass
	Main Horizontal	H2	146.0	30.6%	Pass
	Standoff	S2	146.0	33.3%	Pass
	Solid Round	B9	146.0	42.9%	Pass
	Bolt Check	--	146.0	4.2%	Pass

Structure Rating (max from all components) =	42.9%

Notes:
1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
2) All sectors are typical

Table 4 - Tieback Connection Data Table

Tower Connection Node No.	Existing / Proposed	Resultant End Reaction (lb)	Connected Member Type	Connected Member Size	Member Compressive Capacity (lb)[3]	Notes
N102	Proposed	639	Sector Frame	N/A	N/A	4

Notes:
1) Tieback connection point is within 25% of either end of the connected tower member
2) Tieback connection point is NOT within 25% of either end of the connected tower member
3) Reduced member compressive capacity according to CED-STD-10294 *Standard for Installation of Mounts and Appurtenances*
4) Tieback connections to adjacent sector frame

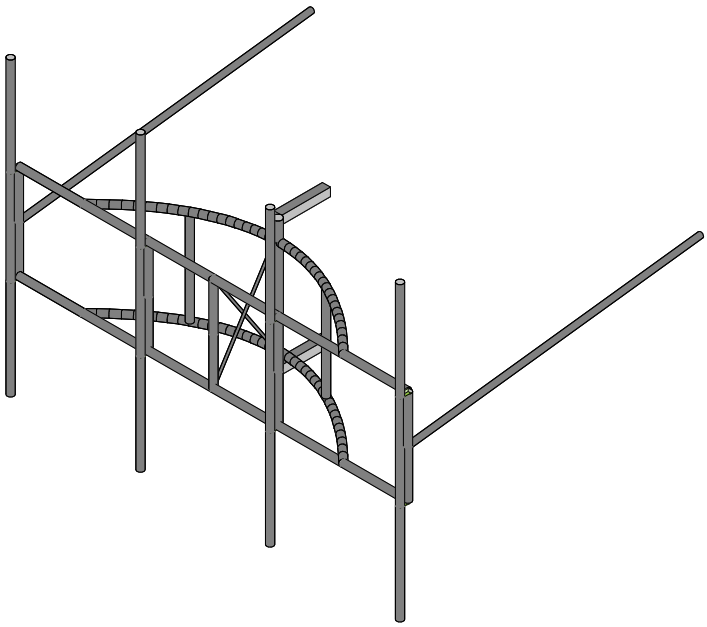
4.1) Recommendations

The Sector Frame Mount has sufficient capacity to support the proposed loading after the following is installed:

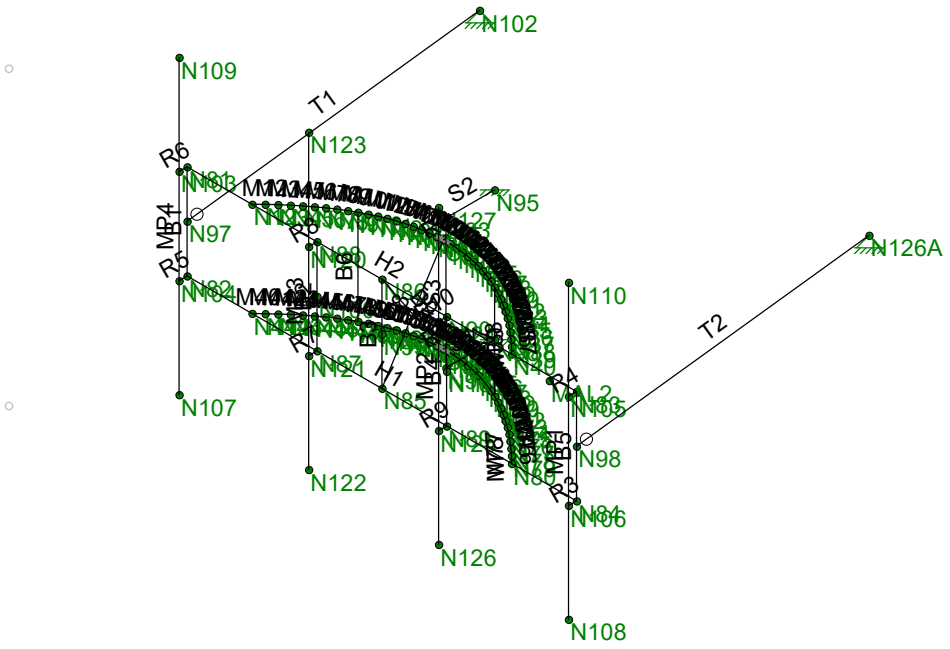
- Replace Mount with (1) Armor Tower CSOTF Mount per sector

APPENDIX A

WIRE FRAME AND RENDERED MODELS



Infinigy Engineering, PLLC	803175	Final Configuration
CLK		Jan 15, 2019 at 10:25 AM
1039-D0001-B		CSOTF - 803175.r3d



Infinigy Engineering, PLLC	803175	Wireframe
CLK		Jan 15, 2019 at 10:25 AM
1039-D0001-B		CSOTF - 803175.r3d

APPENDIX B

SOFTWARE INPUT CALCULATIONS

Site Name:	803175
Client:	Crown Castle
Carrier:	Verizon
Engineer:	CLK
Date:	1/29/2019

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INFINIGY WIND LOAD CALCULATOR 3.0.2

Site Information Inputs:

Adopted Building Code:	2012 IBC
Structure Load Standard:	TIA-222-H
Antenna Load Standard:	TIA-222-H
Structure Risk Category:	II
Structure Type:	Mount - Sector
Number of Sectors:	3
Structure Shape 1:	Round

Rooftop Inputs:

Rooftop Wind Speed-Up?:	No

Wind Loading Inputs:

Design Wind Velocity:	125	mph (ultimate 3-second gust)
Wind Centerline 1 (z_1):	146.0	ft
Side Face Angle (θ):	60	degrees
Exposure Category:	C	
Topographic Category:	1	

Wind with No Ice		
q_z (psf)	Gh	F_{ST} (psf)
51.92	1.00	**62.30**

Wind with Ice		
q_z (psf)	Gh	F_{ST} (psf)
8.31	1.00	**29.53**

Ice Loading Inputs:

Is Ice Loading Needed?:	Yes	
Ice Wind Velocity:	50	mph (ultimate 3-second gust)
Base Ice Thickness:	2.00	in

Input Appurtenance Information and Load Placements:

Appurtenance Name	Elevation (ft)	Total Quantity	Ka	Front Shape	Side Shape	q_z (psf)	EPA (ft^2)	Fz (lbs)	Fx (lbs)	Fz(60) (lbs)	Fx(30) (lbs)
Amphenol BXA-80063-6BF-EDIN-4	149.0	3	1.00	Flat	Flat	52.14	7.26	378.66	210.39	252.46	336.59
Andrew LNX-6512DS-A1M	149.0	3	1.00	Flat	Flat	52.14	5.09	265.41	173.62	196.57	242.46
Andrew SBNHH-1D65B	149.0	3	1.00	Flat	Flat	52.14	8.08	421.24	278.52	314.20	385.56
Andrew SBNHH-1D65B	149.0	3	1.00	Flat	Flat	52.14	8.08	421.24	278.52	314.20	385.56
GPS / GPS_A	149.0	1	1.00	Flat	Flat	52.14	0.26	13.30	13.30	13.30	13.30
Raycap RHSDC-3315-PF-48	145.0	2	1.00	Flat	Flat	51.84	3.36	174.38	113.64	128.83	159.20
Samsung RFV01U-D1A	149.0	3	1.00	Flat	Flat	52.14	1.88	97.76	65.18	73.32	89.62
Samsung RFV01U-D2A	149.0	3	1.00	Flat	Flat	52.14	1.88	97.76	52.79	64.04	86.52

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	B1	N82	N81			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
2	B2	N87	N88			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
3	B3	N85	N86			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
4	B4	N89	N90			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
5	B5	N84	N83			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
6	B6	N50	N10			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
7	B7	N70	N30			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
8	B8	CP	N85			3/4" SR	Beam	None	A572 Gr.50	Typical
9	B9	N86	CP2			3/4" SR	Beam	None	A572 Gr.50	Typical
10	H1	N84	N82			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
11	H2	N83	N81			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
12	M1	N1	N2			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
13	M2	N2	N3			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
14	M3	N3	N4			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
15	M4	N4	N5			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
16	M5	N5	N6			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
17	M6	N6	N7			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
18	M7	N7	N8			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
19	M8	N8	N9			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
20	M9	N9	N10			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
21	M10	N10	N11			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
22	M11	N11	N12			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
23	M12	N12	N13			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
24	M13	N13	N14			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
25	M14	N14	N15			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
26	M15	N15	N16			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
27	M16	N16	N17			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
28	M17	N17	N18			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
29	M18	N18	N19			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
30	M19	N19	CP			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
31	M20	CP	N21			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
32	M21	N21	N22			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
33	M22	N22	N23			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
34	M23	N23	N24			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
35	M24	N24	N25			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
36	M25	N25	N26			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
37	M26	N26	N27			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
38	M27	N27	N28			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
39	M28	N28	N29			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
40	M29	N29	N30			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
41	M30	N30	N31			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
42	M31	N31	N32			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
43	M32	N32	N33			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
44	M33	N33	N34			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
45	M34	N34	N35			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
46	M35	N35	N36			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
47	M36	N36	N37			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
48	M37	N37	N38			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
49	M38	N38	N39			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
50	M39	N39	N40			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
51	M40	N41	N42			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
52	M41	N42	N43			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
53	M42	N43	N44			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
54	M43	N44	N45			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
55	M44	N45	N46			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
56	M45	N46	N47			2.0 Std Pipe	Beam	None	ASTM A5...	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
57	M46	N47	N48			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
58	M47	N48	N49			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
59	M48	N49	N50			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
60	M49	N50	N51			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
61	M50	N51	N52			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
62	M51	N52	N53			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
63	M52	N53	N54			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
64	M53	N54	N55			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
65	M54	N55	N56			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
66	M55	N56	N57			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
67	M56	N57	N58			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
68	M57	N58	N59			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
69	M58	N59	CP2			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
70	M59	CP2	N61			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
71	M60	N61	N62			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
72	M61	N62	N63			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
73	M62	N63	N64			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
74	M63	N64	N65			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
75	M64	N65	N66			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
76	M65	N66	N67			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
77	M66	N67	N68			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
78	M67	N68	N69			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
79	M68	N69	N70			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
80	M69	N70	N71			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
81	M70	N71	N72			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
82	M71	N72	N73			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
83	M72	N73	N74			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
84	M73	N74	N75			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
85	M74	N75	N76			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
86	M75	N76	N77			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
87	M76	N77	N78			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
88	M77	N78	N79			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
89	M78	N79	N80			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
90	R1	N92	CP2			RIGID	None	None	RIGID	Typical
91	R2	N91	CP			RIGID	None	None	RIGID	Typical
92	R3	N84	N106			RIGID	None	None	RIGID	Typical
93	R4	N83	N105			RIGID	None	None	RIGID	Typical
94	R5	N82	N104			RIGID	None	None	RIGID	Typical
95	R6	N81	N103			RIGID	None	None	RIGID	Typical
96	R7	N87	N121			RIGID	None	None	RIGID	Typical
97	R8	N88	N120			RIGID	None	None	RIGID	Typical
98	R9	N89	N125			RIGID	None	None	RIGID	Typical
99	R10	N90	N124			RIGID	None	None	RIGID	Typical
100	MP4	N107	N109			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
101	MP3	N122	N123			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
102	MP2	N126	N127			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
103	MP1	N108	N110			2.0 Std Pipe	Beam	None	ASTM A5...	Typical
104	S1	N96	N94			HSS 3x3x3/16	Beam	None	ASTM A5...	Typical
105	S2	N95	N93			HSS 3x3x3/16	Beam	None	ASTM A5...	Typical
106	S3	N94	N93			2.5 Sch. 80 Pipe	Beam	None	ASTM A5...	Typical
107	T1	N97	N102			1.5 Std Pipe	Beam	None	ASTM A5...	Typical
108	T2	N98	N126A			1.5 Std Pipe	Beam	None	ASTM A5...	Typical

Material Takeoff

	Material	Size	Pieces	Length[in]	Weight[LB]
1	General				
2	RIGID		10	26	0
3	Total General		10	26	0
4					
5	Hot Rolled Steel				
6	A572 Gr.50	SR 3/4"	2	84.9	10.6
7	ASTM A500 Gr. 50	PIPE_1.5	2	244.8	55.9
8	ASTM A500 Gr. 50	PIPE_2.0	91	1178.1	366.5
9	ASTM A500 Gr. 50	PIPE_2.5X	1	48	30.7
10	ASTM A500 Gr. C	HSS3X3X3	2	36	20.8
11	Total HR Steel		98	1591.8	484.5

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Self Weight	DL		-1			13			
2	Wind Load AZI 000	WLZ					13		1	
3	Wind Load AZI 090	WLX					13		1	
4	Ice Weight	OL1					13	108		
5	Wind + Ice Load AZI ...	OL2					13		1	
6	Wind + Ice Load AZI ...	OL3					13		1	
7	Service Live 1	LL				2				
8	BLC 2 Transient Area...	None						96		
9	BLC 3 Transient Area...	None						104		
10	BLC 5 Transient Area...	None						96		
11	BLC 6 Transient Area...	None						104		

Load Combinations

	Description	S...	PD...	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	F...	.....	F.....	F.....	F.....	F...
1	1.4D	Yes	Y		DL	1.4											
2	1.2D + 1W AZI 000	Yes	Y		DL	1.2	WLZ	1									
3	1.2D + 1W AZI 030	Yes	Y		DL	1.2	WLZ	.866	WLX	.5							
4	1.2D + 1W AZI 060	Yes	Y		DL	1.2	WLZ	.5	WLX	.866							
5	1.2D + 1W AZI 090	Yes	Y		DL	1.2			WLX	1							
6	1.2D + 1W AZI 120	Yes	Y		DL	1.2	WLZ	-.5	WLX	.866							
7	1.2D + 1W AZI 150	Yes	Y		DL	1.2	WLZ	-.866	WLX	.5							
8	1.2D + 1W AZI 180	Yes	Y		DL	1.2	WLZ	-1									
9	1.2D + 1W AZI 210	Yes	Y		DL	1.2	WLZ	-.866	WLX	-.5							
10	1.2D + 1W AZI 240	Yes	Y		DL	1.2	WLZ	-.5	WLX	-.866							
11	1.2D + 1W AZI 270	Yes	Y		DL	1.2			WLX	-1							
12	1.2D + 1W AZI 300	Yes	Y		DL	1.2	WLZ	.5	WLX	-.866							
13	1.2D + 1W AZI 330	Yes	Y		DL	1.2	WLZ	.866	WLX	-.5							
14	0.9D + 1W AZI 000	Yes	Y		DL	.9	WLZ	1									
15	0.9D + 1W AZI 030	Yes	Y		DL	.9	WLZ	.866	WLX	.5							
16	0.9D + 1W AZI 060	Yes	Y		DL	.9	WLZ	.5	WLX	.866							
17	0.9D + 1W AZI 090	Yes	Y		DL	.9			WLX	1							
18	0.9D + 1W AZI 120	Yes	Y		DL	.9	WLZ	-.5	WLX	.866							
19	0.9D + 1W AZI 150	Yes	Y		DL	.9	WLZ	-.866	WLX	.5							
20	0.9D + 1W AZI 180	Yes	Y		DL	.9	WLZ	-1									
21	0.9D + 1W AZI 210	Yes	Y		DL	.9	WLZ	-.866	WLX	-.5							
22	0.9D + 1W AZI 240	Yes	Y		DL	.9	WLZ	-.5	WLX	-.866							
23	0.9D + 1W AZI 270	Yes	Y		DL	.9			WLX	-1							
24	0.9D + 1W AZI 300	Yes	Y		DL	.9	WLZ	.5	WLX	-.866							
25	0.9D + 1W AZI 330	Yes	Y		DL	.9	WLZ	.866	WLX	-.5							

Load Combinations (Continued)

	Description	S...	PD...	S...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	F...	.....	F.....	F.....	F.....	F...
26	1.2D + 1.0Di	Yes	Y		DL	1.2	OL1	1									
27	1.2D + 1.0Di + 1.0Wi AZI 000	Yes	Y		DL	1.2	OL1	1	OL2	1							
28	1.2D + 1.0Di + 1.0Wi AZI 030	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	.5					
29	1.2D + 1.0Di + 1.0Wi AZI 060	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	.8...					
30	1.2D + 1.0Di + 1.0Wi AZI 090	Yes	Y		DL	1.2	OL1	1			OL3	1					
31	1.2D + 1.0Di + 1.0Wi AZI 120	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	.8...					
32	1.2D + 1.0Di + 1.0Wi AZI 150	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	.5					
33	1.2D + 1.0Di + 1.0Wi AZI 180	Yes	Y		DL	1.2	OL1	1	OL2	-1							
34	1.2D + 1.0Di + 1.0Wi AZI 210	Yes	Y		DL	1.2	OL1	1	OL2	-.866	OL3	-.5					
35	1.2D + 1.0Di + 1.0Wi AZI 240	Yes	Y		DL	1.2	OL1	1	OL2	-.5	OL3	-....					
36	1.2D + 1.0Di + 1.0Wi AZI 270	Yes	Y		DL	1.2	OL1	1			OL3	-1					
37	1.2D + 1.0Di + 1.0Wi AZI 300	Yes	Y		DL	1.2	OL1	1	OL2	.5	OL3	-....					
38	1.2D + 1.0Di + 1.0Wi AZI 330	Yes	Y		DL	1.2	OL1	1	OL2	.866	OL3	-.5					
39	1.2D + 1.5L + 1.0WL (30 mph) AZI 000	Yes	Y		DL	1.2	LL	1.5	WLZ	.058							
40	1.2D + 1.5L + 1.0WL (30 mph) AZI 030	Yes	Y		DL	1.2	LL	1.5	WLZ	.05	WLX	.0...					
41	1.2D + 1.5L + 1.0WL (30 mph) AZI 060	Yes	Y		DL	1.2	LL	1.5	WLZ	.029	WLX	.05					
42	1.2D + 1.5L + 1.0WL (30 mph) AZI 090	Yes	Y		DL	1.2	LL	1.5			WLX	.0...					
43	1.2D + 1.5L + 1.0WL (30 mph) AZI 120	Yes	Y		DL	1.2	LL	1.5	WLZ	-.029	WLX	.05					
44	1.2D + 1.5L + 1.0WL (30 mph) AZI 150	Yes	Y		DL	1.2	LL	1.5	WLZ	-.05	WLX	.0...					
45	1.2D + 1.5L + 1.0WL (30 mph) AZI 180	Yes	Y		DL	1.2	LL	1.5	WLZ	-.058							
46	1.2D + 1.5L + 1.0WL (30 mph) AZI 210	Yes	Y		DL	1.2	LL	1.5	WLZ	-.05	WLX	-....					
47	1.2D + 1.5L + 1.0WL (30 mph) AZI 240	Yes	Y		DL	1.2	LL	1.5	WLZ	-.029	WLX	-.05					
48	1.2D + 1.5L + 1.0WL (30 mph) AZI 270	Yes	Y		DL	1.2	LL	1.5			WLX	-....					
49	1.2D + 1.5L + 1.0WL (30 mph) AZI 300	Yes	Y		DL	1.2	LL	1.5	WLZ	.029	WLX	-.05					
50	1.2D + 1.5L + 1.0WL (30 mph) AZI 330	Yes	Y		DL	1.2	LL	1.5	WLZ	.05	WLX	-....					

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-in]	LC	MY [lb-in]	LC	MZ [lb-in]	LC
1	N96	max	658.457	17	1998.666	27	2583.899	27	-999.198	20	10844.602	17	2369.758	23
2		min	-683.09	11	3.702	20	71.995	20	-21737.027	27	-11213.356	11	-2427.758	5
3	N95	max	1439.801	5	2005.191	33	1241.652	14	-2807.635	14	21504.552	5	1730.384	17
4		min	-1415.765	23	4.257	14	-2880.78	33	-21305.315	33	-21155.178	23	-1789.756	11
5	N102	max	110.15	16	72.76	34	639.6	15	0	50	0	50	0	50
6		min	-110.514	22	11.893	16	-638.784	21	0	1	0	1	0	1
7	N126A	max	54.241	14	72.8	32	614.279	25	0	50	0	50	0	50
8		min	-54.195	20	11.978	24	-613.369	19	0	1	0	1	0	1
9	Totals:	max	2200.262	17	3912.289	32	2981.314	14						
10		min	-2200.262	11	692.303	25	-2981.316	8						

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc.....		LC	phi*Pnc [lb]	phi*Pn...	phi*M...	phi*M...	...	Eqn
1	B9	SR 3/4"	.429	42.447	27	.004	0		10	3974.429	19880...	2982.1...	2982.1...	1...	H1-1a
2	M19	PIPE_2.0	.345	.652	32	.172	.652		32	45898.862	45900	32085	32085	1...	H1-1b
3	M20	PIPE_2.0	.335	0	34	.170	0		34	45898.873	45900	32085	32085	1...	H1-1b
4	S2	HSS3X3X3	.333	0	30	.092	0	y	35	83516.02	85050	88650	88650	2...	H1-1b
5	M18	PIPE_2.0	.329	2.474	32	.155	2.474		32	45883.623	45900	32085	32085	1...	H1-1b
6	M21	PIPE_2.0	.320	0	34	.154	0		34	45883.751	45900	32085	32085	1...	H1-1b
7	M58	PIPE_2.0	.306	.652	37	.154	.652		35	45898.862	45900	32085	32085	1...	H1-1b
8	H2	PIPE_2.0	.306	120	7	.123	120		30	6830.97	45900	32085	32085	1...	H1-1b
9	H1	PIPE_2.0	.305	72	33	.118	120		31	6830.97	45900	32085	32085	1...	H1-1b
10	S1	HSS3X3X3	.303	0	36	.094	0	y	29	83516.02	85050	88650	88650	2...	H1-1b
11	M59	PIPE_2.0	.297	0	30	.153	0		31	45898.873	45900	32085	32085	1...	H1-1b
12	M57	PIPE_2.0	.293	2.474	37	.139	2.474		35	45883.623	45900	32085	32085	1...	H1-1b
13	B6	PIPE_2.0	.293	35	30	.080	0		34	42737.097	45900	32085	32085	2...	H1-1b

Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc.....	LC	phi*Pnc [lb]	phi*Pn...	phi*M...	phi*M...	...	Eqn
14	M60	PIPE_2.0	.284	0	30	.139	0	31	45883.751	45900	32085	32085	1...	H1-1b
15	B7	PIPE_2.0	.269	35	36	.081	35	33	42737.097	45900	32085	32085	2...	H1-1b
16	M17	PIPE_2.0	.265	2.49	32	.139	2.49	32	45883.41	45900	32085	32085	1...	H1-1b
17	MP3	PIPE_2.0	.259	72	8	.117	70....	32	12143.947	45900	32085	32085	4...	H1-1b
18	MP4	PIPE_2.0	.259	72	8	.039	70....	8	12143.947	45900	32085	32085	4...	H1-1b
19	M22	PIPE_2.0	.257	0	34	.139	0	34	45883.623	45900	32085	32085	1...	H1-1b
20	M9	PIPE_2.0	.239	2.826	32	.051	2.826	33	45878.637	45900	32085	32085	1...	H1-1b
21	M56	PIPE_2.0	.239	2.49	37	.125	2.49	35	45883.41	45900	32085	32085	1...	H1-1b
22	M48	PIPE_2.0	.236	2.826	31	.046	2.826	33	45878.637	45900	32085	32085	1...	H1-1b
23	MP1	PIPE_2.0	.234	72	8	.039	70....	8	12143.947	45900	32085	32085	4...	H1-1b
24	M61	PIPE_2.0	.230	0	30	.126	0	32	45883.623	45900	32085	32085	1...	H1-1b
25	M30	PIPE_2.0	.230	0	34	.050	0	33	45879.532	45900	32085	32085	1...	H1-1b
26	M69	PIPE_2.0	.226	0	35	.045	0	33	45879.532	45900	32085	32085	1...	H1-1b
27	M8	PIPE_2.0	.214	2.89	32	.041	2.89	33	45877.657	45900	32085	32085	1...	H1-1b
28	M31	PIPE_2.0	.210	0	34	.040	0	33	45878.637	45900	32085	32085	1...	H1-1b
29	M47	PIPE_2.0	.209	2.89	31	.037	2.89	33	45877.657	45900	32085	32085	1...	H1-1b
30	M16	PIPE_2.0	.207	2.513	32	.126	2.513	32	45883.111	45900	32085	32085	1...	H1-1b
31	M70	PIPE_2.0	.204	0	35	.036	0	33	45878.637	45900	32085	32085	1...	H1-1b
32	M23	PIPE_2.0	.199	0	34	.127	0	34	45883.41	45900	32085	32085	1...	H1-1b
33	S3	PIPE_2.5X	.190	48	33	.121	48	6	85959.338	94500	79650	79650	1...	H1-1b
34	M32	PIPE_2.0	.190	0	34	.033	0	7	45877.657	45900	32085	32085	1...	H1-1b
35	M7	PIPE_2.0	.190	2.958	32	.035	2.958	8	45876.592	45900	32085	32085	1...	H1-1b
36	M55	PIPE_2.0	.188	2.513	37	.113	2.513	35	45883.111	45900	32085	32085	1...	H1-1b
37	M46	PIPE_2.0	.183	2.958	31	.030	2.958	33	45876.592	45900	32085	32085	1...	H1-1b
38	M71	PIPE_2.0	.182	0	35	.028	0	33	45877.657	45900	32085	32085	1...	H1-1b
39	M62	PIPE_2.0	.181	0	30	.115	0	32	45883.41	45900	32085	32085	1...	H1-1b
40	MP2	PIPE_2.0	.171	72	8	.116	70....	34	12143.947	45900	32085	32085	4...	H1-1b
41	M33	PIPE_2.0	.170	0	34	.031	0	8	45876.592	45900	32085	32085	1...	H1-1b
42	M6	PIPE_2.0	.166	3.03	33	.035	0	8	45875.442	45900	32085	32085	1...	H1-1b
43	B2	PIPE_2.0	.163	35	31	.122	35	32	42737.097	45900	32085	32085	2...	H1-1b
44	M72	PIPE_2.0	.161	0	35	.025	0	37	45876.592	45900	32085	32085	1...	H1-1b
45	B4	PIPE_2.0	.160	35	35	.121	35	34	42737.097	45900	32085	32085	2...	H1-1b
46	M45	PIPE_2.0	.158	3.03	30	.029	3.03	29	45875.442	45900	32085	32085	1...	H1-1b
47	M15	PIPE_2.0	.156	2.541	31	.115	2.541	33	45882.728	45900	32085	32085	1...	H1-1b
48	M34	PIPE_2.0	.150	0	33	.032	3.03	8	45875.442	45900	32085	32085	1...	H1-1b
49	M24	PIPE_2.0	.149	0	35	.116	0	33	45883.111	45900	32085	32085	1...	H1-1b
50	B1	PIPE_2.0	.148	35	30	.055	17.5	9	42737.097	45900	32085	32085	2...	H1-1b
51	T1	PIPE_1.5	.146	122.376	15	.007	122...	36	4419.892	33705	18945	18945	1...	H1-1b*
52	B5	PIPE_2.0	.145	35	37	.054	17.5	8	42737.097	45900	32085	32085	2...	H1-1b
53	T2	PIPE_1.5	.143	61.188	37	.007	0	36	4419.892	33705	18945	18945	1...	H1-1b
54	M54	PIPE_2.0	.143	2.541	37	.104	2.541	34	45882.728	45900	32085	32085	1...	H1-1b
55	M5	PIPE_2.0	.143	3.106	33	.036	0	2	45874.206	45900	32085	32085	1...	H1-1b
56	M73	PIPE_2.0	.140	0	36	.029	0	37	45875.442	45900	32085	32085	1...	H1-1b
57	B8	SR 3/4"	.139	0	14	.003	42....	5	3974.429	19880...	2982.1...	2982.1...	1...	H1-1b*
58	M63	PIPE_2.0	.137	0	30	.105	0	32	45883.111	45900	32085	32085	1...	H1-1b
59	M10	PIPE_2.0	.136	0	32	.090	2.766	33	45879.532	45900	32085	32085	1...	H1-1b
60	M44	PIPE_2.0	.134	3.106	30	.032	3.106	29	45874.206	45900	32085	32085	1...	H1-1b
61	M1	PIPE_2.0	.131	0	12	.045	0	7	45868.412	45900	32085	32085	1...	H1-1b
62	M35	PIPE_2.0	.130	0	33	.034	0	38	45874.206	45900	32085	32085	1...	H1-1b
63	M29	PIPE_2.0	.129	2.711	34	.089	0	33	45880.342	45900	32085	32085	1...	H1-1b
64	M39	PIPE_2.0	.127	3.437	4	.042	3.437	9	45868.412	45900	32085	32085	1...	H1-1b
65	M4	PIPE_2.0	.121	3.184	34	.038	0	2	45872.885	45900	32085	32085	1...	H1-1b
66	M74	PIPE_2.0	.120	0	36	.031	0	37	45874.206	45900	32085	32085	1...	H1-1b
67	M49	PIPE_2.0	.120	0	37	.084	2.766	34	45879.532	45900	32085	32085	1...	H1-1b
68	M43	PIPE_2.0	.112	3.184	30	.034	3.184	29	45872.885	45900	32085	32085	1...	H1-1b
69	M68	PIPE_2.0	.112	2.711	30	.083	0	32	45880.342	45900	32085	32085	1...	H1-1b
70	M14	PIPE_2.0	.111	2.575	31	.106	2.575	33	45882.259	45900	32085	32085	1...	H1-1b

Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc.....		LC	phi*Pnc [lb]	phi*Pn...	phi*M...	phi*M...	...	Eqn
71	M36	PIPE_2.0	.111	0	32	.036	0		38	45872.885	45900	32085	32085	1...	H1-1b
72	M11	PIPE_2.0	.109	0	32	.091	2.711		33	45880.342	45900	32085	32085	1...	H1-1b
73	M25	PIPE_2.0	.107	0	35	.107	0		33	45882.728	45900	32085	32085	1...	H1-1b
74	M28	PIPE_2.0	.106	2.661	34	.090	0		33	45881.066	45900	32085	32085	1...	H1-1b
75	M2	PIPE_2.0	.105	0	11	.042	0		7	45869.988	45900	32085	32085	1...	H1-1b
76	M40	PIPE_2.0	.103	0	30	.034	3.437		29	45868.412	45900	32085	32085	1...	H1-1b
77	M75	PIPE_2.0	.103	0	36	.033	0		37	45872.885	45900	32085	32085	1...	H1-1b
78	M53	PIPE_2.0	.102	2.575	36	.096	2.575		34	45882.259	45900	32085	32085	1...	H1-1b
79	M3	PIPE_2.0	.102	3.266	34	.039	0		7	45871.479	45900	32085	32085	1...	H1-1b
80	M64	PIPE_2.0	.098	0	30	.097	0		32	45882.728	45900	32085	32085	1...	H1-1b
81	M38	PIPE_2.0	.097	3.35	4	.039	3.35		9	45869.988	45900	32085	32085	1...	H1-1b
82	M42	PIPE_2.0	.096	3.266	30	.035	3.266		29	45871.479	45900	32085	32085	1...	H1-1b
83	M37	PIPE_2.0	.094	0	32	.037	3.266		8	45871.479	45900	32085	32085	1...	H1-1b
84	M50	PIPE_2.0	.093	0	37	.084	2.711		34	45880.342	45900	32085	32085	1...	H1-1b
85	M78	PIPE_2.0	.091	3.437	36	.032	0		37	45868.412	45900	32085	32085	1...	H1-1b
86	B3	PIPE_2.0	.090	0	33	.014	0		30	42737.097	45900	32085	32085	2...	H1-1b
87	M67	PIPE_2.0	.090	2.661	30	.083	0		32	45881.066	45900	32085	32085	1...	H1-1b
88	M41	PIPE_2.0	.089	0	30	.035	3.35		29	45869.988	45900	32085	32085	1...	H1-1b
89	M76	PIPE_2.0	.088	0	36	.034	0		37	45871.479	45900	32085	32085	1...	H1-1b
90	M12	PIPE_2.0	.082	0	32	.094	2.661		33	45881.066	45900	32085	32085	2...	H1-1b
91	M27	PIPE_2.0	.081	2.615	34	.094	0		33	45881.705	45900	32085	32085	1...	H1-1b
92	M77	PIPE_2.0	.081	3.35	36	.033	0		37	45869.988	45900	32085	32085	1...	H1-1b
93	M13	PIPE_2.0	.077	2.615	31	.099	2.615		33	45881.705	45900	32085	32085	1...	H1-1b
94	M26	PIPE_2.0	.075	0	35	.100	0		33	45882.259	45900	32085	32085	1...	H1-1b
95	M52	PIPE_2.0	.070	2.615	36	.090	2.615		34	45881.705	45900	32085	32085	1...	H1-1b
96	M65	PIPE_2.0	.069	0	31	.091	0		32	45882.259	45900	32085	32085	1...	H1-1b
97	M66	PIPE_2.0	.068	2.615	31	.086	0		32	45881.705	45900	32085	32085	1...	H1-1b
98	M51	PIPE_2.0	.068	0	36	.086	2.661		34	45881.066	45900	32085	32085	2...	H1-1b

APPENDIX D

ADDITIONAL CALCUATIONS

Date:	1/29/2019
Client	Crown Castle
Carrier	Verizon
Engineer:	CLK
Site:	803175
Job #:	1039-D0001-B

Code:	LRFD	
Axial:	2005.00	lbs
Shear:	2880.00	lbs

Bolt Capacity (1/2" A307 Bolt)				
	Ult Load / Bolt	Factored Load (ϕ=0.75)	# of Bolts	Factor Joint Capacity
Axial (lb)	8226.7	6170.0	4	24680
Shear(lb)	5133.3	3850.0	4	15400

Interaction Check	
T /ϕT_n	8.1%
V /ϕVn	18.7%
≤1.0	4.2%
	OK