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Structural Analysis Report

September 7, 2018

Site Name	DBS - Beacon
FA Number	10075463
PACE Number	MRUNY012288 / MRUNY011929 / MRUNY009633 / MRUNY009403 / MRUNY009457
PT Number	2151A0GX4P / 2151A0GXMA / 2151A0C4A2 / 2151A0BX9Q / 2151A0BW95
Client	Airosmith
Carrier	AT&T
Infinigy Job Number	395-000
Site Location	139 Rombout Avenue Beacon, NY 12508 41° 30' 14.04" N NAD83 73° 58' 33.24" W NAD83
Structure Type	Rooftop Mounts
Structural Usage Ratio	95.7%
Overall Result	Pass
Note	Ballast frame shall have 4 total pavers. 2 pavers shall be installed per tray evenly distributed throughout each tray.

Upon reviewing the results of this analysis, it is our opinion that the mount meets the specified TIA code requirements. The mounts for the proposed carrier are therefore deemed adequate to support the final loading configuration as listed in this report.



Christopher L. Kudlacik
Project Engineer 1

AZ CA CO FL GA IL MD NC NH NJ NY TN TX WA

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Introduction

Infinigy Engineering has been requested to perform a structural analysis on the existing rooftop supporting structures. All supporting documents have been obtained from the client and are assumed to be accurate and applicable to this site. The antenna mounts were analyzed using RISA 3D v. 17.0.0 software.

Supporting Documentation

Construction Drawings	Infinigy Engineering Job #395-000, dated August 23, 2018
RFDS	AT&T RFDS ID # 2400686, dated May 25, 2018
Previous Analysis	Infinigy Engineering Job #395-000, dated March 8, 2018

Analysis Code Requirements

Wind Speed	89 mph (3-Second Gust, V_{ASD}) / 115 mph (3-Second Gust, V_{ULT})
Wind Speed w/ ice	40 mph (3-Second Gust) w/ 0.75" ice
TIA Revision	ANSI/TIA-222-G
Adopted IBC	2015 IBC / 2016 NYS Uniform Code Supplement
Structure Class	II
Exposure Category	B
Topographic Category	I
Calculated Crest Height	0 ft

Conclusion

Upon reviewing the results of this analysis, it is our opinion that the mount meets the specified TIA code requirements. The mounts for the proposed carrier are therefore deemed adequate to support the final loading configuration as listed in this report.

If you have any questions, require additional information, or actual conditions differ from those as detailed in this report please contact me via the information below:

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Existing & Reserved Loading

Rad Center (ft)	Qty.	Appurtenance	Mount Type	Carrier
58.0	3	KMW EPBQ-654L8H8-L2	Mount Pipe	AT&T
50.0	3	Andrew SBJAHH-1D65C-DL		
	3	Commscope E15Z01P13		
45.0	3	Ericsson RRUS 4478 B14		
	3	Ericsson RRUS 11 B12		
	2	Ericsson RRUS 12 w/A2		
	1	Ericsson RRUS 32 B66		
	1	Ericsson RRUS 32 B2		
	2	Raycap DC6-48-60-18-8F		

Proposed Loading

Rad Center (ft)	Qty.	Appurtenance	Mount Type	Carrier
40.0	3	Ericsson 4478 B5	--	AT&T
	3	Ericsson RRUS 32 B30		
	1	Raycap DC6-48-60-18-8F		

Final Loading Configuration

Rad Center (ft)	Qty.	Appurtenance	Mount Type	Carrier
58.0	3	KMW EPBQ-654L8H8-L2	Mount Pipe	AT&T
50.0	3	Andrew SBJAHH-1D65C-DL		
	3	Commscope E15Z01P13		
45.0	3	Ericsson RRUS 4478 B14		
	3	Ericsson RRUS 11 B12		
	2	Ericsson RRUS 12 w/A2		
	1	Ericsson RRUS 32 B66		
	1	Ericsson RRUS 32 B2		
	2	Raycap DC6-48-60-18-8F		
40.0	3	Ericsson 4478 B5	Ballast	
	3	Ericsson RRUS 32 B30		
	1	Raycap DC6-48-60-18-8F		

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Structure Usages

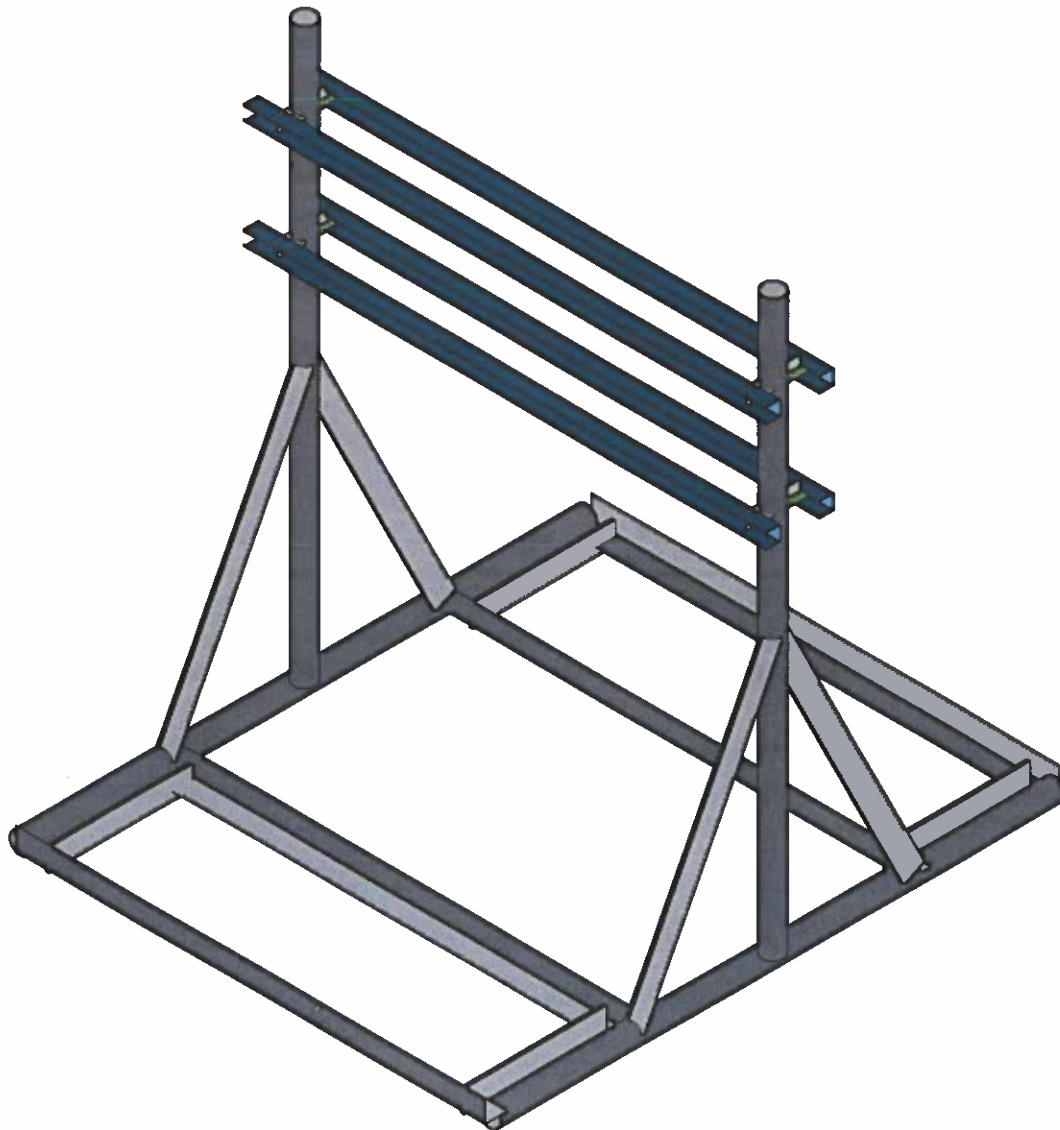
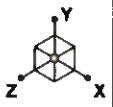
Ballast Mount	31.7%	Pass
Roof Pressure	95.7%	Pass
Overturing	9.1%	Pass
RATING =	95.7%	Pass

Assumptions and Limitations

Our structural calculations are completed assuming all information provided to Infinigy Engineering is accurate and applicable to this site. For the purposes of calculations, we assume an overall structure condition of “like new” and all members, connections, anchors, and masonry to be free of corrosion and/or structural defects. The structure owner and/or contractor shall verify the structure’s condition prior to installation of any proposed equipment. If actual conditions differ from those described in this report Infinigy Engineering should be notified immediately to complete a revised evaluation.

Our evaluation is completed using standard TIA, AISC, ACI, and ASCE methods and procedures. Our structural results are proprietary and should not be used by others as their own. Infinigy Engineering is not responsible for decisions made by others that are or are not based on our supplied assumptions and conclusions.

This report is an evaluation of the rooftop mounted equipment and/or antenna supporting structures to be proposed or modified as shown in the referenced construction drawings. Applicable building element adequacy to support these structures is also evaluated when the applied forces increase significantly based on engineering judgment.



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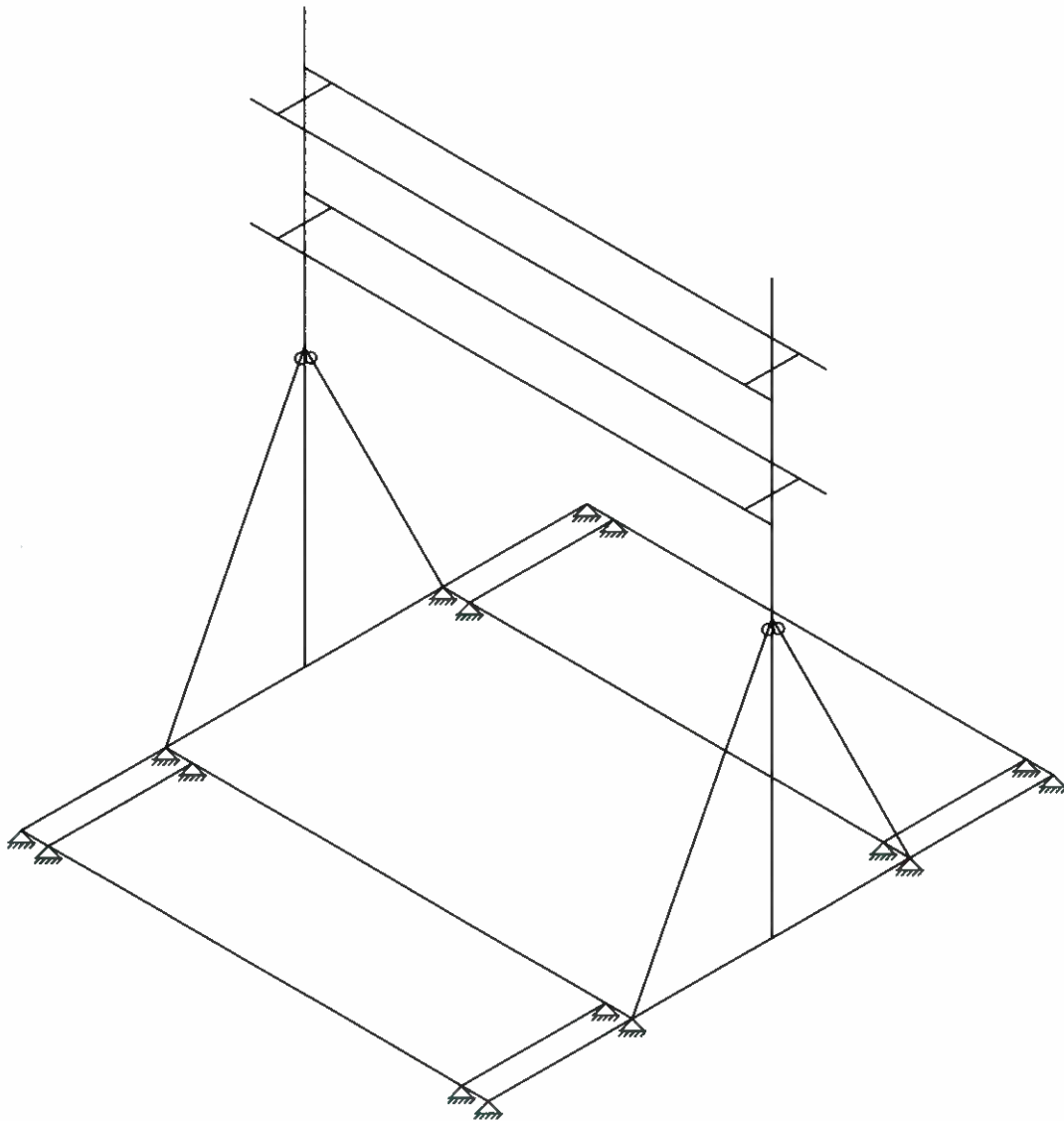
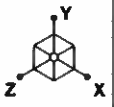
395-000

Beacon NY Pough_10123715

Existing configuration

Sept 6, 2018 at 11:17 AM

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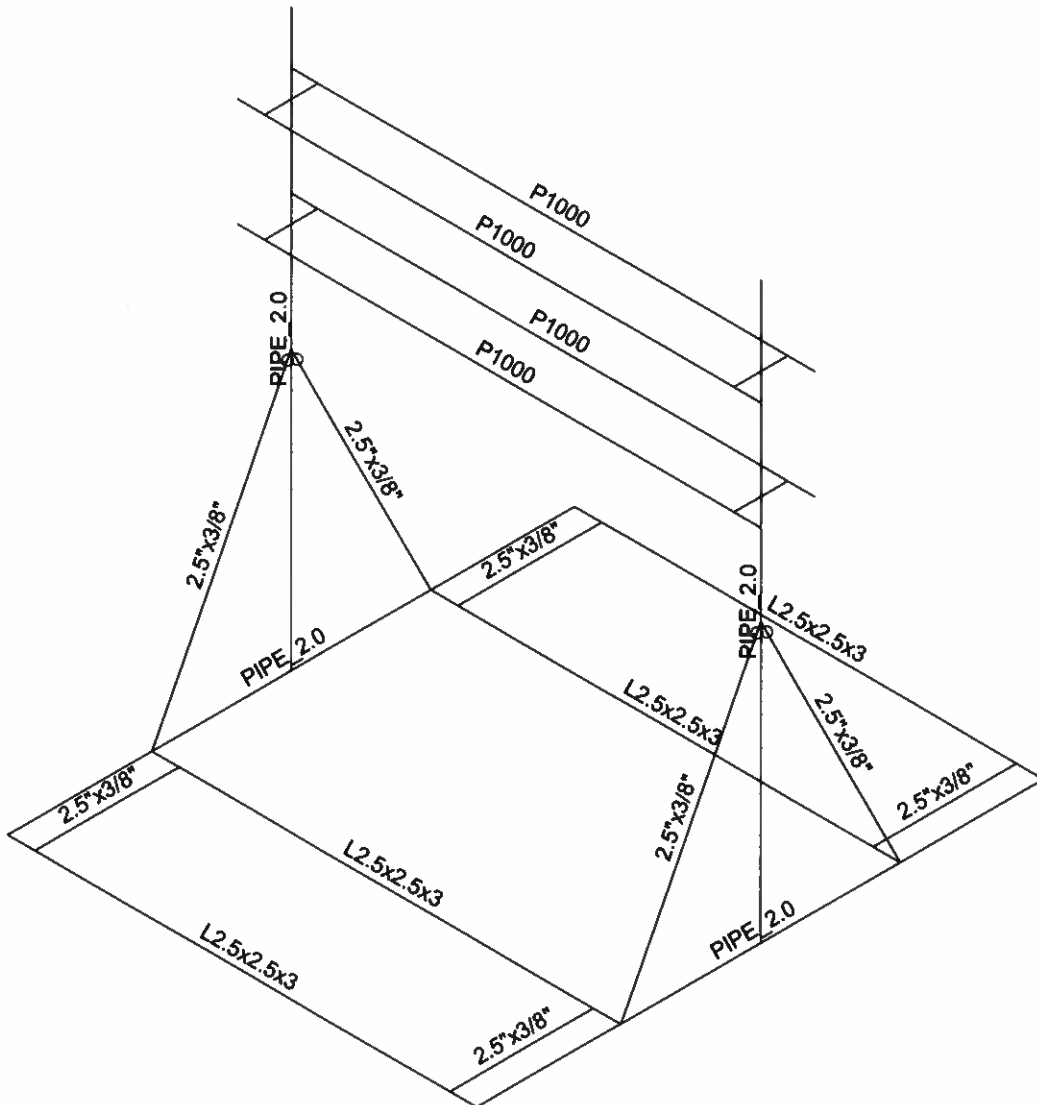
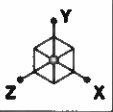
395-000

Beacon NY Pough_10123715

Wireframe

Sept 6, 2018 at 11:18 AM

Beacon_10123715.R3D



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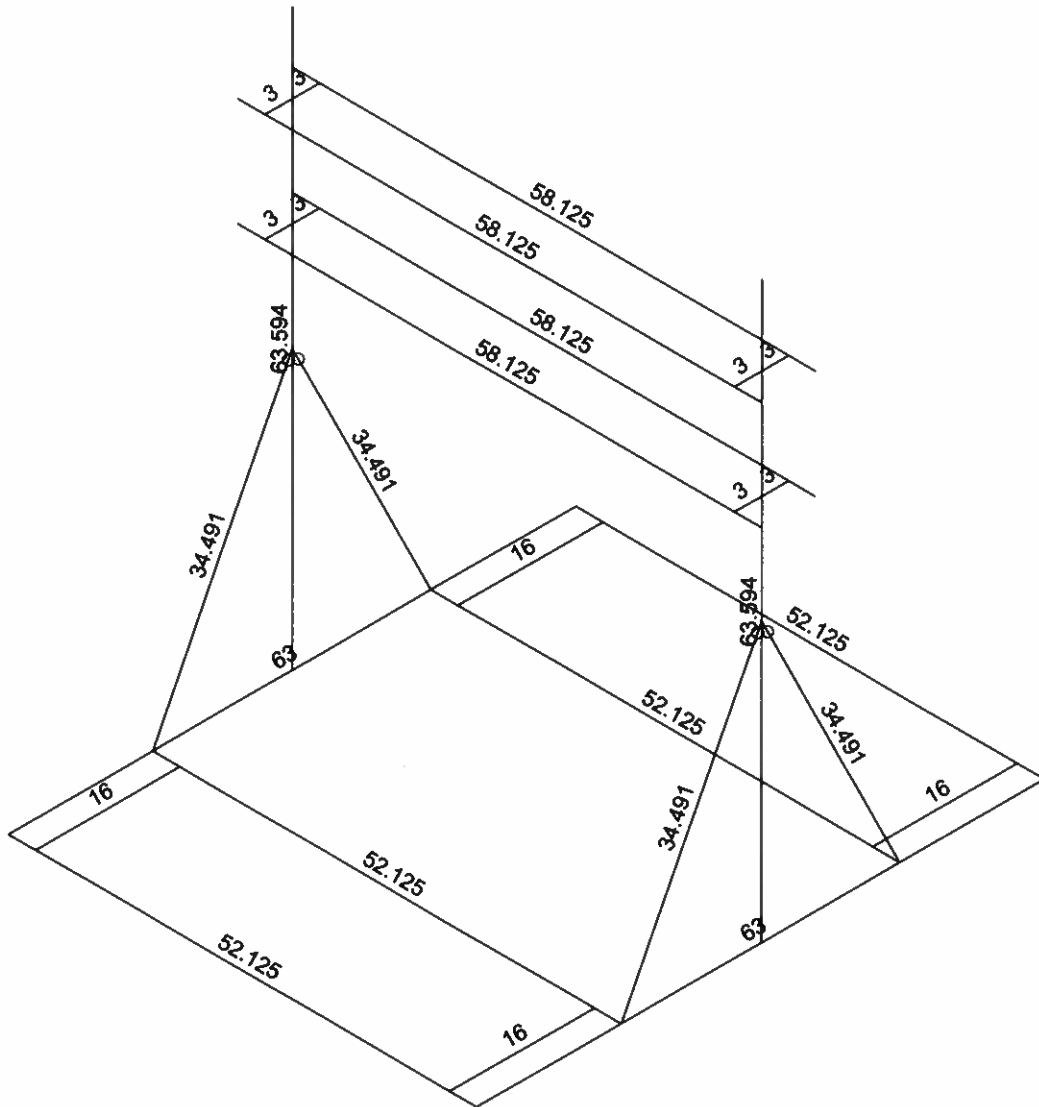
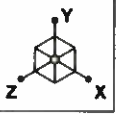
395-000

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Member Shapes

Sept 6, 2018 at 11:18 AM

Beacon_10123715.R3D



Member Length (in) Displayed
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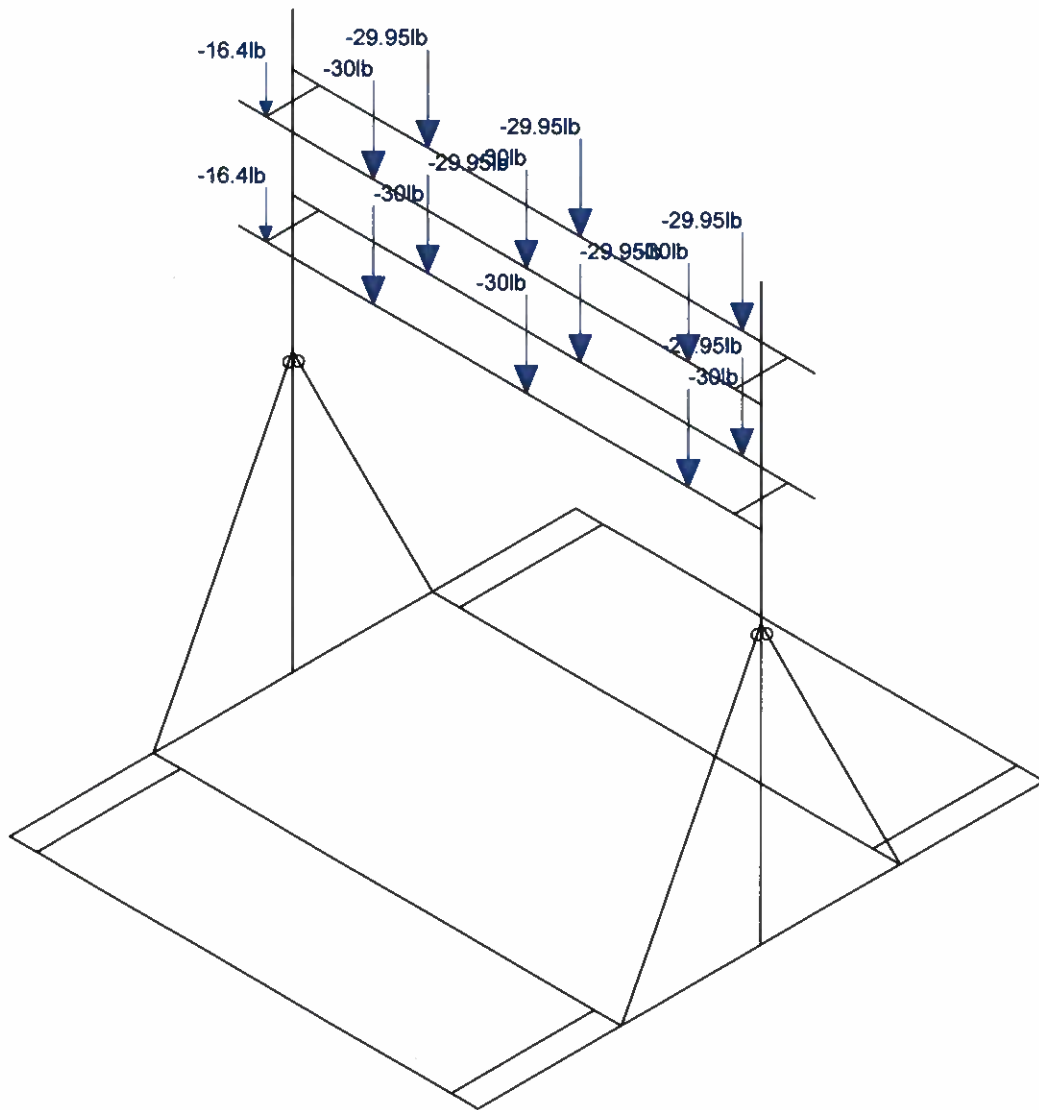
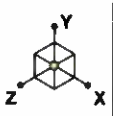
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Member Lengths

Sept 6, 2018 at 11:18 AM

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Loads: BLC 1, Self Weight
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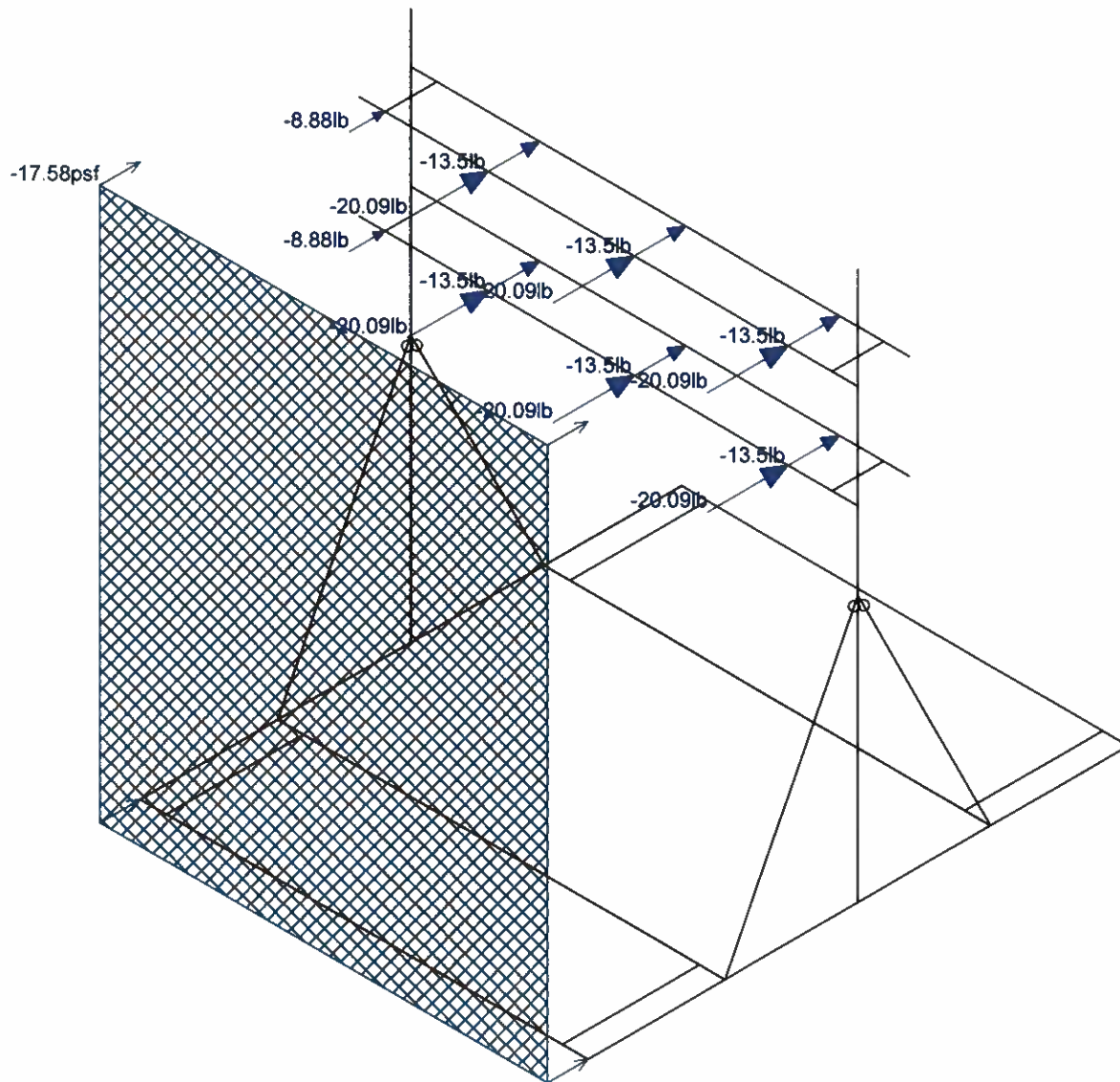
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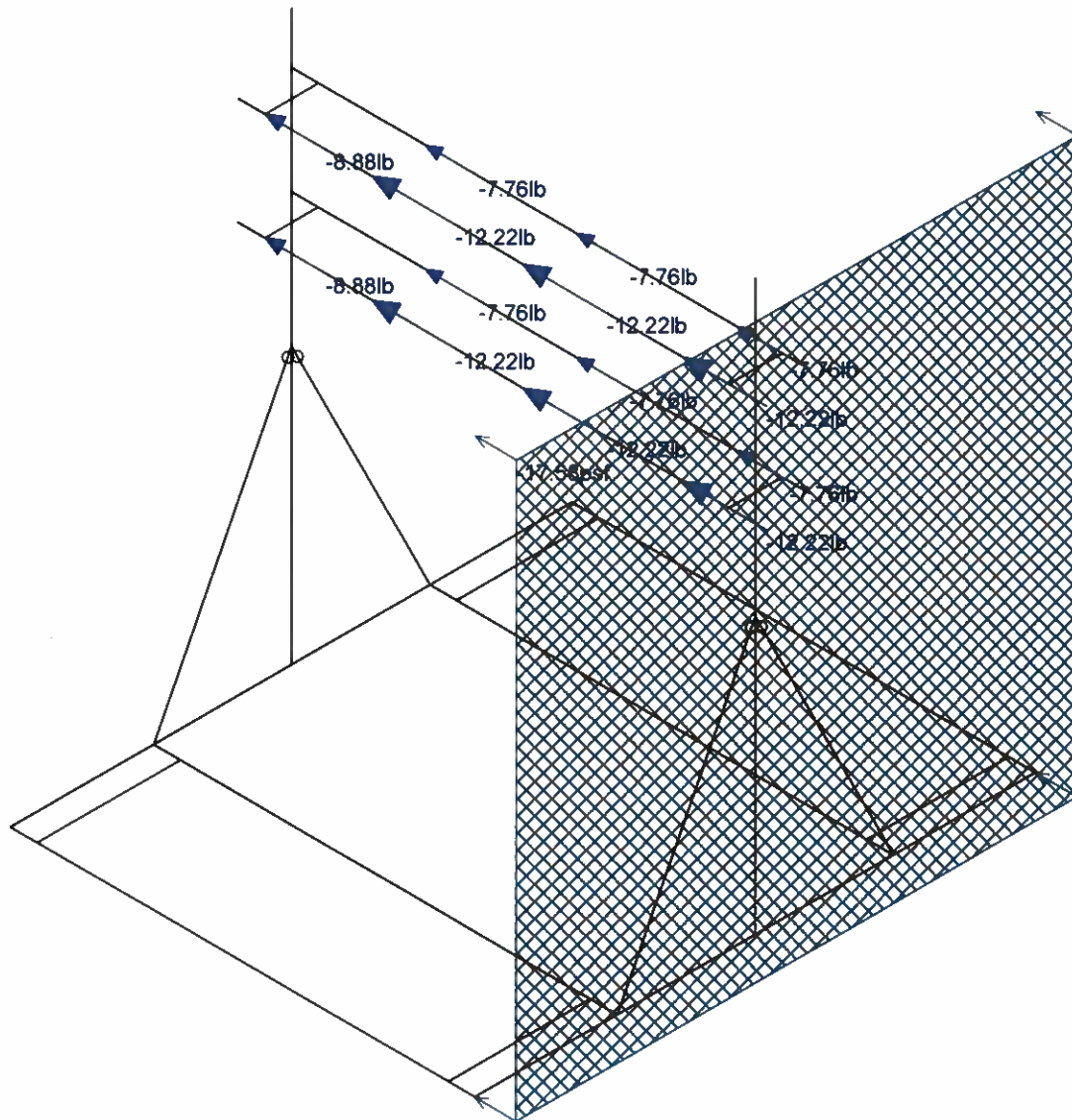
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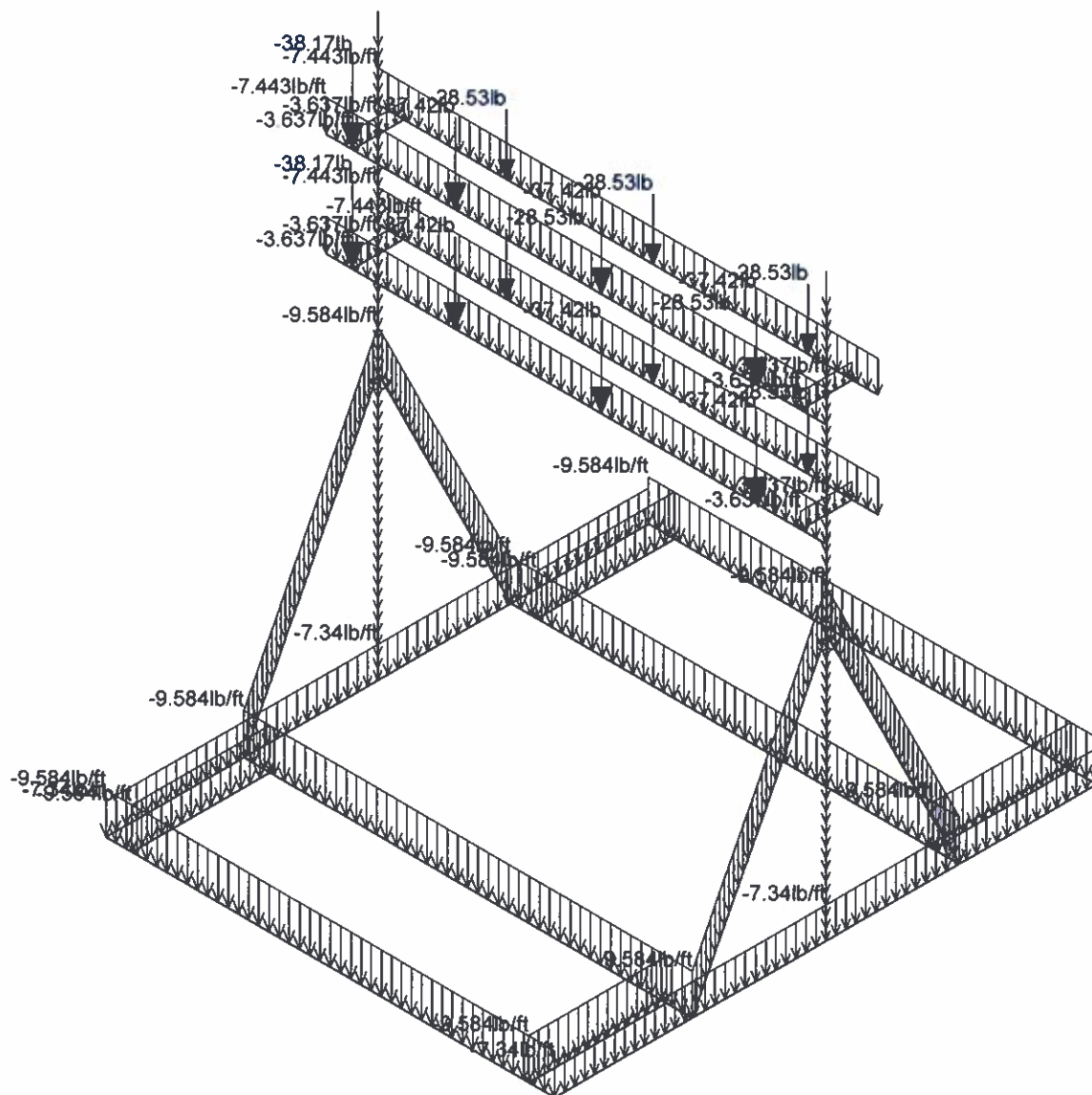
Beacon_10123715.R3D



Beacon_10123715.R3D



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Loads: BLC 4, Ice Weight
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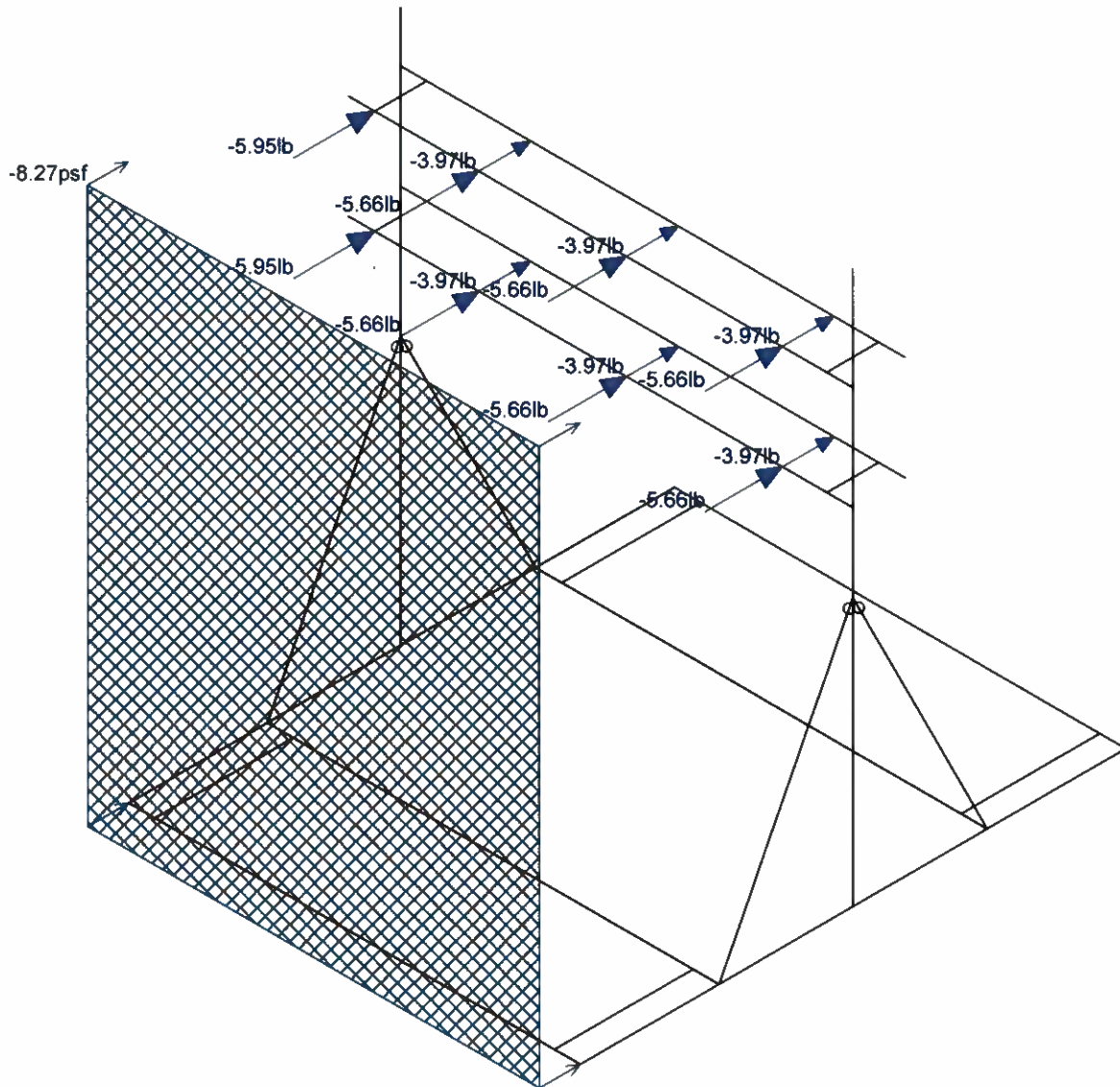
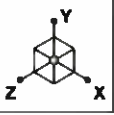
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Ice Weight

Sept 6, 2018 at 11:19 AM

Beacon_10123715.R3D



Loads: BLC 5, Wind + Ice Load AZI 000
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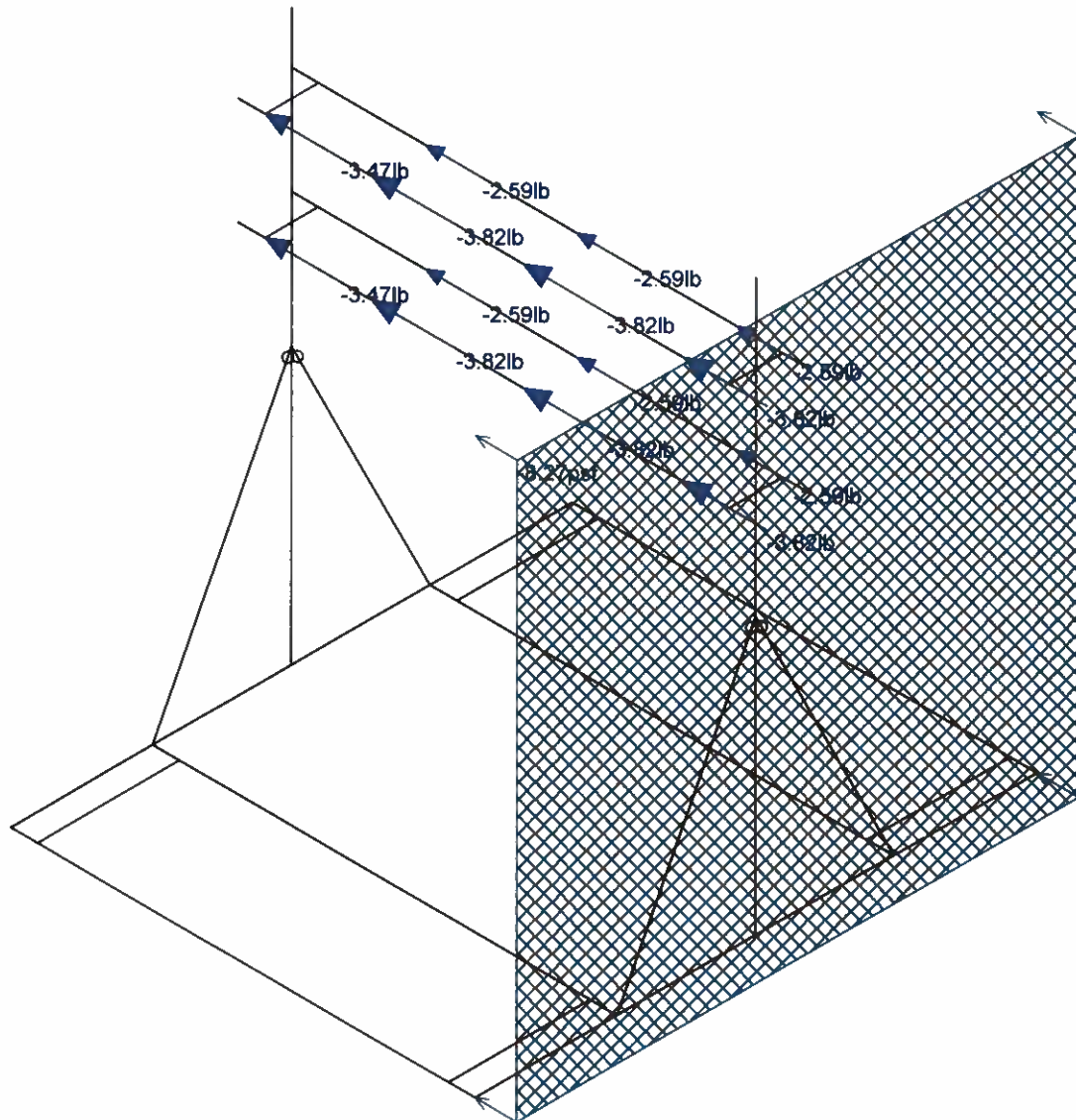
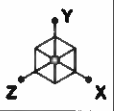
395-000

Beacon NY Pough_10123715

000 Ice Wind

Sept 6, 2018 at 11:19 AM

Beacon_10123715.R3D



Loads: BLC 6, Wind + Ice Load AZI 090
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395-000

Beacon NY Pough_10123715

090 Ice Wind

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INFINIGY WIND LOAD CALCULATOR 3.0.2

Rooftop Inputs:

Adopted Building Code:	2015 IBC
Structure Load Standard:	TIA-222-G
Antenna Load Standard:	TIA-222-G
Structure Risk Category:	II
Structure Type:	Mount - Ballast
Number of Sectors:	3
Structure Shape 1:	Round

Rooftop Wind Speed-Up?: No

Wind Loading Inputs:

Design Wind Velocity:	89	mph (nominal 3-second gust)
Wind Centerline 1 (z_1):	40.0	ft
Side Face Angle (θ):	60	degrees
Exposure Category:	B	
Topographic Category:	1	

Wind with No Ice		
q_z (psf)	Gh	F_{ST} (psf)
14.65	1.00	17.58

Wind with Ice		
q_z (psf)	Gh	F_{SI} (psf)
2.96	1.00	8.27

Ice Loading Inputs:

Is Ice Loading Needed?:	Yes	
Ice Wind Velocity:	40	mph (nominal 3-second gust)
Base Ice Thickness:	0.75	in

Input Appurtenance Information and Load Placements:

[illegible]

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N5	N3			2.0" STD Pipe	Beam	None	A53 Gr.B	Typical
2	M2	N6	N4			2.0" STD Pipe	Beam	None	A53 Gr.B	Typical
3	M3	N5	N6		270	L2.5"x2.5"x3/16"	Beam	None	A36 Gr.36	Typical
4	M4	N8	N7		270	L2.5"x2.5"x3/16"	Beam	None	A36 Gr.36	Typical
5	M5	N3	N4			L2.5"x2.5"x3/16"	Beam	None	A36 Gr.36	Typical
6	M6	N9	N10		270	L2.5"x2.5"x3/16"	Beam	None	A36 Gr.36	Typical
7	M7	N12	N13			2.5"x3/8" Plate	Beam	None	A36 Gr.36	Typical
8	M8	N16	N17			2.5"x3/8" Plate	Beam	None	A36 Gr.36	Typical
9	M9	N14	N11			2.5"x3/8" Plate	Beam	None	A36 Gr.36	Typical
10	M10	N18	N15			2.5"x3/8" Plate	Beam	None	A36 Gr.36	Typical
11	M11	N1	N19			2.0" STD Pipe	Beam	None	A53 Gr.B	Typical
12	M12	N2	N20			2.0" STD Pipe	Beam	None	A53 Gr.B	Typical
13	M13	N8	N22			2.5"x3/8" Plate	Beam	None	A36 Gr.36	Typical
14	M14	N22	N10			2.5"x3/8" Plate	Beam	None	A36 Gr.36	Typical
15	M15	N7	N21			2.5"x3/8" Plate	Beam	None	A36 Gr.36	Typical
16	M16	N21	N9			2.5"x3/8" Plate	Beam	None	A36 Gr.36	Typical
17	M19	N36	N38			Unistrut	Beam	None	A653 SS ...	Typical
18	M20	N35	N37			Unistrut	Beam	None	A653 SS ...	Typical
19	M19A	N36A	N38A			Unistrut	Beam	None	A653 SS ...	Typical
20	M20A	N35A	N37A			Unistrut	Beam	None	A653 SS ...	Typical
21	M21	N33	N39			RIGID	None	None	RIGID	Typical
22	M22	N31	N40			RIGID	None	None	RIGID	Typical
23	M23	N34	N42			RIGID	None	None	RIGID	Typical
24	M24	N32	N41			RIGID	None	None	RIGID	Typical
25	M25	N39	N33A			RIGID	None	None	RIGID	Typical
26	M26	N40	N31A			RIGID	None	None	RIGID	Typical
27	M27	N41	N32A			RIGID	None	None	RIGID	Typical
28	M28	N42	N34A			RIGID	None	None	RIGID	Typical

Material Takeoff

	Material	Size	Pieces	Length(in)	Weight(K)
1	General				
2	RIGID		8	24	0
3	Total General		8	24	0
4					
5	Hot Rolled Steel				
6	A36 Gr.36	2.5"x3/8"	8	202	0
7	A36 Gr.36	L2.5x2.5x3	4	208.5	0
8	A53 Gr.B	PIPE_2.0	4	253.2	0
9	Total HR Steel		16	663.7	.2
10					
11	Cold Formed Steel				
12	A653 SS Gr33	P1000	4	232.5	0
13	Total CF Steel		4	232.5	0

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(P...
1	Self Weight	DL		-1			14		
2	Wind Load AZI 000	WLZ					14	1	
3	Wind Load AZI 090	WLX					14	1	
4	Ice Weight	OL1					14	28	
5	Wind + Ice Load AZI ...	OL2					14	1	
6	Wind + Ice Load AZI ...	OL3					14	1	

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(P...
7	Service Live 1	LL							
8	BLC 2 Transient Area...	None						14	
9	BLC 3 Transient Area...	None						20	
10	BLC 5 Transient Area...	None						14	
11	BLC 6 Transient Area...	None						20	

Load Combinations

	Description	Sol.	PD.	SR.	BLC Fact.	BLC Fact.	BLC Fact.	BLC Fact.	BLC Fact.	BLC Fact.	BLC Fact.	BLC Fact.	BLC Fact.	BLC Fact.
1	1.4D	Yes	Y	DL	1.4									
2	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	1.6							
3	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	1.386	W...	.8					
4	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	.8	W...	1.386					
5	1.2D + 1.6...	Yes	Y	DL	1.2			W...	1.6					
6	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	-.8	W...	1.386					
7	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	-1.3...	W...	.8					
8	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	-1.6							
9	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	-1.3...	W...	-.8					
10	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	-.8	W...	-1.3...					
11	1.2D + 1.6...	Yes	Y	DL	1.2			W...	-1.6					
12	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	.8	W...	-1.3...					
13	1.2D + 1.6...	Yes	Y	DL	1.2	WLZ	1.386	W...	-.8					
14	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	1.6							
15	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	1.386	W...	.8					
16	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	.8	W...	1.386					
17	0.9D + 1.6...	Yes	Y	DL	.9			W...	1.6					
18	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	-.8	W...	1.386					
19	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	-1.3...	W...	.8					
20	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	-1.6							
21	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	-1.3...	W...	-.8					
22	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	-.8	W...	-1.3...					
23	0.9D + 1.6...	Yes	Y	DL	.9			W...	-1.6					
24	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	.8	W...	-1.3...					
25	0.9D + 1.6...	Yes	Y	DL	.9	WLZ	1.386	W...	-.8					
26	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1							
27	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	1					
28	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	.866	OL3	.5			
29	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	.5	OL3	.866			
30	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1			OL3	1			
31	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	-.5	OL3	.866			
32	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	-.866	OL3	.5			
33	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	-.1					
34	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	-.866	OL3	-.5			
35	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	-.5	OL3	-.866			
36	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1			OL3	-.1			
37	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	.5	OL3	-.866			
38	1.2D + 1.0...	Yes	Y	DL	1.2	OL1	1	OL2	.866	OL3	-.5			
39	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5	WLZ	.111					
40	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5	WLZ	.096	W...	.056			
41	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5	WLZ	.056	W...	.096			
42	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5			W...	.111			
43	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5	WLZ	-.056	W...	.096			
44	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5	WLZ	-.096	W...	.056			
45	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5	WLZ	-.111					
46	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5	WLZ	-.096	W...	-.056			
47	1.2D + 1.5...	Yes	Y	DL	1.2	LL	1.5	WLZ	-.056	W...	-.096			

Load Combinations (Continued)

	Description	Sol.	PD	SR	BLC Fact	BLC Fact	BLC Fact	BLC Fact	BLC Fact	BLC Fact	BLC Fact	BLC Fact	BLC Fact	BLC Fact
48	1.2D + 1.5..	Yes	Y		DL	1.2	LL	1.5		W...	-111			
49	1.2D + 1.5..	Yes	Y		DL	1.2	LL	1.5	WLZ	.056	W...	-.096		
50	1.2D + 1.5..	Yes	Y		DL	1.2	LL	1.5	WLZ	.096	W...	-.056		

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N7	max	105.725	5	764.929	6	161.643	24	0	50	0	50	0	50
2		min	-101.772	23	-497.674	24	-292.499	6	0	1	0	1	0	1
3	N13	max	4.167	5	462.53	11	165.709	5	0	50	0	50	0	50
4		min	-4.157	23	-428.289	17	-155.151	23	0	1	0	1	0	1
5	N12	max	3.648	17	107.548	36	36.125	14	0	50	0	50	0	50
6		min	-3.657	11	-37.417	17	-39.028	8	0	1	0	1	0	1
7	N5	max	.932	23	44.422	17	26.301	8	0	50	0	50	0	50
8		min	-1.516	5	-71.756	11	-23.398	14	0	1	0	1	0	1
9	N6	max	1.606	12	44.134	23	26.261	8	0	50	0	50	0	50
10		min	-.869	18	-72.14	5	-23.189	14	0	1	0	1	0	1
11	N16	max	3.657	5	107.684	30	35.916	14	0	50	0	50	0	50
12		min	-3.648	23	-37.376	23	-38.989	8	0	1	0	1	0	1
13	N8	max	101.103	17	778.282	10	160.677	16	0	50	0	50	0	50
14		min	-106.489	11	-501.368	16	-299.236	10	0	1	0	1	0	1
15	N17	max	4.157	17	462.759	5	166.166	11	0	50	0	50	0	50
16		min	-4.167	11	-428.105	23	-154.757	17	0	1	0	1	0	1
17	N10	max	99.658	17	784.619	12	300.004	12	0	50	0	50	0	50
18		min	-103.547	11	-510.342	18	-162.938	18	0	1	0	1	0	1
19	N18	max	4.157	17	462.665	5	153.813	17	0	50	0	50	0	50
20		min	-4.167	11	-427.903	23	-164.32	11	0	1	0	1	0	1
21	N4	max	1.36	10	44.403	23	23.255	20	0	50	0	50	0	50
22		min	-.756	16	-72.506	5	-26.172	2	0	1	0	1	0	1
23	N15	max	3.657	5	107.64	30	38.9	2	0	50	0	50	0	50
24		min	-3.648	23	-37.431	23	-35.983	20	0	1	0	1	0	1
25	N11	max	3.648	17	107.588	36	39.117	2	0	50	0	50	0	50
26		min	-3.657	11	-37.451	17	-36.059	20	0	1	0	1	0	1
27	N3	max	.67	23	44.336	17	23.332	20	0	50	0	50	0	50
28		min	-1.388	5	-72.597	11	-26.39	2	0	1	0	1	0	1
29	N14	max	4.167	5	462.308	11	153.378	23	0	50	0	50	0	50
30		min	-4.157	23	-428.167	17	-164.837	5	0	1	0	1	0	1
31	N9	max	104.345	5	767.761	4	294.923	4	0	50	0	50	0	50
32		min	-99.042	23	-509.242	22	-162.579	22	0	1	0	1	0	1
33	Totals:	max	436.319	5	1836.699	27	586.948	14						
34		min	-436.319	11	547.864	20	-586.949	8						

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc.....	L.....	phi*Pnc [lb]	phi*Pn.....	phi*Mn.....	phi*Mn.....	Egn
1	M14	2.5"x3/8"	.317	34.491	13	.009	34....	y 5	2086.203	30375	237.306	1582.0..2	H1-1a
2	M13	2.5"x3/8"	.315	0	9	.010	0	y 11	2086.203	30375	237.306	1582.0..2	H1-1a
3	M15	2.5"x3/8"	.304	0	7	.010	0	y 11	2086.203	30375	237.306	1582.0..2	H1-1a
4	M16	2.5"x3/8"	.302	34.491	3	.009	34....	y 5	2086.203	30375	237.306	1582.0..2	H1-1a
5	M12	PIPE_2.0	.185	31.134	8	.036	43....	35	29687.828	32130	1871.6..	1871.6..1	H1-1b
6	M11	PIPE_2.0	.181	31.134	8	.036	43....	31	29687.828	32130	1871.6..	1871.6..1	H1-1b
7	M6	L2.5x2.5x3	.119	0	5	.050	49.41	z 5	15672.758	29192.4	872.574	1971.834	H2-1
8	M4	L2.5x2.5x3	.119	52.125	5	.050	2.715	z 5	15672.758	29192.4	872.574	1971.834	H2-1
9	M2	PIPE_2.0	.038	31.5	8	.085	16....	11	31452.388	32130	1871.6..	1871.6..1	H1-1b
10	M1	PIPE_2.0	.037	31.5	8	.085	16....	5	31452.388	32130	1871.6..	1871.6..1	H1-1b
11	M3	L2.5x2.5x3	.018	48.867	33	.009	49.41	z 30	15672.758	29192.4	872.574	1929.3..2	H2-1

Envelope AISC 14th(360-10): LRFD Steel Code Checks (Continued)

Member	Shape	Code Ch...	Loc[in]	LC	Shear Check	Loc.....	L...phi*Pnc [lb]	phi*Pn...	phi*Mn...	phi*Mn.....	Eqn
12	M5	L2.5x2.5x3	.018	3.258	27	.009	2.715 y 36	15672.758	29192.4	872.574	1929.3...2...H2-1
13	M8	2.5"x3/8"	.005	16	11	.001	16 y 35	9694.814	30375	237.306	1582.0...1...H1-1b
14	M9	2.5"x3/8"	.005	0	5	.001	0 y 29	9694.814	30375	237.306	1582.0...1...H1-1b
15	M7	2.5"x3/8"	.005	16	5	.001	16 y 31	9694.814	30375	237.306	1582.0...1...H1-1b
16	M10	2.5"x3/8"	.005	0	11	.001	0 y 37	9694.814	30375	237.306	1582.0...1...H1-1b

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in ²]	Iyy [in ⁴]	Izz [in ⁴]	J [in ⁴]
1	2.0" STD ...	PIPE 2.0	Beam	None	A53 Gr.B	Typical	1.02	.627	.627	1.25
2	L2.5"x2.5"...	L2.5x2.5x3	Beam	None	A36 Gr.36	Typical	.901	.535	.535	.011
3	2.5"x3/8" ...	2.5"x3/8"	Beam	None	A36 Gr.36	Typical	.938	.011	.488	.04

Joint Boundary Conditions

Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N7	Reaction	Reaction	Reaction		
2	N13	Reaction	Reaction	Reaction		
3	N12	Reaction	Reaction	Reaction		
4	N5	Reaction	Reaction	Reaction		
5	N6	Reaction	Reaction	Reaction		
6	N16	Reaction	Reaction	Reaction		
7	N8	Reaction	Reaction	Reaction		
8	N17	Reaction	Reaction	Reaction		
9	N10	Reaction	Reaction	Reaction		
10	N18	Reaction	Reaction	Reaction		
11	N4	Reaction	Reaction	Reaction		
12	N15	Reaction	Reaction	Reaction		
13	N11	Reaction	Reaction	Reaction		
14	N3	Reaction	Reaction	Reaction		
15	N14	Reaction	Reaction	Reaction		
16	N9	Reaction	Reaction	Reaction		
17	N43					
18	N44					
19	N45					

Member Advanced Data

Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
1	M1					Yes				None
2	M2					Yes				None
3	M3					Yes				None
4	M4					Yes				None
5	M5					Yes				None
6	M6					Yes				None
7	M7					Yes				None
8	M8					Yes				None
9	M9					Yes				None
10	M10					Yes				None
11	M11					Yes				None
12	M12					Yes				None
13	M13		BenPIN			Yes				None
14	M14	BenPIN				Yes				None
15	M15		BenPIN			Yes				None
16	M16	BenPIN				Yes				None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
17	M19						Yes				None
18	M20						Yes	Default			None
19	M19A						Yes				None
20	M20A						Yes				None
21	M21						Yes	** NA **			None
22	M22						Yes	** NA **			None
23	M23						Yes	** NA **			None
24	M24						Yes	** NA **			None
25	M25						Yes	** NA **			None
26	M26						Yes	** NA **			None
27	M27						Yes	** NA **			None
28	M28						Yes	** NA **			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	2.0" STD Pi...	63	16	16	16	16	16				Lateral
2	M2	2.0" STD Pi...	63	16	16	16	16	16				Lateral
3	M3	L2.5"x2.5"x...	52.125			Lbyy						Lateral
4	M4	L2.5"x2.5"x...	52.125			Lbyy						Lateral
5	M5	L2.5"x2.5"x...	52.125			Lbyy						Lateral
6	M6	L2.5"x2.5"x...	52.125			Lbyy						Lateral
7	M7	2.5"x3/8" Pi...	16			Lbyy						Lateral
8	M8	2.5"x3/8" Pi...	16			Lbyy						Lateral
9	M9	2.5"x3/8" Pi...	16			Lbyy						Lateral
10	M10	2.5"x3/8" Pi...	16			Lbyy						Lateral
11	M11	2.0" STD Pi...	63.594	30.813	30.813	30.813	30.813	30.813				Lateral
12	M12	2.0" STD Pi...	63.594	30.813	30.813	30.813	30.813	30.813				Lateral
13	M13	2.5"x3/8" Pi...	34.491			Lbyy						Lateral
14	M14	2.5"x3/8" Pi...	34.491			Lbyy						Lateral
15	M15	2.5"x3/8" Pi...	34.491			Lbyy						Lateral
16	M16	2.5"x3/8" Pi...	34.491			Lbyy						Lateral

Joint Loads and Enforced Displacements

Joint Label	L.D.M	Direction	Magnitude[(lb,lb-ft), (in,rad), (lb*s^2...
No Data to Print ...			

Member Point Loads (BLC 1 : Self Weight)

	Member Label	Direction	Magnitude[(lb,lb-ft)]	Location[in,%]
1	M19A	Y	-29.95	15
2	M19A	Y	-29.95	32
3	M19A	Y	-29.95	50
4	M19	Y	-30	15
5	M19	Y	-30	32
6	M19	Y	-30	50
7	M19	Y	-16.4	3
8	M20A	Y	-29.95	15
9	M20A	Y	-29.95	32
10	M20A	Y	-29.95	50
11	M20	Y	-30	15
12	M20	Y	-30	32
13	M20	Y	-30	50
14	M20	Y	-16.4	3

Member Point Loads (BLC 2 : Wind Load AZI 000)

	Member Label	Direction	Magnitude(lb,lb-ft)	Location(in,%)
1	M19A	Z	-13.5	15
2	M19A	Z	-13.5	32
3	M19A	Z	-13.5	50
4	M19	Z	-20.09	15
5	M19	Z	-20.09	32
6	M19	Z	-20.09	50
7	M19	Z	-8.88	3
8	M20A	Z	-13.5	15
9	M20A	Z	-13.5	32
10	M20A	Z	-13.5	50
11	M20	Z	-20.09	15
12	M20	Z	-20.09	32
13	M20	Z	-20.09	50
14	M20	Z	-8.88	3

Member Point Loads (BLC 3 : Wind Load AZI 090)

	Member Label	Direction	Magnitude(lb,lb-ft)	Location(in,%)
1	M19A	X	-7.76	15
2	M19A	X	-7.76	32
3	M19A	X	-7.76	50
4	M19	X	-12.22	15
5	M19	X	-12.22	32
6	M19	X	-12.22	50
7	M19	X	-8.88	3
8	M20A	X	-7.76	15
9	M20A	X	-7.76	32
10	M20A	X	-7.76	50
11	M20	X	-12.22	15
12	M20	X	-12.22	32
13	M20	X	-12.22	50
14	M20	X	-8.88	3

Member Point Loads (BLC 4 : Ice Weight)

	Member Label	Direction	Magnitude(lb,lb-ft)	Location(in,%)
1	M19A	Y	-28.53	15
2	M19A	Y	-28.53	32
3	M19A	Y	-28.53	50
4	M19	Y	-37.42	15
5	M19	Y	-37.42	32
6	M19	Y	-37.42	50
7	M19	Y	-38.17	3
8	M20A	Y	-28.53	15
9	M20A	Y	-28.53	32
10	M20A	Y	-28.53	50
11	M20	Y	-37.42	15
12	M20	Y	-37.42	32
13	M20	Y	-37.42	50
14	M20	Y	-38.17	3

Member Point Loads (BLC 5 : Wind + Ice Load AZI 000)

	Member Label	Direction	Magnitude(lb,lb-ft)	Location(in,%)
1	M19A	Z	-3.97	15
2	M19A	Z	-3.97	32
3	M19A	Z	-3.97	50
4	M19	Z	-5.66	15

Member Point Loads (BLC 5 : Wind + Ice Load AZI 000) (Continued)

	Member Label	Direction	Magnitude[lb.lb-ft]	Location[in.%]
5	M19	Z	-5.66	32
6	M19	Z	-5.66	50
7	M19	Z	-5.95	3
8	M20A	Z	-3.97	15
9	M20A	Z	-3.97	32
10	M20A	Z	-3.97	50
11	M20	Z	-5.66	15
12	M20	Z	-5.66	32
13	M20	Z	-5.66	50
14	M20	Z	-5.95	3

Member Point Loads (BLC 6 : Wind + Ice Load AZI 090)

	Member Label	Direction	Magnitude[lb.lb-ft]	Location[in.%]
1	M19A	X	-2.59	15
2	M19A	X	-2.59	32
3	M19A	X	-2.59	50
4	M19	X	-3.82	15
5	M19	X	-3.82	32
6	M19	X	-3.82	50
7	M19	X	-3.47	3
8	M20A	X	-2.59	15
9	M20A	X	-2.59	32
10	M20A	X	-2.59	50
11	M20	X	-3.82	15
12	M20	X	-3.82	32
13	M20	X	-3.82	50
14	M20	X	-3.47	3

Member Distributed Loads (BLC 4 : Ice Weight)

	Member Label	Direction	Start Magnitude[lb/ft....	End Magnitude[lb/ft.F...	Start Location[in.%]	End Location[in.%]
1	M1	Y	-7.34	-7.34	0	%100
2	M2	Y	-7.34	-7.34	0	%100
3	M3	Y	-9.584	-9.584	0	%100
4	M4	Y	-9.584	-9.584	0	%100
5	M5	Y	-9.584	-9.584	0	%100
6	M6	Y	-9.584	-9.584	0	%100
7	M7	Y	-9.584	-9.584	0	%100
8	M8	Y	-9.584	-9.584	0	%100
9	M9	Y	-9.584	-9.584	0	%100
10	M10	Y	-9.584	-9.584	0	%100
11	M11	Y	-7.34	-7.34	0	%100
12	M12	Y	-7.34	-7.34	0	%100
13	M13	Y	-9.584	-9.584	0	%100
14	M14	Y	-9.584	-9.584	0	%100
15	M15	Y	-9.584	-9.584	0	%100
16	M16	Y	-9.584	-9.584	0	%100
17	M19	Y	-7.443	-7.443	0	%100
18	M20	Y	-7.443	-7.443	0	%100
19	M19A	Y	-7.443	-7.443	0	%100
20	M20A	Y	-7.443	-7.443	0	%100
21	M21	Y	-3.637	-3.637	0	%100
22	M22	Y	-3.637	-3.637	0	%100
23	M23	Y	-3.637	-3.637	0	%100
24	M24	Y	-3.637	-3.637	0	%100
25	M25	Y	-3.637	-3.637	0	%100

Member Distributed Loads (BLC 4 : Ice Weight) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[in.%]	End Location[in.%]
26	M26	Y	-3.637	-3.637	0	%100
27	M27	Y	-3.637	-3.637	0	%100
28	M28	Y	-3.637	-3.637	0	%100

Member Distributed Loads (BLC 8 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[in.%]	End Location[in.%]
1	M3	Z	-3.662	-3.662	0	52.125
2	M4	Z	-3.662	-3.662	0	52.125
3	M5	Z	-3.662	-3.662	0	52.125
4	M6	Z	-3.662	-3.662	0	52.125
5	M11	Z	-3.479	-3.479	0	63.594
6	M12	Z	-3.479	-3.479	0	63.594
7	M13	Z	-.491	-.491	0	34.491
8	M14	Z	-.491	-.491	0	34.491
9	M15	Z	-.491	-.491	0	34.491
10	M16	Z	-.491	-.491	0	34.491
11	M19	Z	-2.381	-2.381	3	55.125
12	M20	Z	-2.381	-2.381	3	55.125
13	M19A	Z	-2.381	-2.381	3	55.125
14	M20A	Z	-2.381	-2.381	3	55.125

Member Distributed Loads (BLC 9 : BLC 3 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[in.%]	End Location[in.%]
1	M1	X	-3.479	-3.479	0	63
2	M2	X	-3.479	-3.479	0	63
3	M7	X	-3.662	-3.662	0	16
4	M8	X	-3.662	-3.662	0	16
5	M9	X	-3.662	-3.662	0	16
6	M10	X	-3.662	-3.662	0	16
7	M11	X	-3.479	-3.479	0	63.594
8	M12	X	-3.479	-3.479	0	63.594
9	M13	X	-3.662	-3.662	0	34.491
10	M14	X	-3.662	-3.662	0	34.491
11	M15	X	-3.662	-3.662	0	34.491
12	M16	X	-3.662	-3.662	0	34.491
13	M21	X	0	0	0	3
14	M22	X	0	0	0	3
15	M23	X	0	0	0	3
16	M24	X	0	0	0	3
17	M25	X	0	0	0	3
18	M26	X	0	0	0	3
19	M27	X	0	0	0	3
20	M28	X	0	0	0	3

Member Distributed Loads (BLC 10 : BLC 5 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft....]	End Magnitude[lb/ft.F...]	Start Location[in.%]	End Location[in.%]
1	M3	Z	-1.723	-1.723	0	52.125
2	M4	Z	-1.723	-1.723	0	52.125
3	M5	Z	-1.723	-1.723	0	52.125
4	M6	Z	-1.723	-1.723	0	52.125
5	M11	Z	-1.637	-1.637	0	63.594
6	M12	Z	-1.637	-1.637	0	63.594
7	M13	Z	-.231	-.231	0	34.491
8	M14	Z	-.231	-.231	0	34.491
9	M15	Z	-.231	-.231	0	34.491

Member Distributed Loads (BLC 10 : BLC 5 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft....	End Magnitude[lb/ft.F...	Start Location[in.%]	End Location[in.%]
10	M16	Z	-231	-231	0	34.491
11	M19	Z	-1.12	-1.12	3	55.125
12	M20	Z	-1.12	-1.12	3	55.125
13	M19A	Z	-1.12	-1.12	3	55.125
14	M20A	Z	-1.12	-1.12	3	55.125

Member Distributed Loads (BLC 11 : BLC 6 Transient Area Loads)

	Member Label	Direction	Start Magnitude[lb/ft....	End Magnitude[lb/ft.F...	Start Location[in.%]	End Location[in.%]
1	M1	X	-1.637	-1.637	0	63
2	M2	X	-1.637	-1.637	0	63
3	M7	X	-1.723	-1.723	0	16
4	M8	X	-1.723	-1.723	0	16
5	M9	X	-1.723	-1.723	0	16
6	M10	X	-1.723	-1.723	0	16
7	M11	X	-1.637	-1.637	0	63.594
8	M12	X	-1.637	-1.637	0	63.594
9	M13	X	-1.723	-1.723	0	34.491
10	M14	X	-1.723	-1.723	0	34.491
11	M15	X	-1.723	-1.723	0	34.491
12	M16	X	-1.723	-1.723	0	34.491
13	M21	X	0	0	0	3
14	M22	X	0	0	0	3
15	M23	X	0	0	0	3
16	M24	X	0	0	0	3
17	M25	X	0	0	0	3
18	M26	X	0	0	0	3
19	M27	X	0	0	0	3
20	M28	X	0	0	0	3

Member Area Loads (BLC 2 : Wind Load AZI 000)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N43	N44	N6	N5	Z	Open Structure	-17.58

Member Area Loads (BLC 3 : Wind Load AZI 090)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N44	N45	N4	N6	X	Open Structure	-17.58

Member Area Loads (BLC 5 : Wind + Ice Load AZI 000)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N43	N44	N6	N5	Z	Open Structure	-8.27

Member Area Loads (BLC 6 : Wind + Ice Load AZI 090)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[psf]
1	N44	N45	N4	N6	X	Open Structure	-8.27

Date: 9/7/2018
 Site Name: Beacon
 Client: AT&T
 Infinigy Job #: 395-000
 Analysis/Design: Analysis
 TIA Rev: ANSI/TIA-222-G

Loading Data		
Horizontal Equipment Load (AL)	219.3	lb
Height from rooftop to center of antenna (H):	5	ft
Overall Frame Bearing Width:	5.25	ft
Overall Frame Bearing Length:	4.3	ft
Overall Frame Weight (Including Equipment):	671.8	lb
Distance Tray 1:	0.5	ft
Distance to Center of Ballast:	2.63	ft
Distance Tray 2:	4.75	ft
Type of Paver	16x8x8	
Paver Weight	32	lb
Paver # Per Tray:	2	
Applied Overturning Moment:	1754.4	lb-ft
Overturning Moment Resistance:	1892.6	lb-ft
Overturning Usage:	92.7	%
Total Weight:	799.8	
Applied Roof Pressure:	35.43	psf
Ultimate Roof Pressure:	40	psf
Roof Pressure Check:	88.57	%

