

Date: **December 21, 2022**

INFINIGY

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Subject: **Mount Analysis Report**

Carrier Designation: **AT&T Mobility Equipment Change Out**
Carrier Site Number: CTL05069
Carrier Site Name: BENNETT POND
Carrier FA Number: 10070924

Crown Castle Designation: **Crown Castle BU Number:** 842857
Crown Castle Site Name: BENNETT POND
Crown Castle JDE Job Number: 715649
Crown Castle Order Number: 614859 Rev. 0

Engineering Firm Designation: **Infinigy Report Designation:** 1039-Z0001-B

Site Data: **66 Sugar Hollow Road, Danbury, Fairfield County, CT, 06810**
Latitude 41°20'10.00" Longitude -73°28'14.40"

Structure Information: **Tower Height & Type:** **106.0 ft Monopole**
Mount Elevation: **106.0 ft**
Mount Type: **14.0 ft Platform**

Infinigy is pleased to submit this "**Mount Analysis Report**" to determine the structural integrity of AT&T Mobility'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:

Platform

Sufficient

***See Section 4.1 of this report for the loading and structural modifications required in order for the mount to support the loading listed in Table 1.**

This analysis utilizes an ultimate 3-second gust wind speed of 115 mph as required by the 2022 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Mount analysis prepared by: Farhad Ahmadyar

Respectfully Submitted by: Emmanuel Poulin, P.E.

structural@infinigy.com

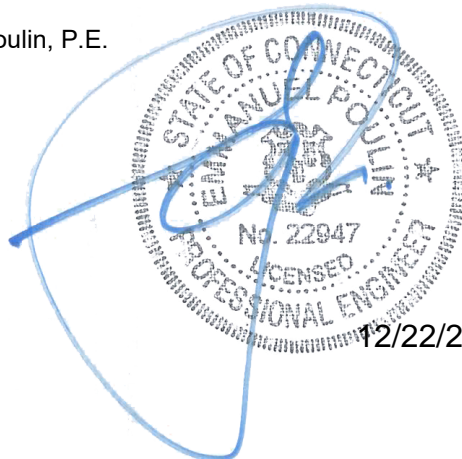


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1) INTRODUCTION

This is an existing 3-sector 14.0 ft Platform.

2) ANALYSIS CRITERIA

Building Code: 2021 IBC / 2022 Connecticut State Building Code
TIA-222 Revision: TIA-222-H
Risk Category: II
Ultimate Wind Speed: 115 mph
Exposure Category: C
Topographic Factor at Base: 1.0
Topographic Factor at Mount: 1.0
Ice Thickness: 1.5 in
Wind Speed with Ice: 50 mph
Seismic S_s: 0.234
Seismic S₁: 0.057
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 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
106.0	108.0	3	CCI ANTENNAS	OPA65R-BU6D	14.0 ft Platform
		3	CCI ANTENNAS	TPA65R-BU6DA-K	
		3	ERICSSON	RRUS 8843 B2/B66	
		3	ERICSSON	RRUS 4449 B5/B12	
		3	ERICSSON	RRUS 4478 B14	
	1	RAYCAP	DC9-48-60-24-8C-EV_CCIV2		
	106.0	1	RAYCAP	DC6-48-60-18-8F	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Crown Application	AT&T Mobility Application	614859 Rev. 0	CCI Sites
Loading Document	AT&T Mobility	RFDS ID: 5109026	TSA
Tower Manufacturer Drawings	Paul J. Ford and Company	5110641	CCI Sites
Previous Mount Analysis Report	Infinigy	10529225	CCI Sites

3.1) Analysis Method

RISA-3D (Version 20.0.4), 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.

Infinigy Mount Analysis Tool V2.3.2, a tool internally developed by Infinigy, was used to calculate wind loading on all appurtenances, dishes and mount members for various loading cases. Selected output from the analysis is included in Appendix B "Software Input Calculations".

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Mount Analysis* (Revision E). In addition, this analysis is in accordance with AT&T Mount Technical Guidance ATT-002-291-373.

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) The analysis will be required to be revised if the existing conditions in the field differ from those shown in the above-referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.
- 5) Prior structural modifications to the tower mounting system are assumed to be installed as shown per available data.
- 6) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM A500 (GR B-46)
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 (Platform, All Sectors)

Notes	Component	Critical Member	Centerline (ft)	% Capacity	Pass / Fail
1,2	Mount Pipe(s)	MP5	106.0	75.9	Pass
	Horizontal(s)	HOR1		99.1	Pass
	Standoff(s)	M61		57.0	Pass
	Handrail(s)	M30		51.0	Pass
	Mount Connection(s)	--		50.8	Pass

Structure Rating (max from all components) =	99.1%
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Notes:

- 1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
- 2) See additional documentation in "Appendix D – Additional Calculations" for detailed mount connection calculations.

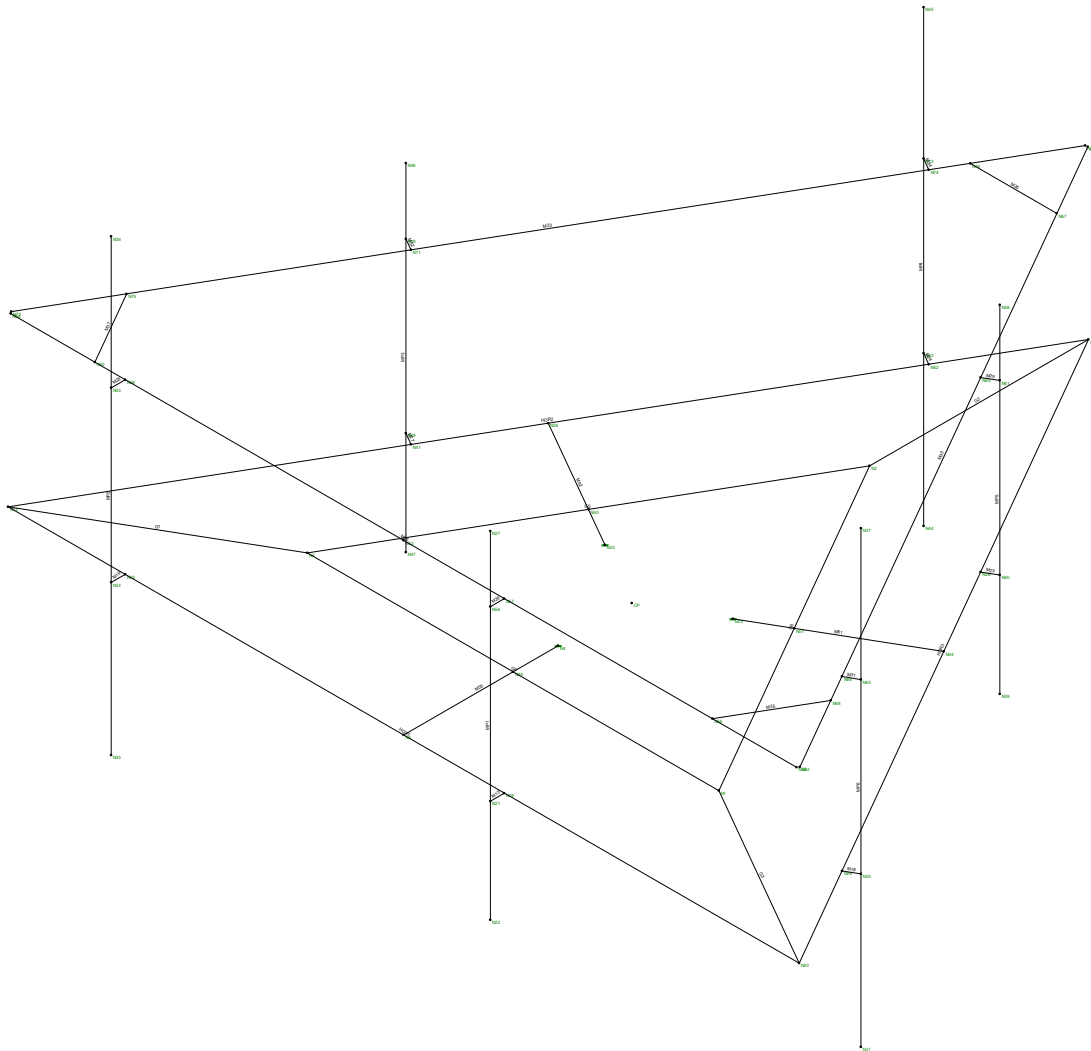
4.1) Recommendations

The mount has sufficient capacity to carry the proposed loading configuration. In order for the results of the analysis to be considered valid, the structural modifications listed below must be completed.

1. Installation of (1) Pipe 2.5 STD 14' long horizontal pipe per sector installed 36" above existing face horizontal.
2. Installation of (1) Site Pro 1 AHCP handrail corner plate kit.

No structural modifications are required at this time, provided that the above-listed changes are implemented.

APPENDIX A
WIRE FRAME AND RENDERED MODELS



Infinigy

FA

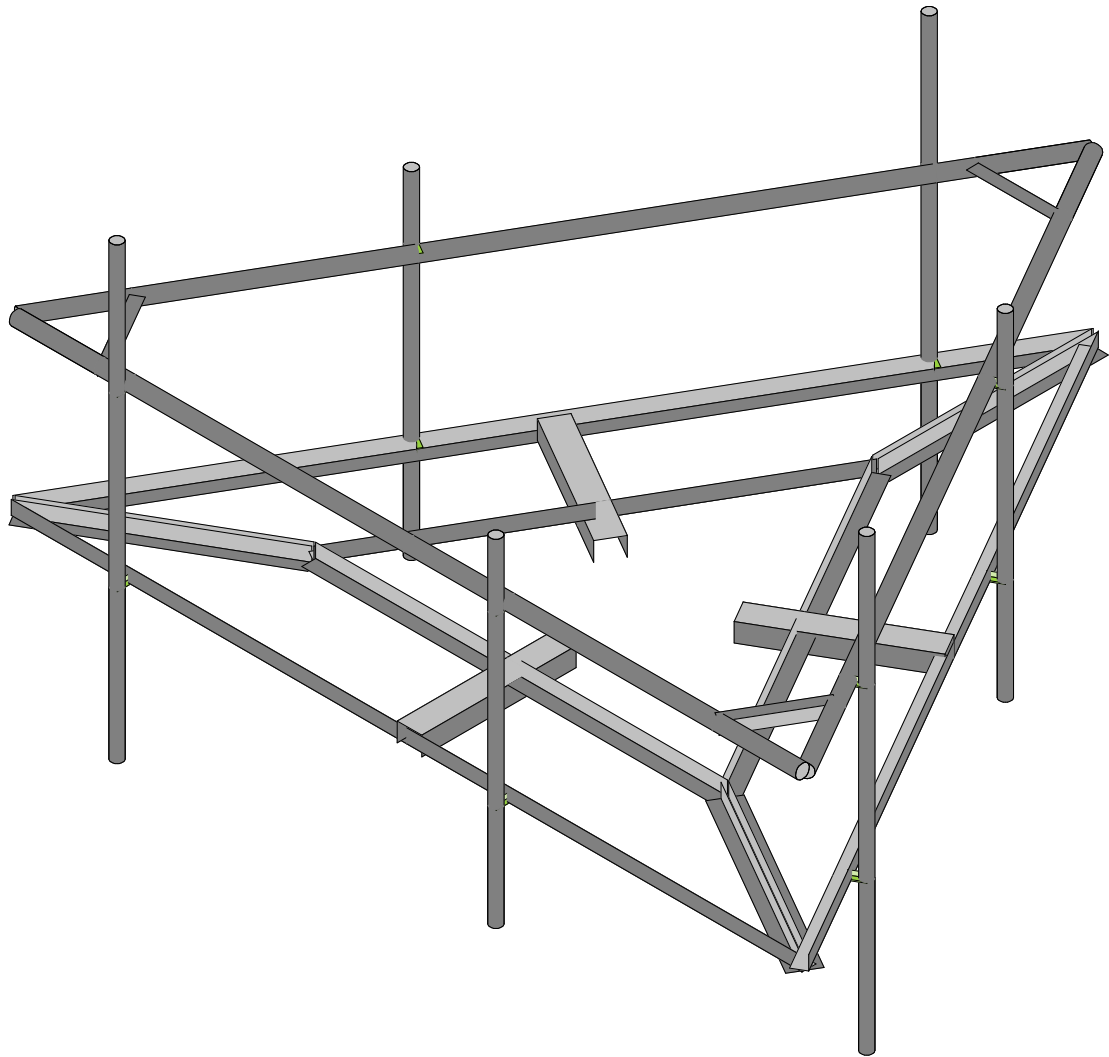
1039-Z0001-B

842857

Wireframe

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Infinigy

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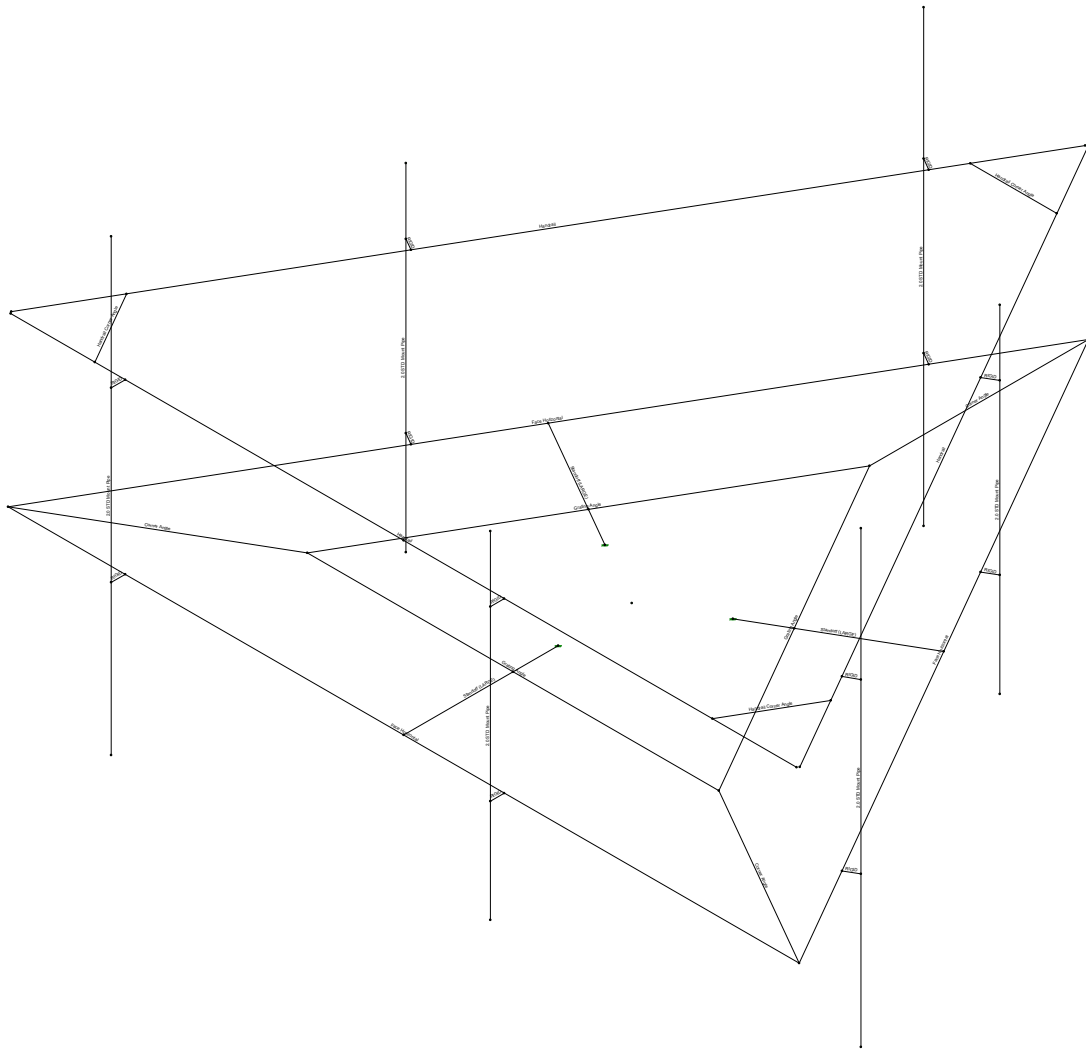
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Render

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Infinigy

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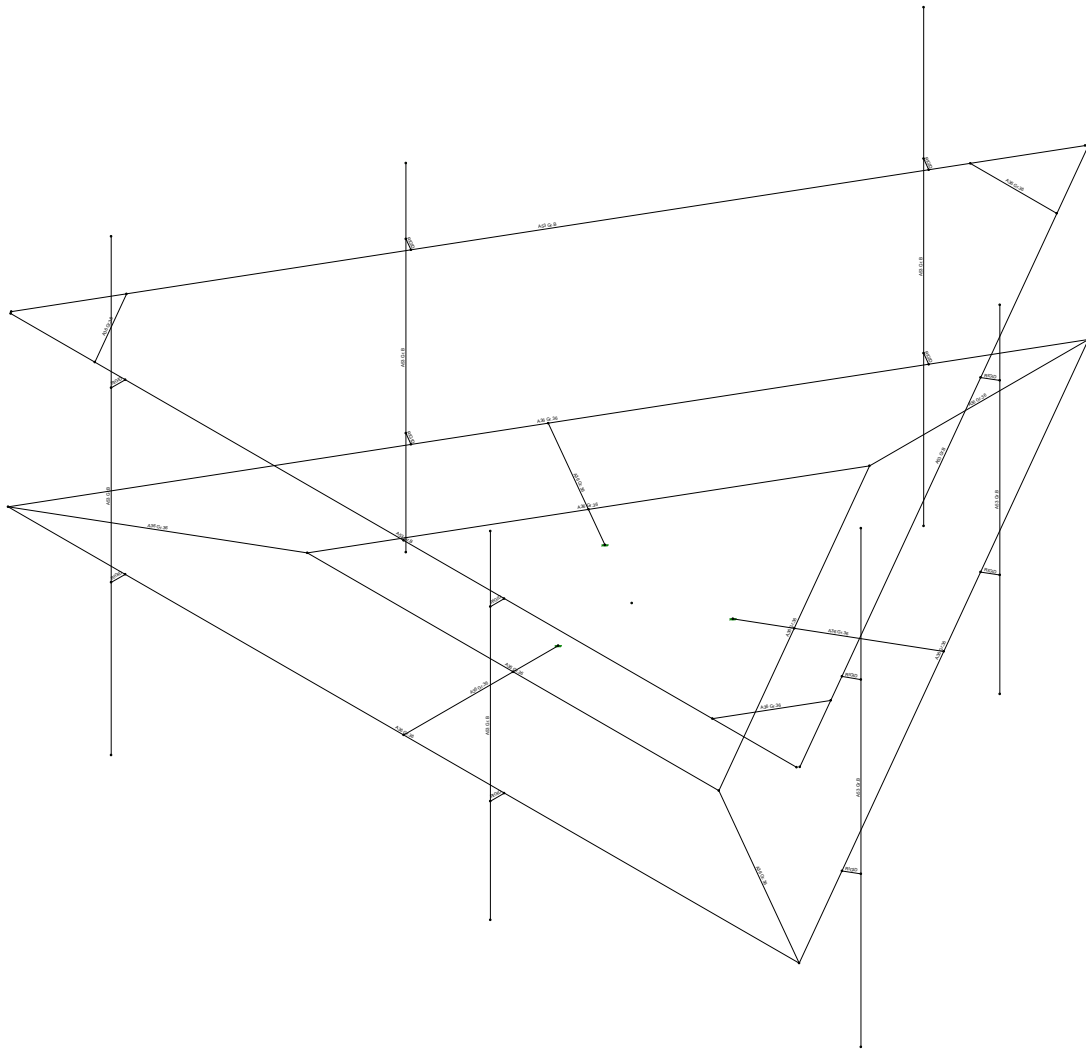
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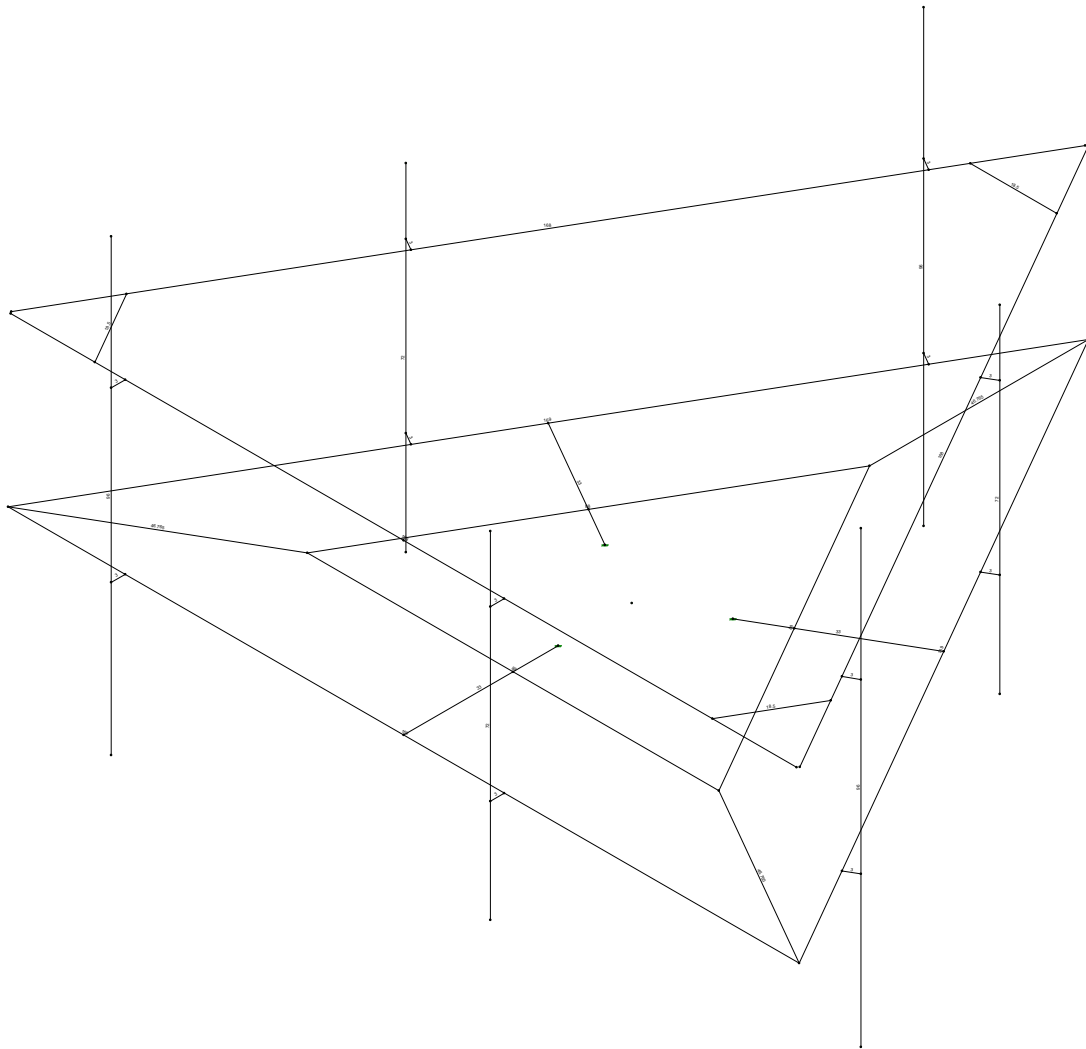
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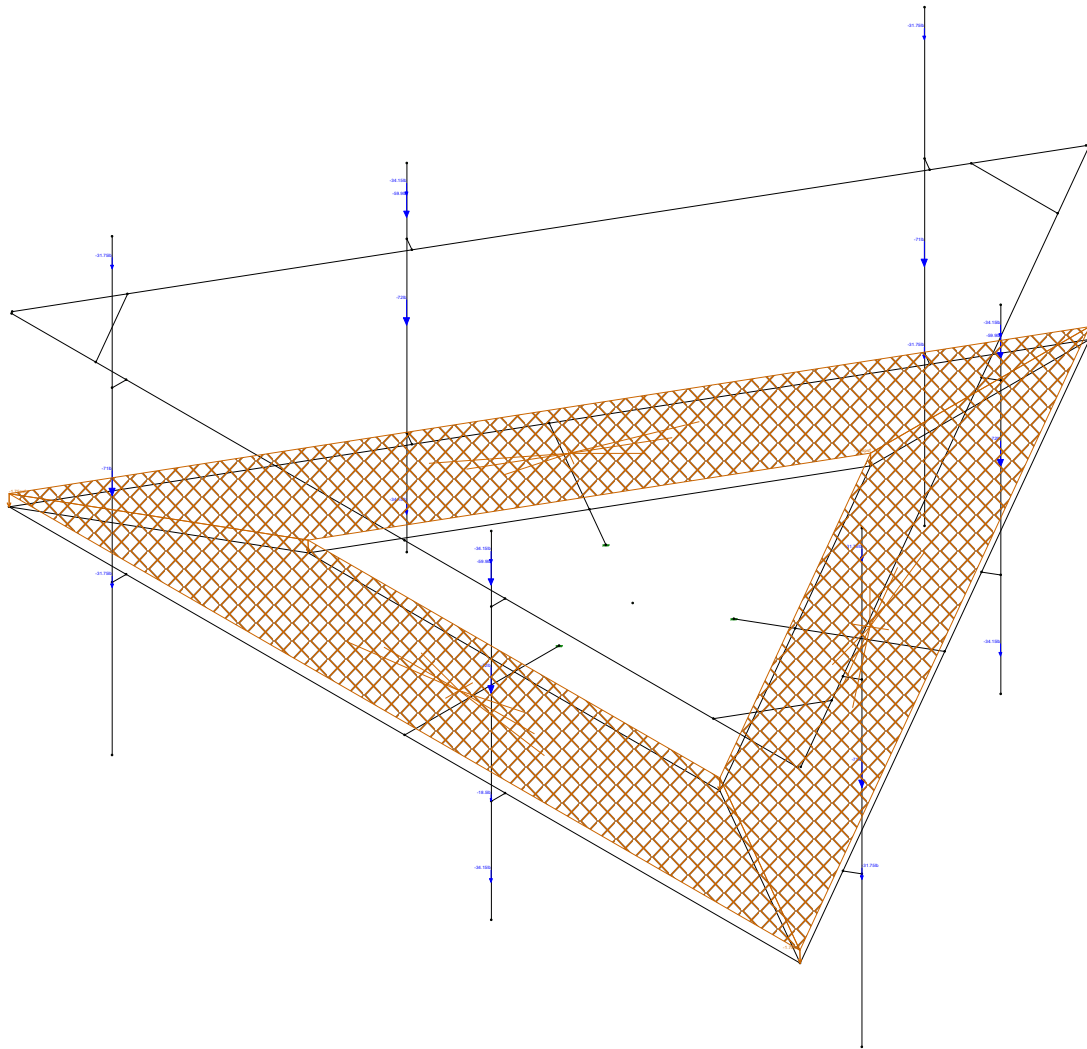
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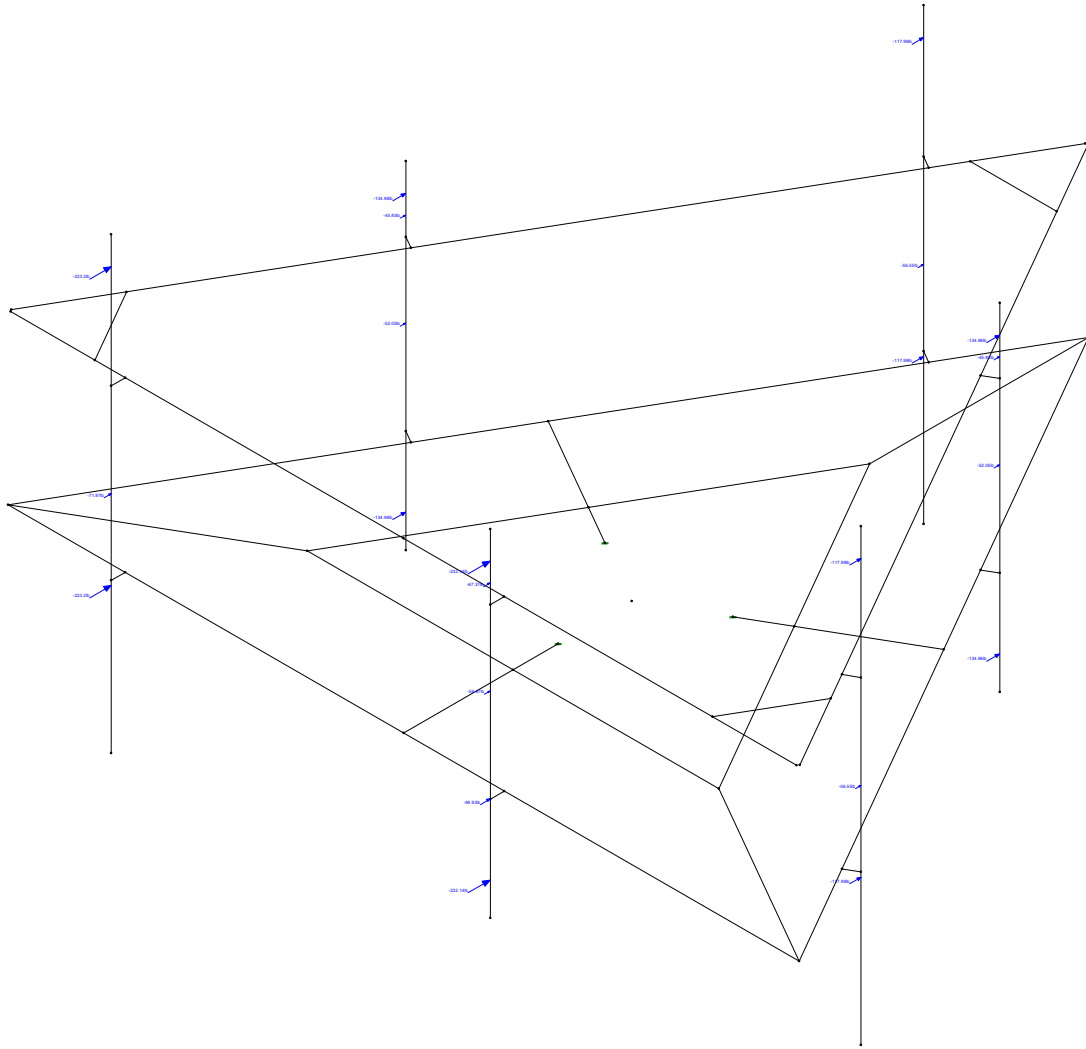
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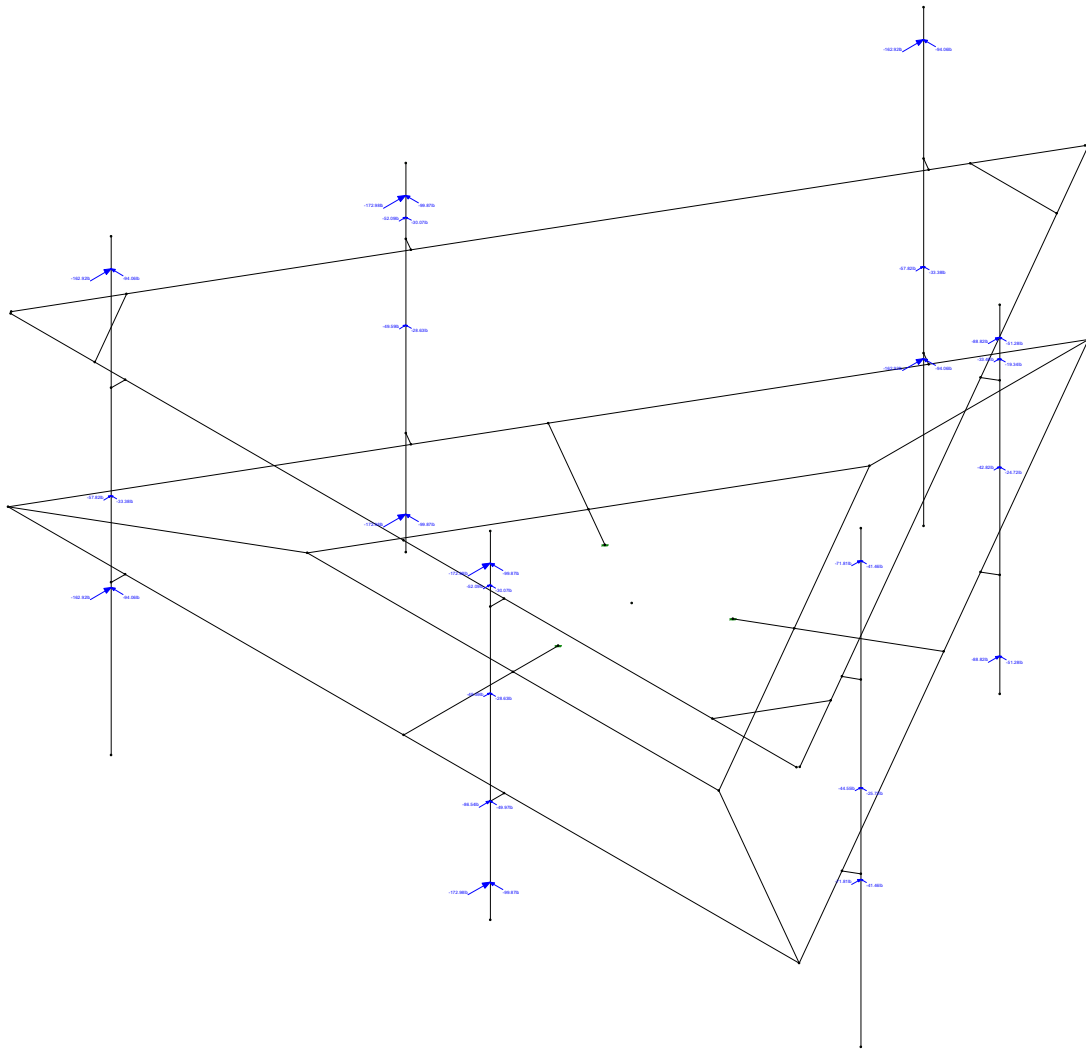
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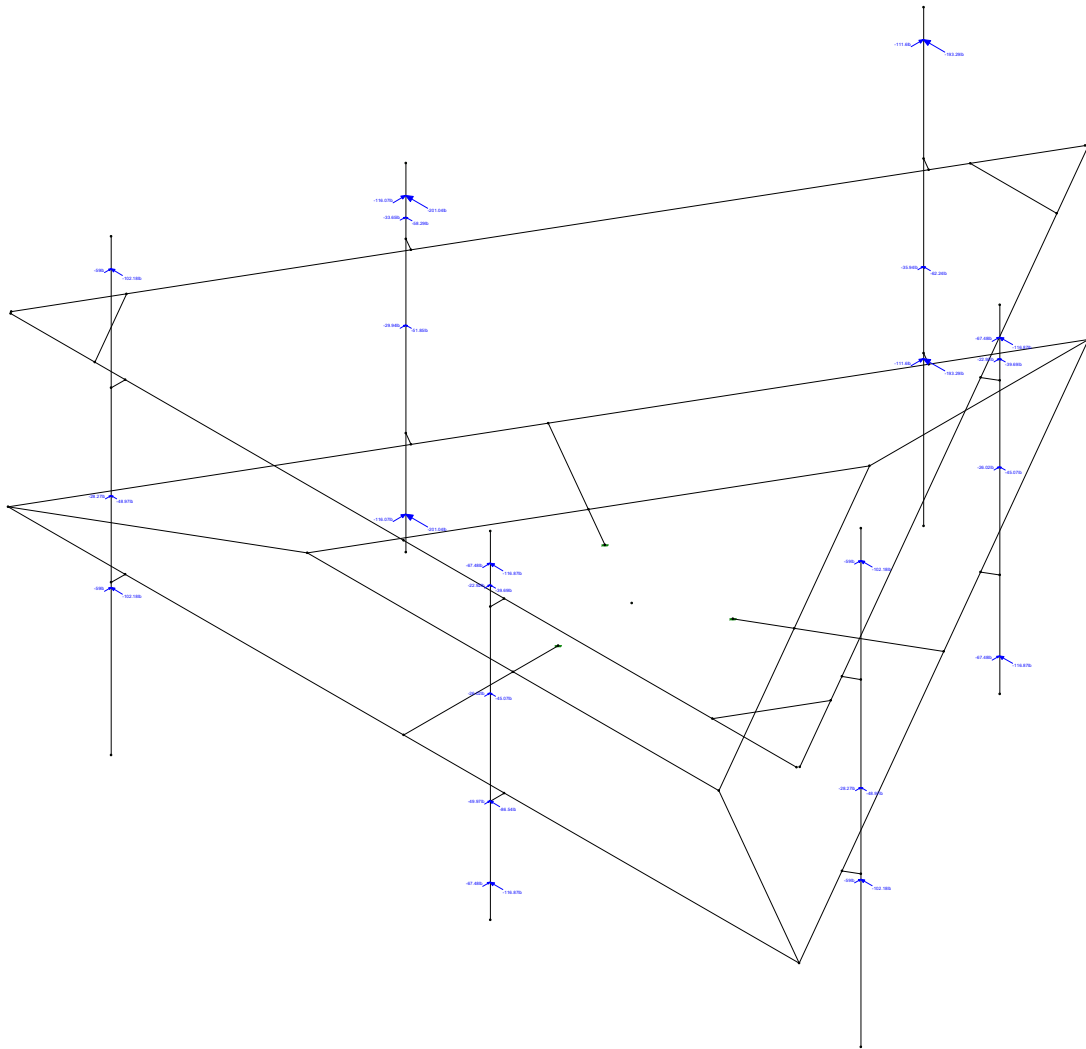
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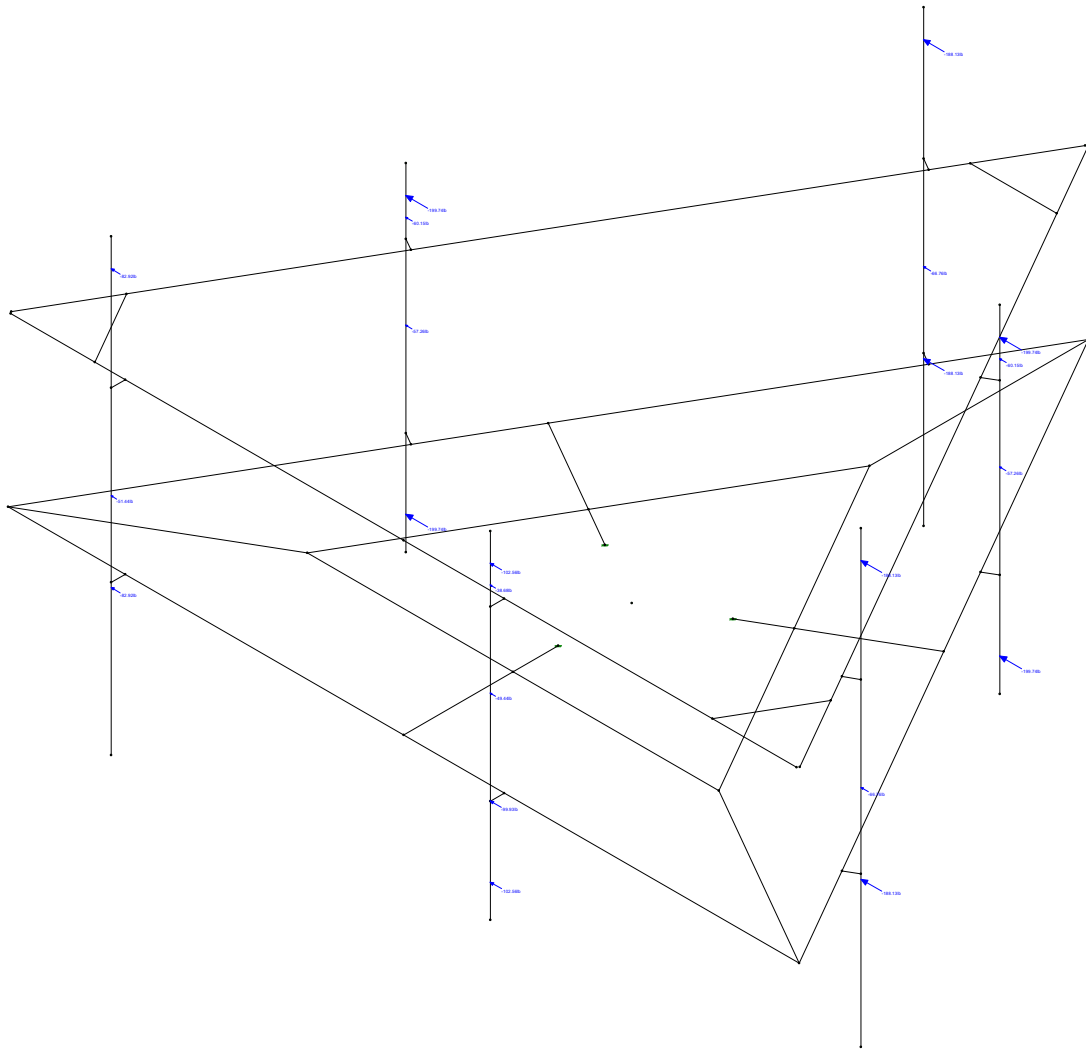
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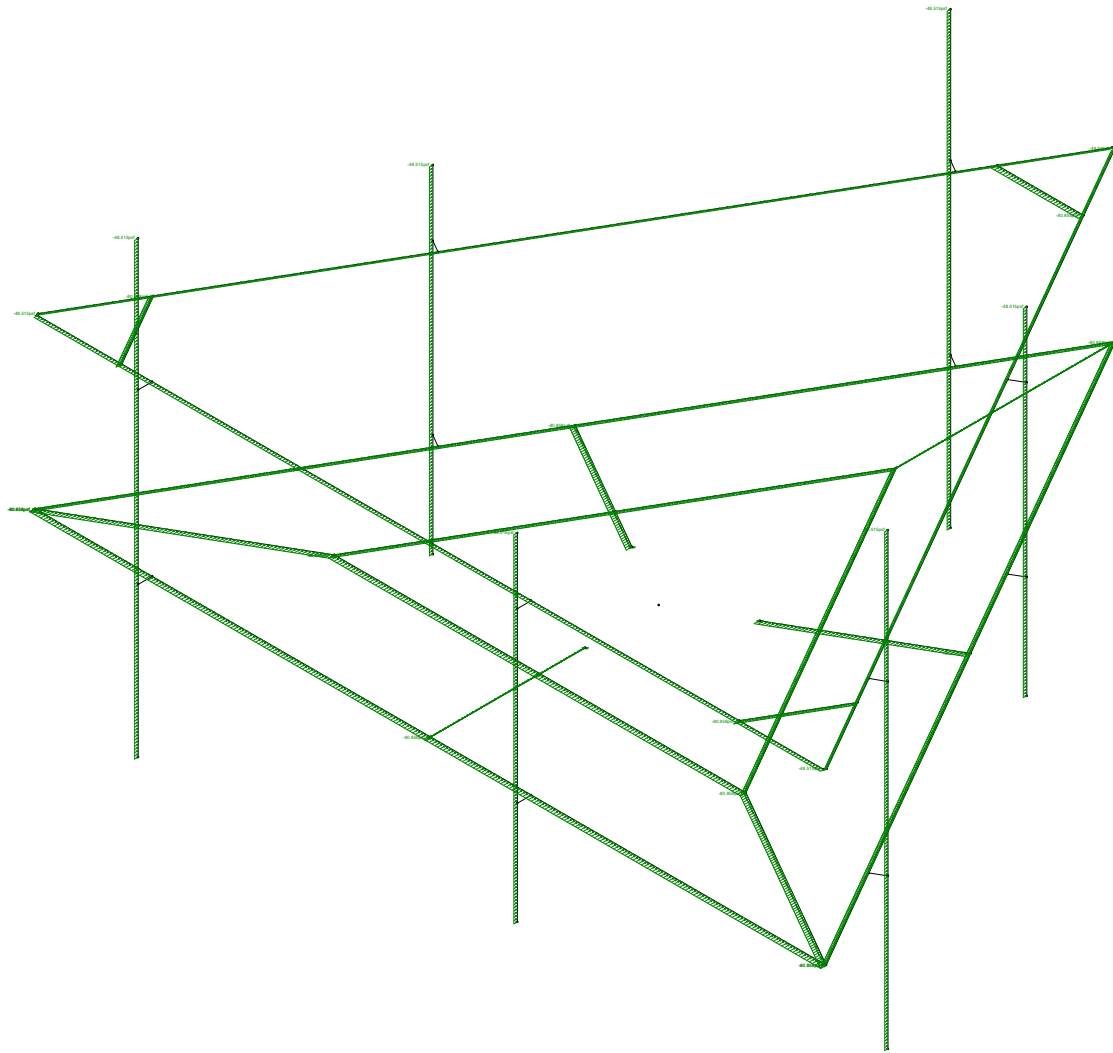
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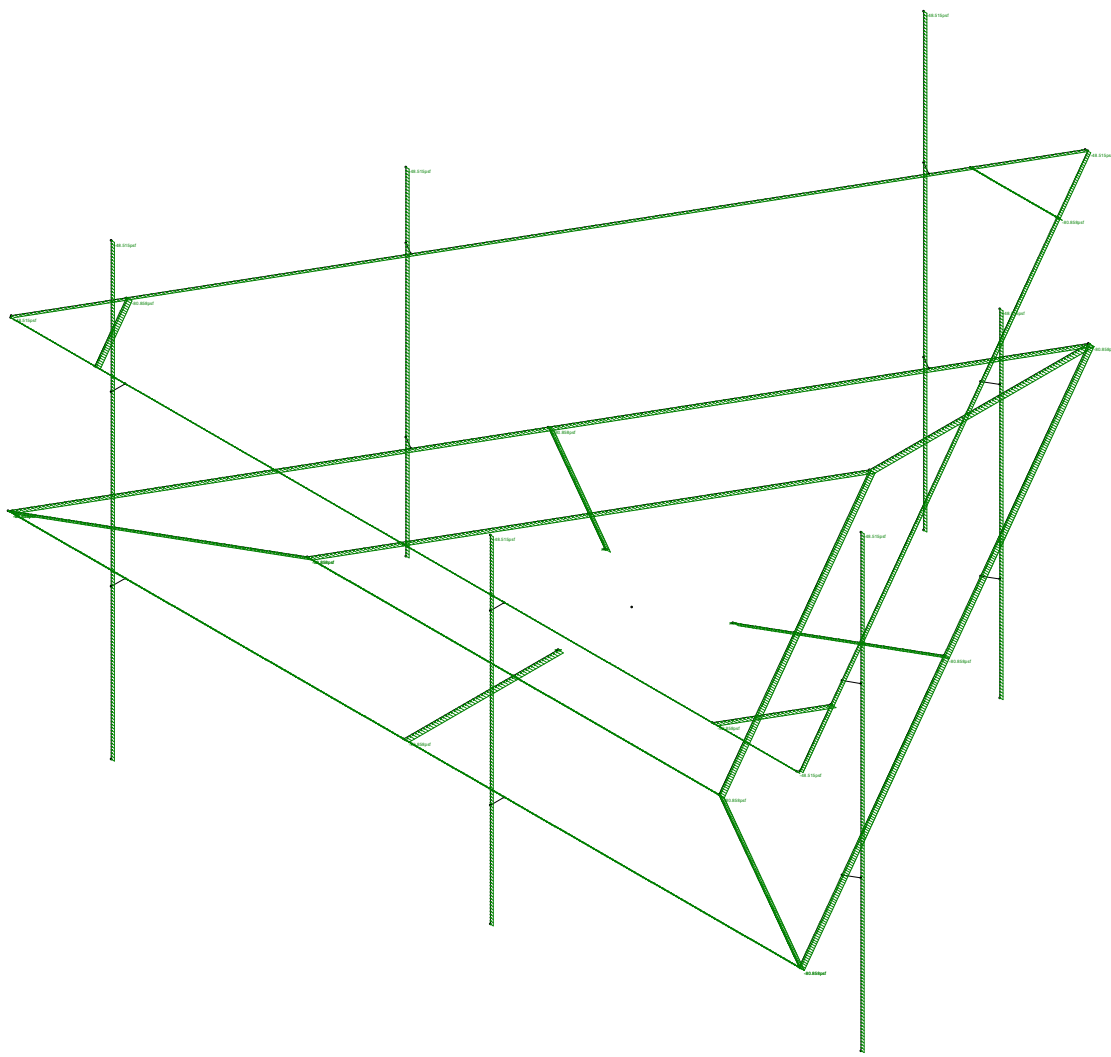
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Infinigy	842857	Wind Loading 90
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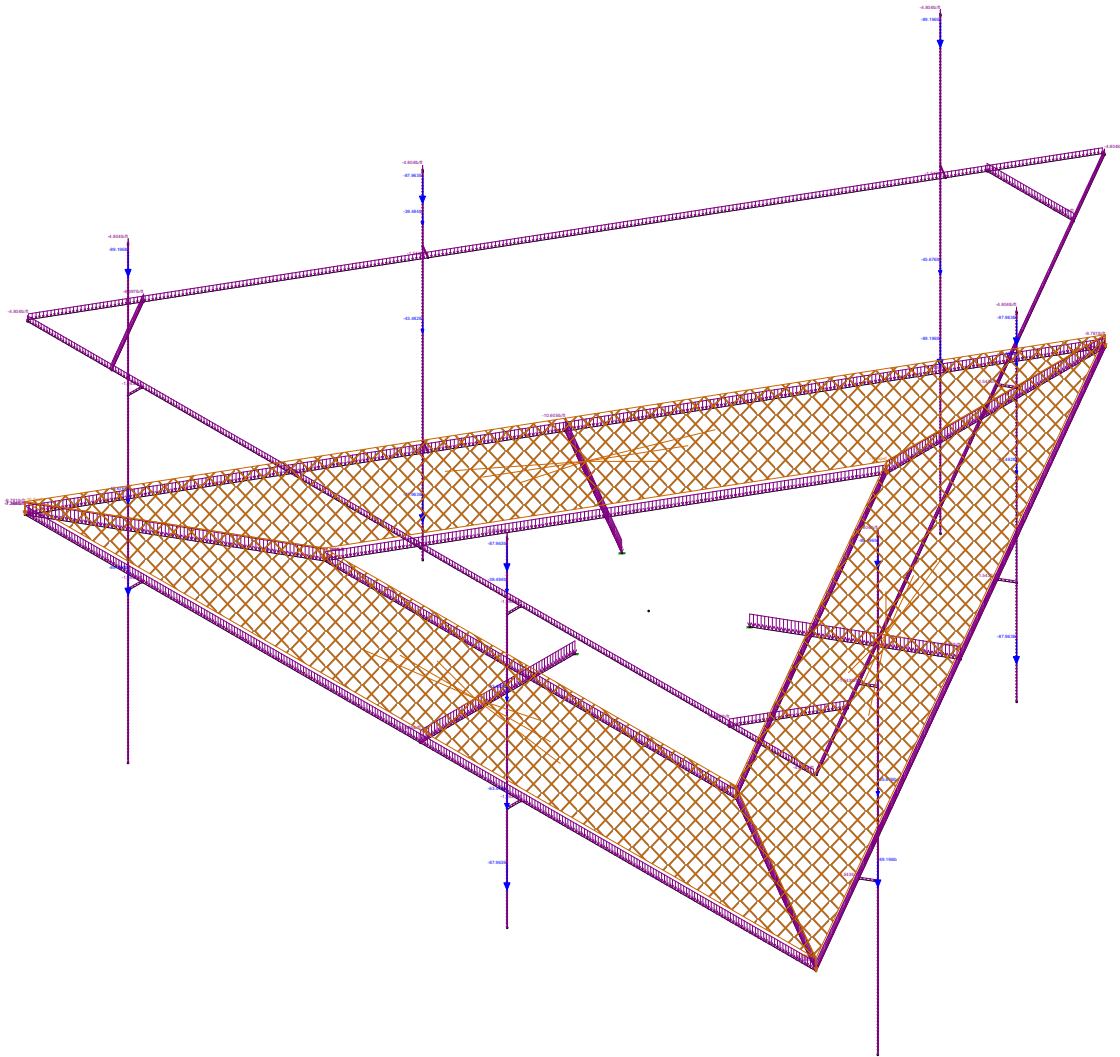
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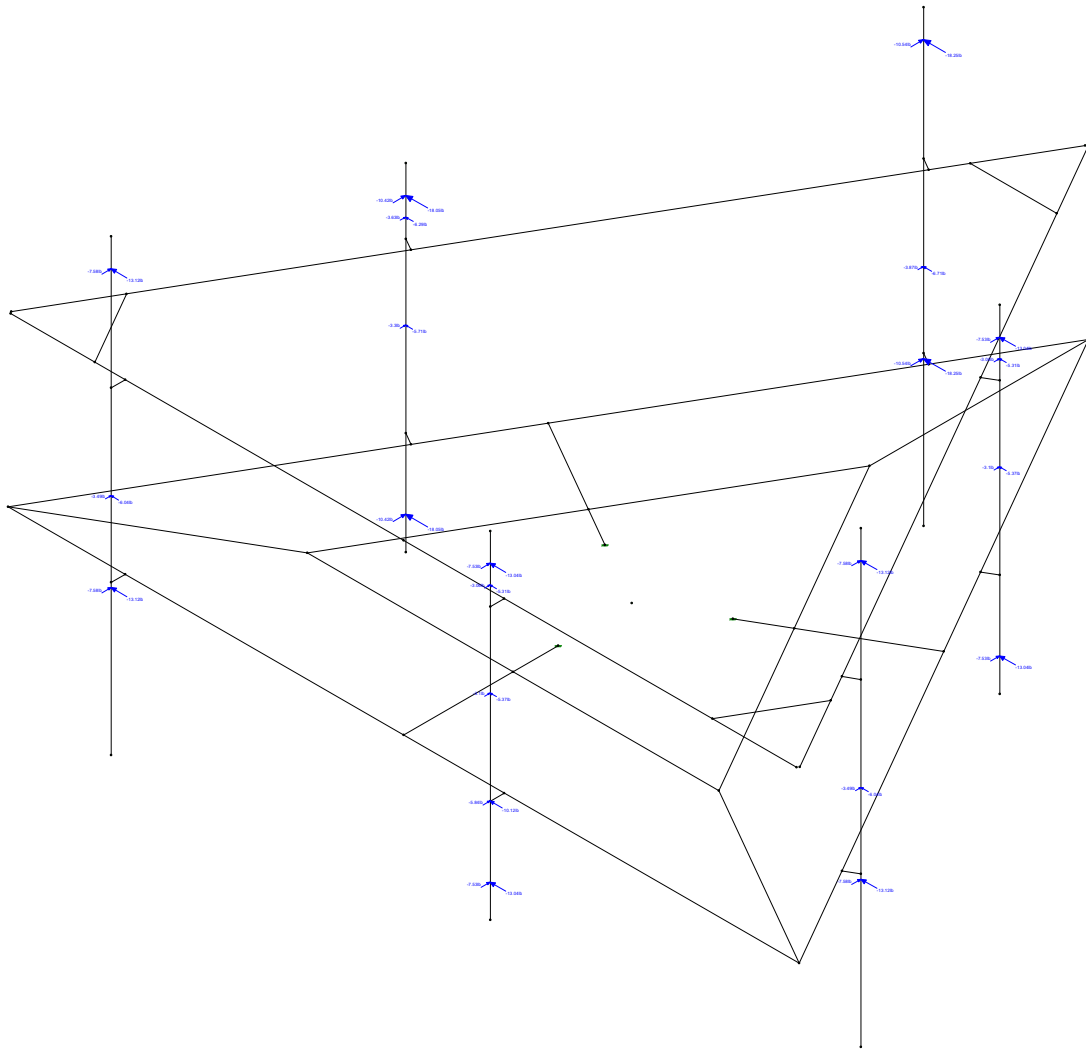
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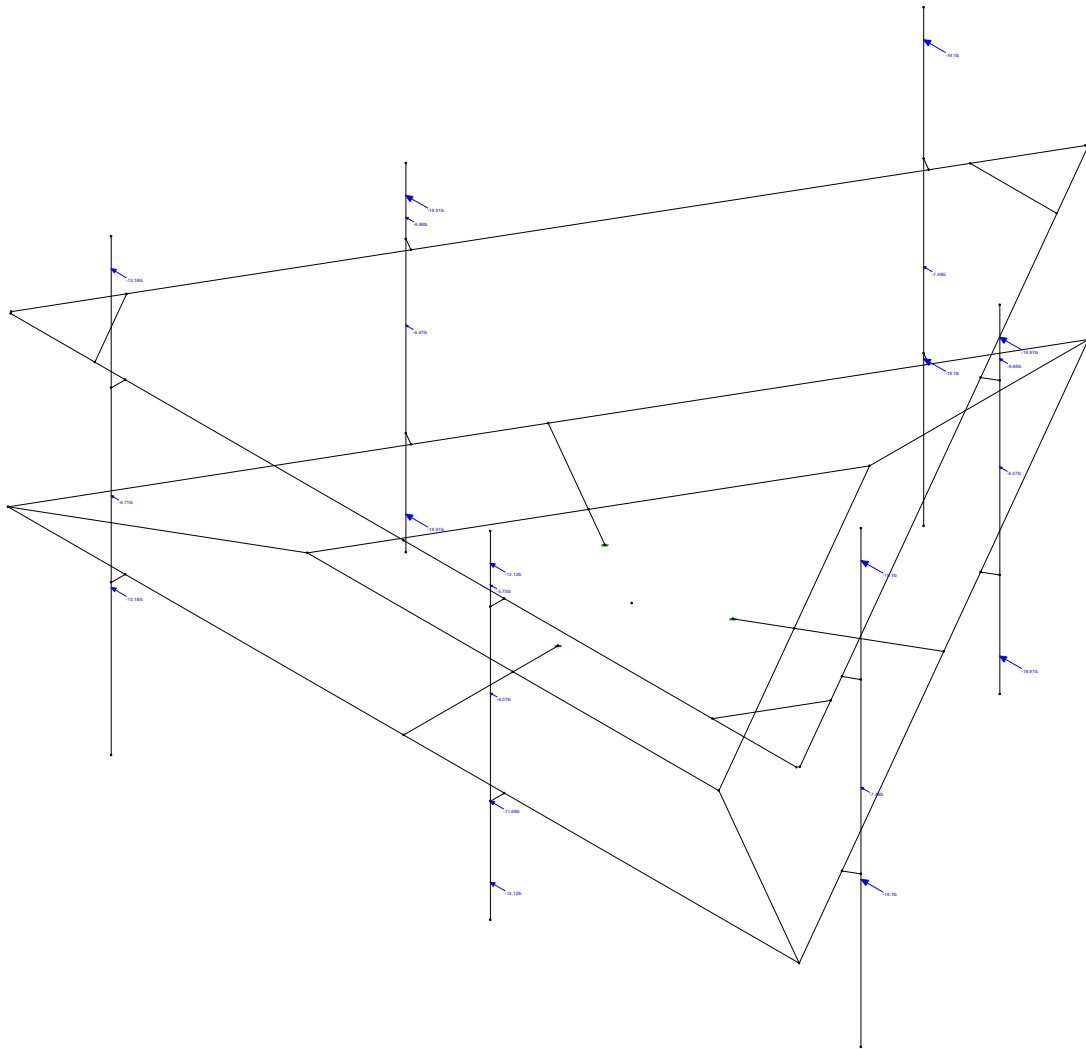
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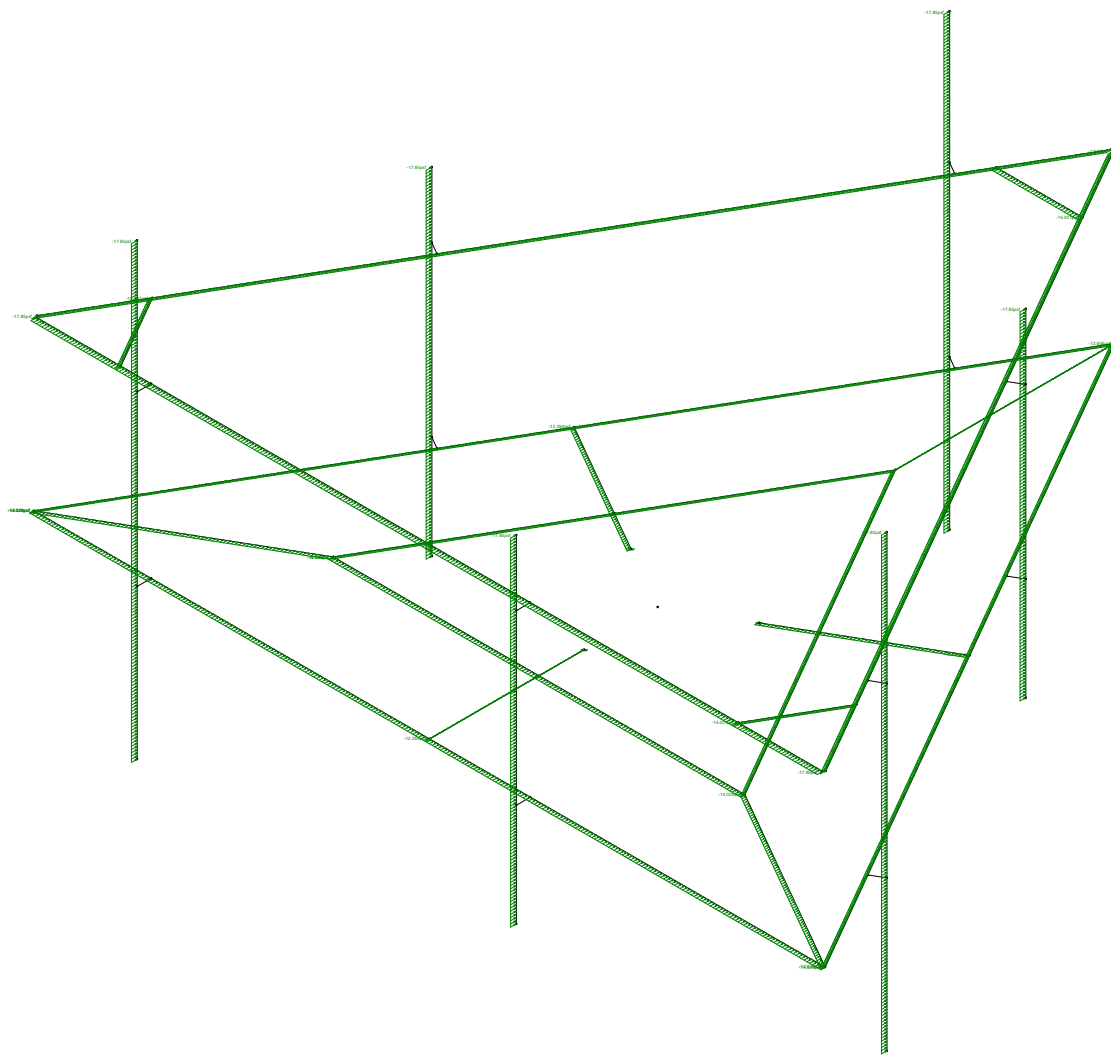
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Infinigy

FA

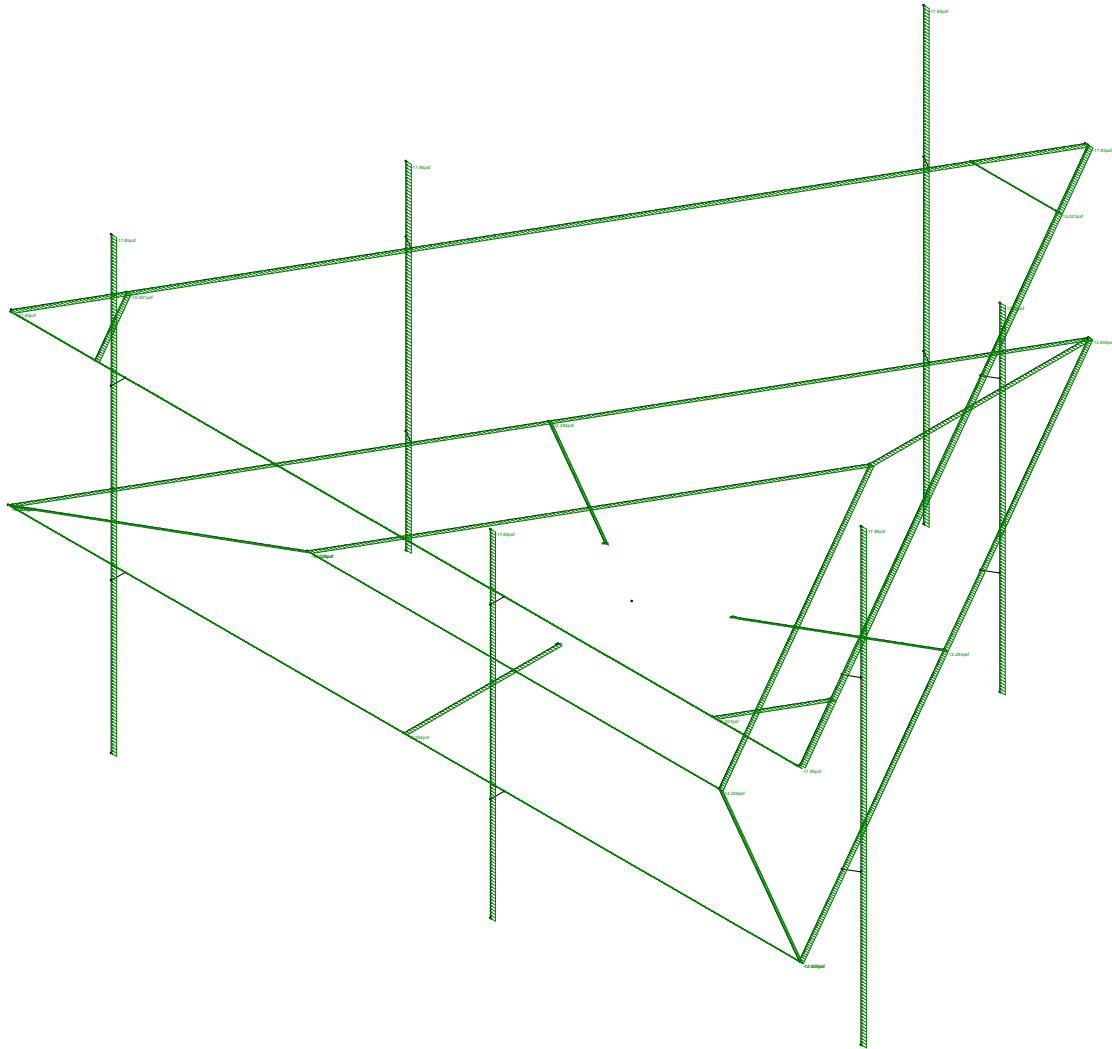
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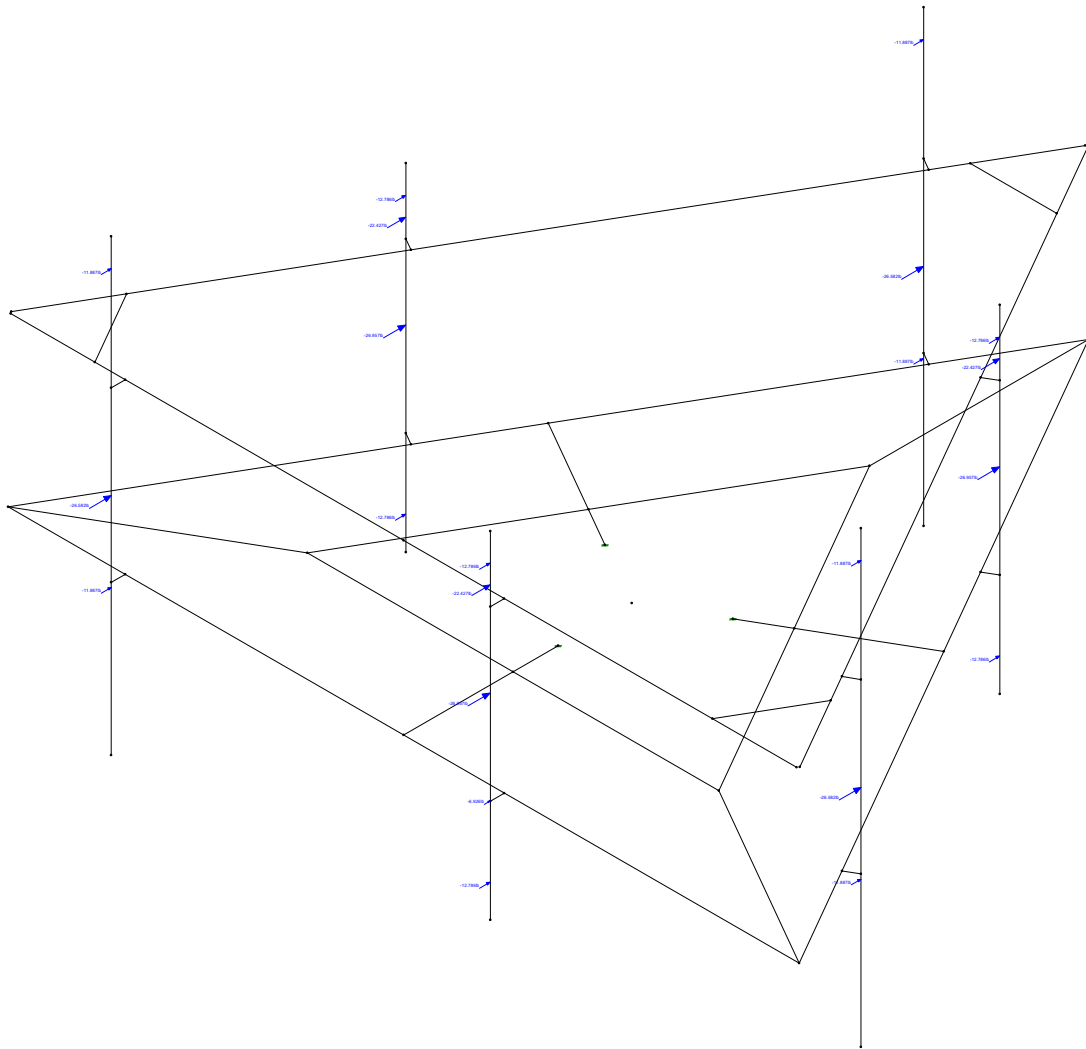
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Dec 21, 2022 at 9:55 AM

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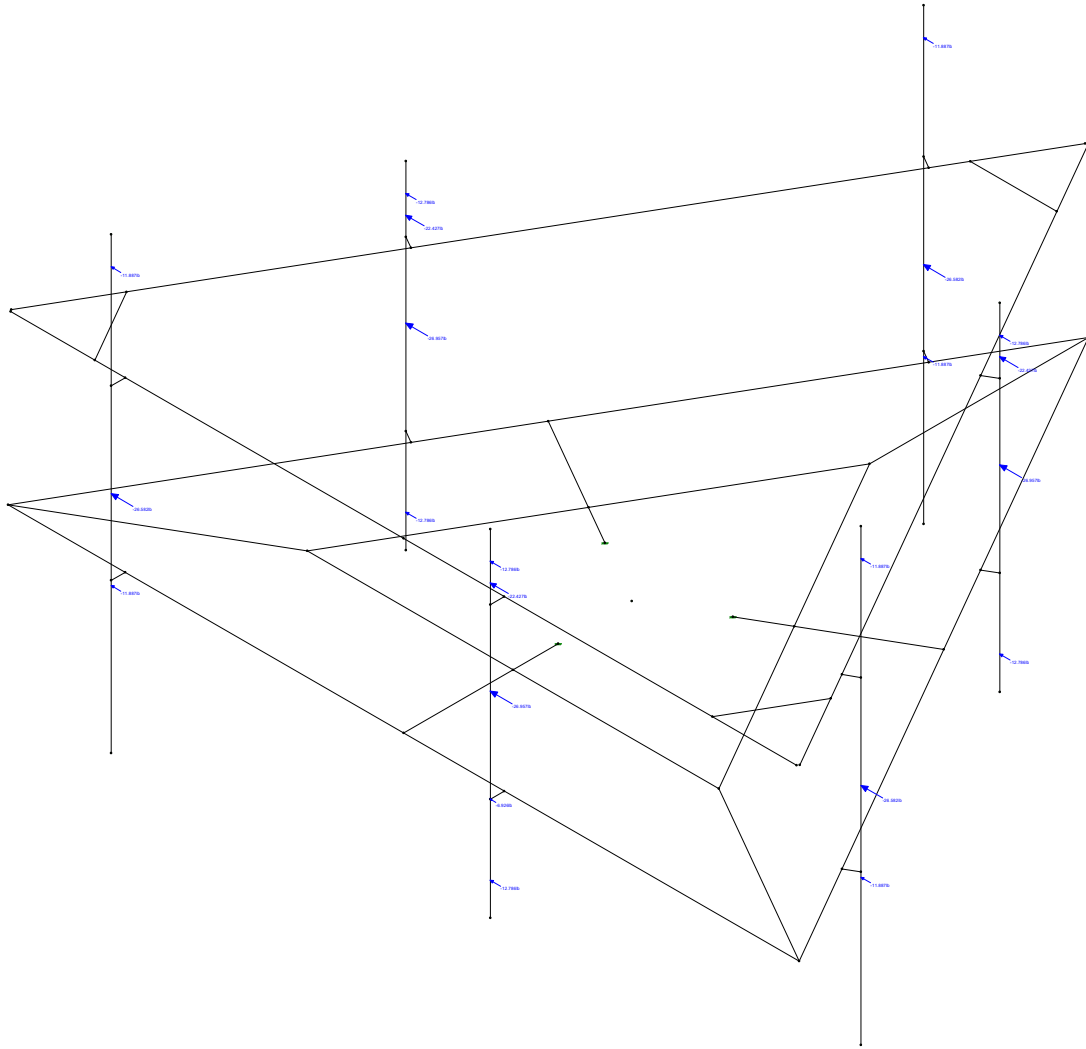


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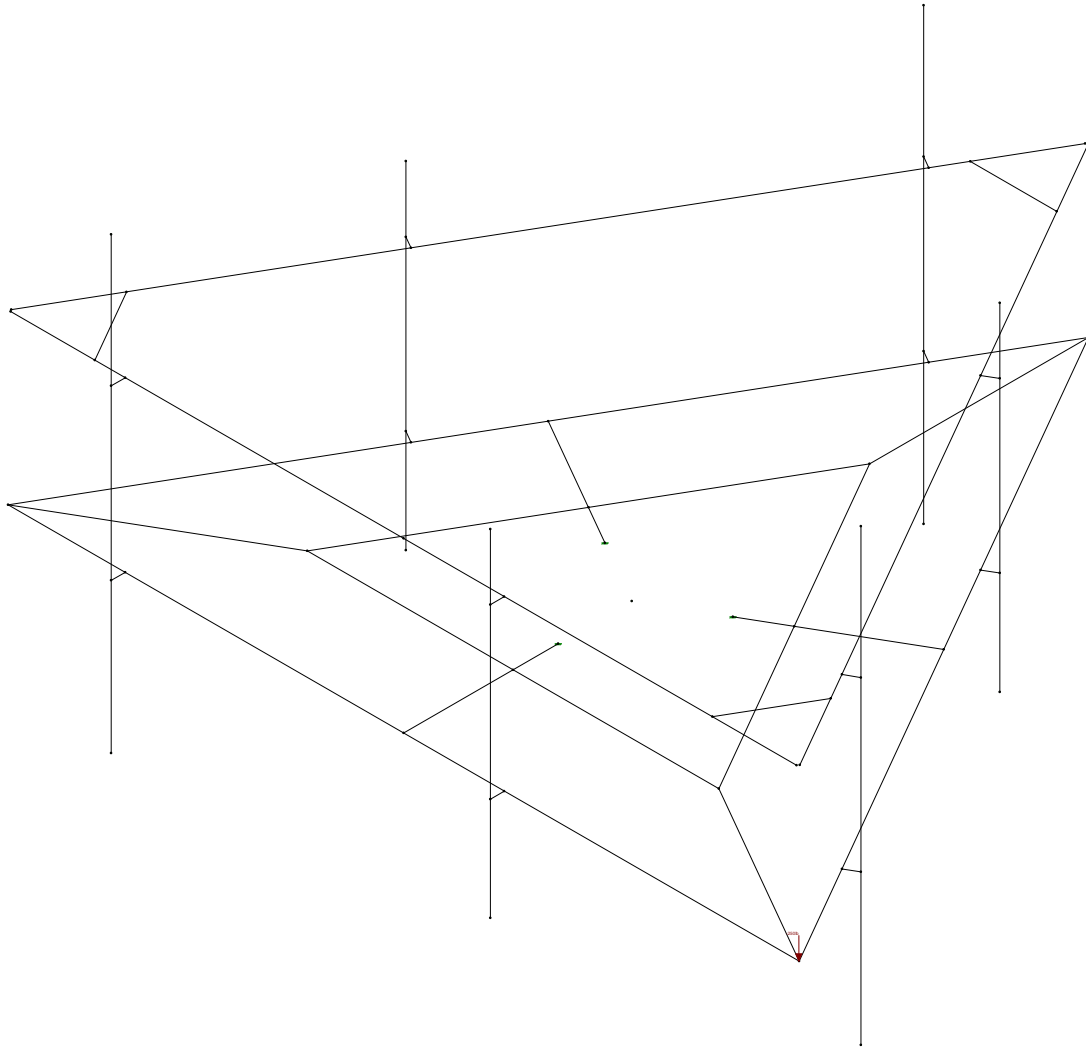
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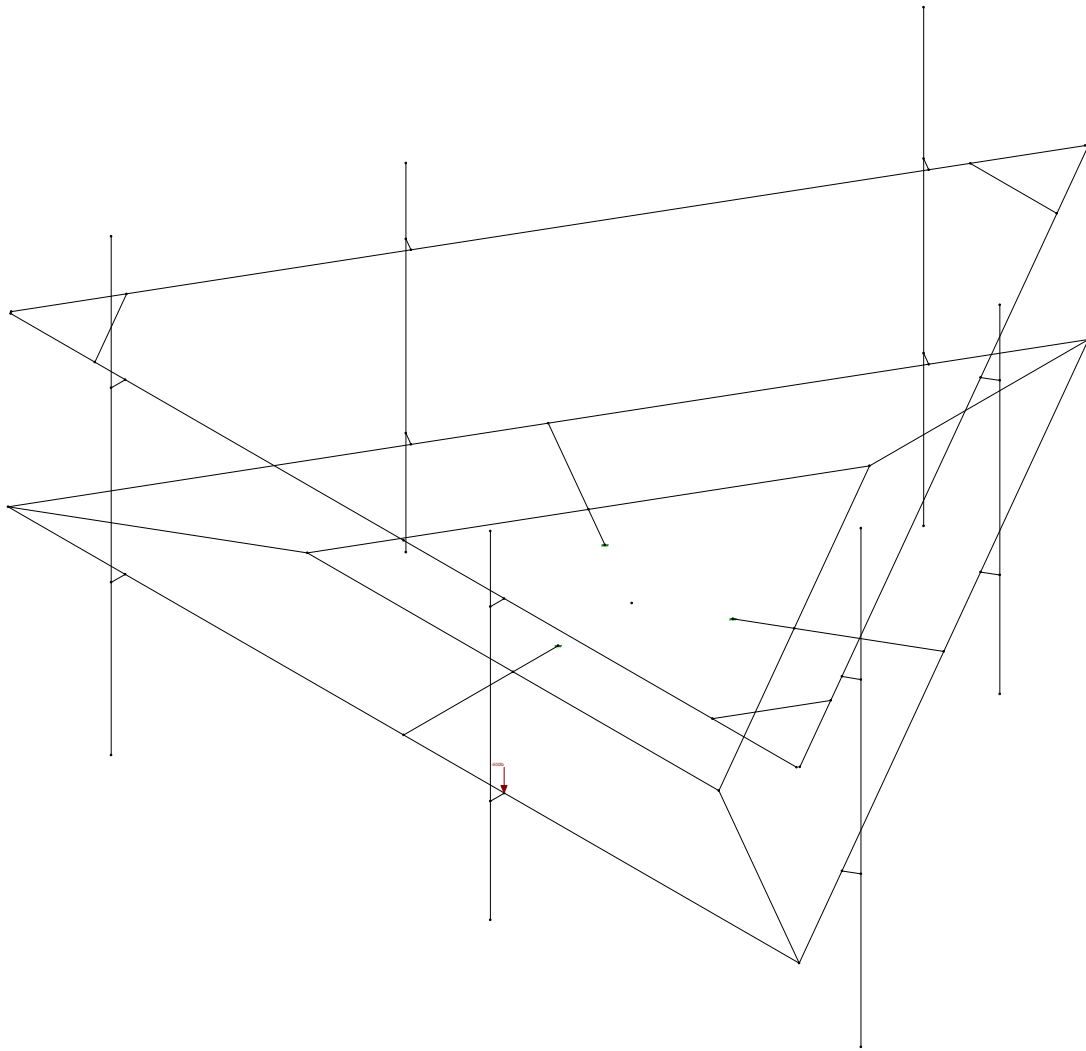
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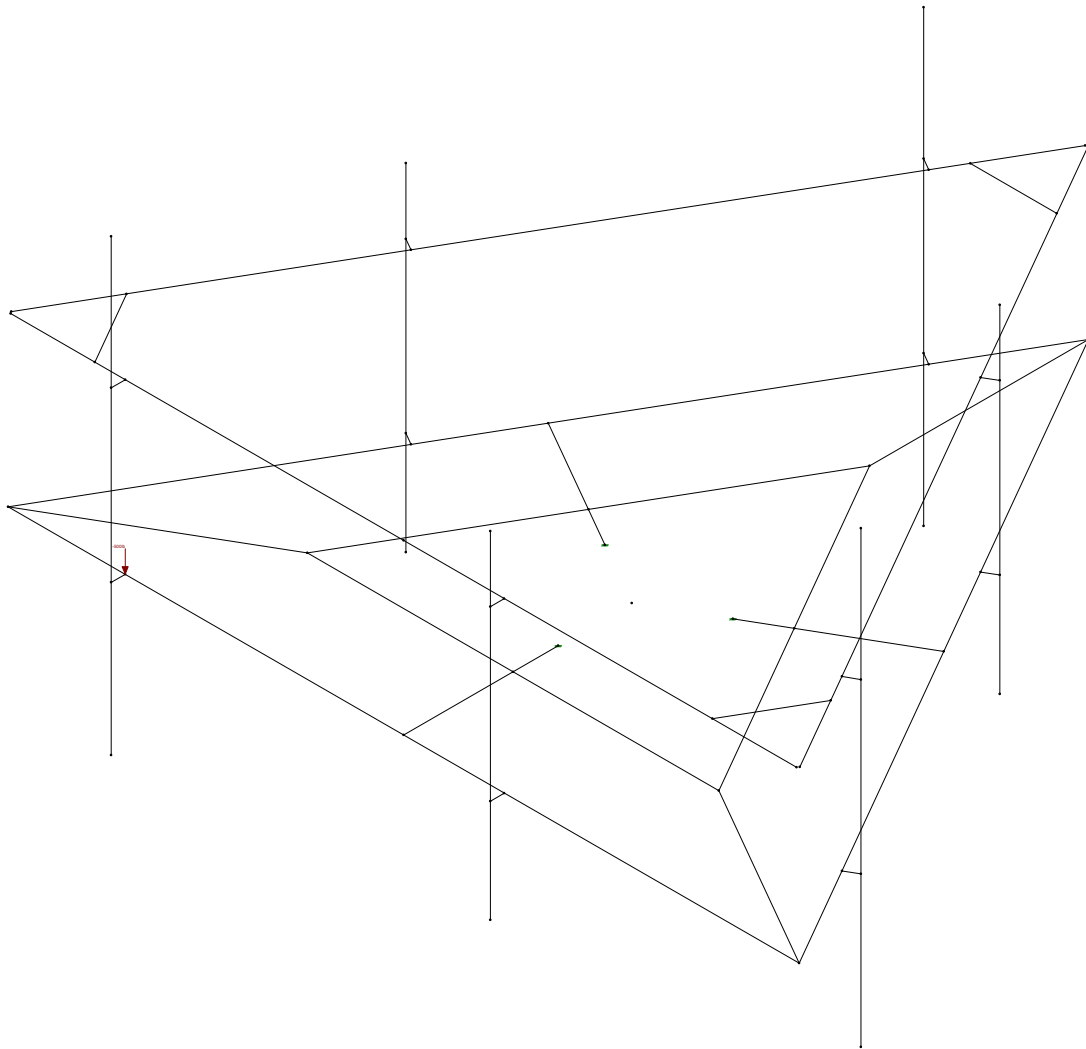
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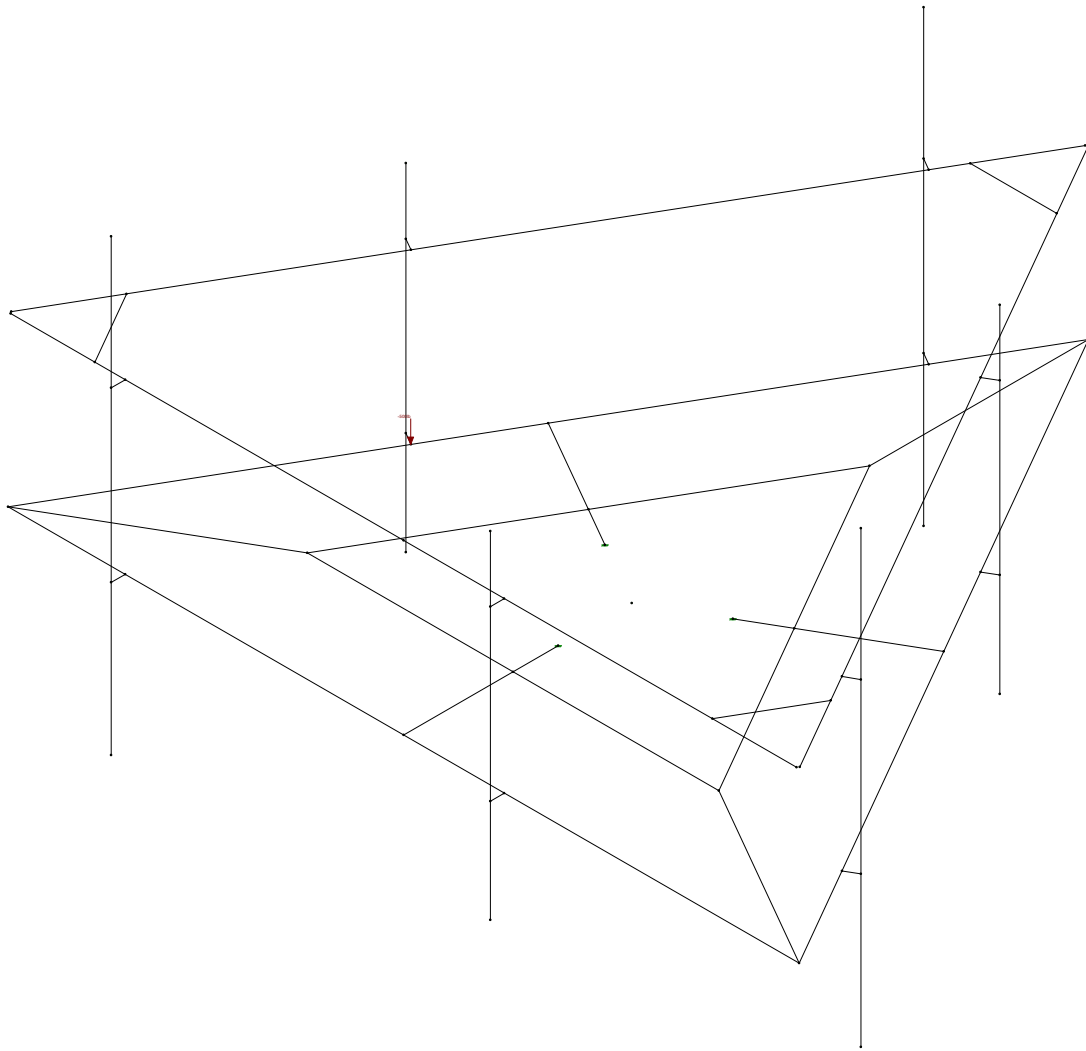
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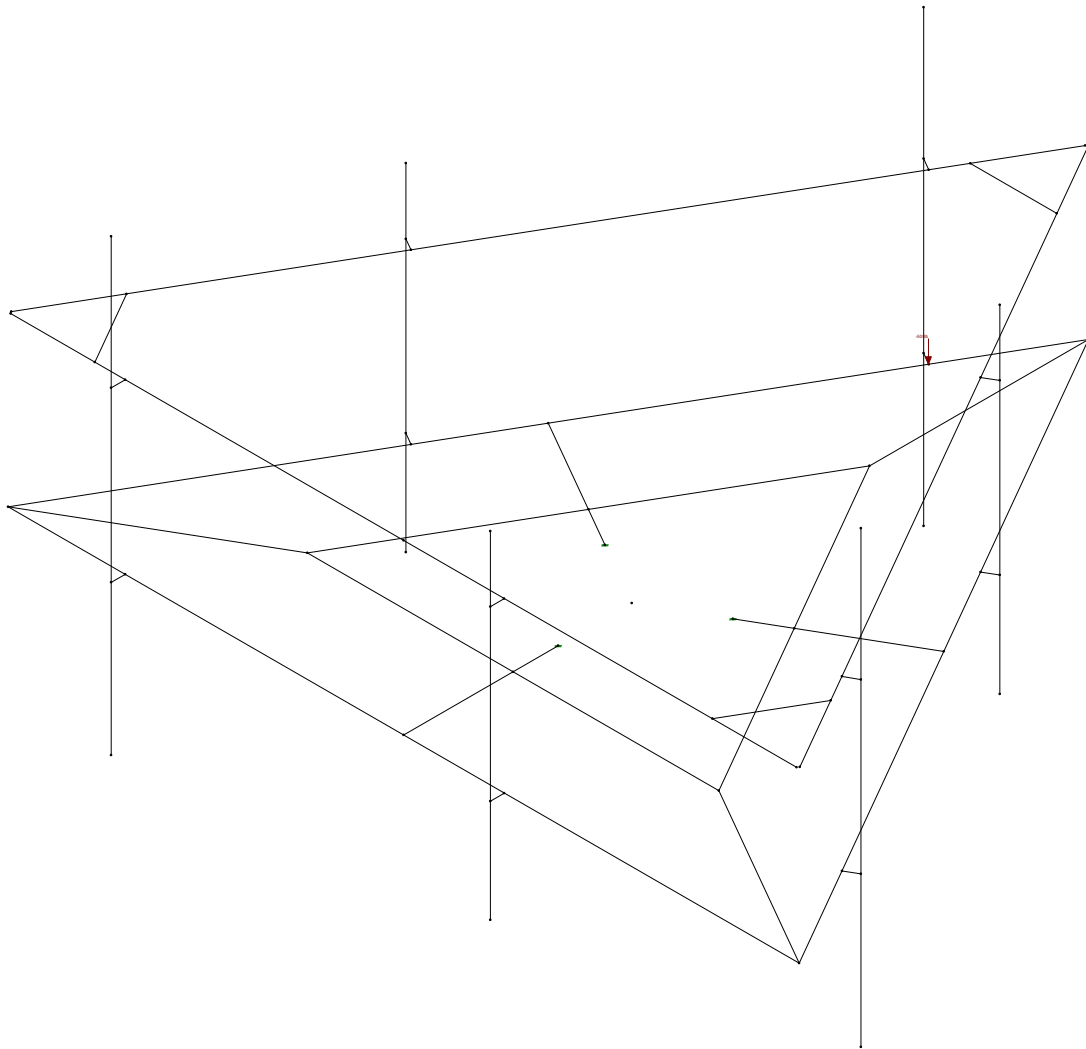
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1039-Z0001-B		842857_loaded_loaded.r3d



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APPENDIX B
SOFTWARE INPUT CALCULATIONS

Program Inputs

PROJECT INFORMATION	
Site Name:	BENNETT POND
Carrier:	AT&T Mobility
Engineer:	Farhad Ahmadyar

SITE INFORMATION	
Risk Category:	II
Exposure Category:	C
Topo Factor Procedure:	Method 1, Category 1
Site Class:	D - Stiff Soil (Assumed)
Ground Elevation:	527.60 ft *Rev H

MOUNT INFORMATION	
Mount Type:	Platform
Num Sectors:	3
Centerline AGL:	106.00 ft
Tower Height AGL:	106.00 ft

TOPOGRAPHIC DATA	
Topo Feature:	N/A
Slope Distance:	N/A ft
Crest Distance:	N/A ft
Crest Height:	N/A ft

FACTORS	
Directionality Fact. (K_d):	0.950
Ground Ele. Factor (K_e):	0.981 *Rev H Only
Rooftop Speed-Up (K_s):	1.000 *Rev H Only
Topographic Factor (K_{zt}):	1.000
Height Esc. Fact. (K_{iz}):	1.124
Gust Effect Factor (G_h):	1.000
Shielding Factor (K_a):	0.900
Velocity Pressure Co. (K_z):	1.281 (Mount Elev)

CODE STANDARDS	
Building Code:	2021 IBC
TIA Standard:	TIA-222-H
ASCE Standard:	ASCE 7-16

WIND AND ICE DATA	
Ultimate Wind (V_{ult}):	115 mph
Design Wind (V):	N/A mph
Ice Wind (V_{ice}):	50 mph
Base Ice Thickness (t_i):	1 in
Radial Ice Thickness (t_{iz}):	1.124 in
Flat Pressure:	80.858 psf
Round Pressure:	48.515 psf
Ice Wind Pressure:	9.171 psf

SEISMIC DATA	
Short-Period Accel. (S_s):	0.234 g
1-Second Accel. (S_1):	0.057 g
Short-Period Design (S_{DS}):	0.250
1-Second Design (S_{D1}):	0.091
Short-Period Coeff. (F_a):	1.600
1-Second Coeff. (F_v):	2.400
Amplification Factor (A_s):	3.000
Response Mod. Coeff. (R):	2.000
Seismic Importance (I_e):	1.000
Seismic Response Co. (C_s):	0.125
Total App. Weight:	372.100 lb
Total Shear Force (V_s):	46.438 lb
Hor. Seismic Load (E_h):	46.438 lb
Vert. Seismic Load (E_v):	18.575 lb *

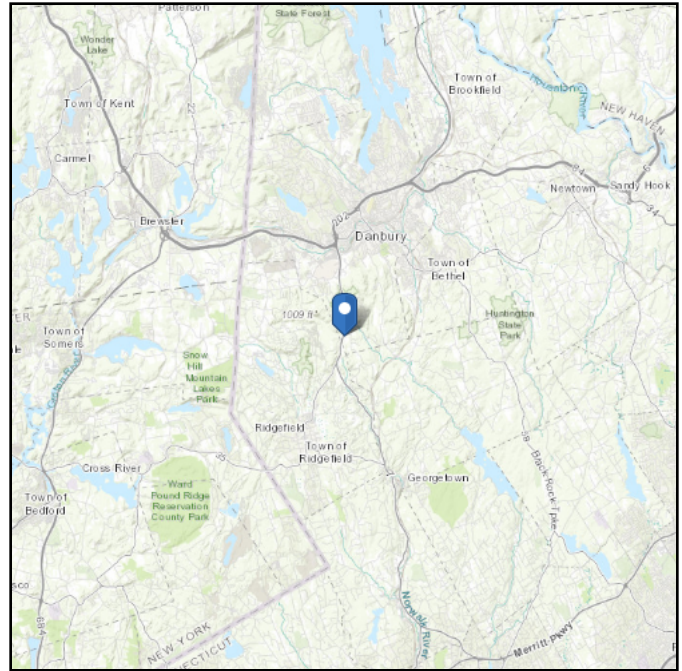
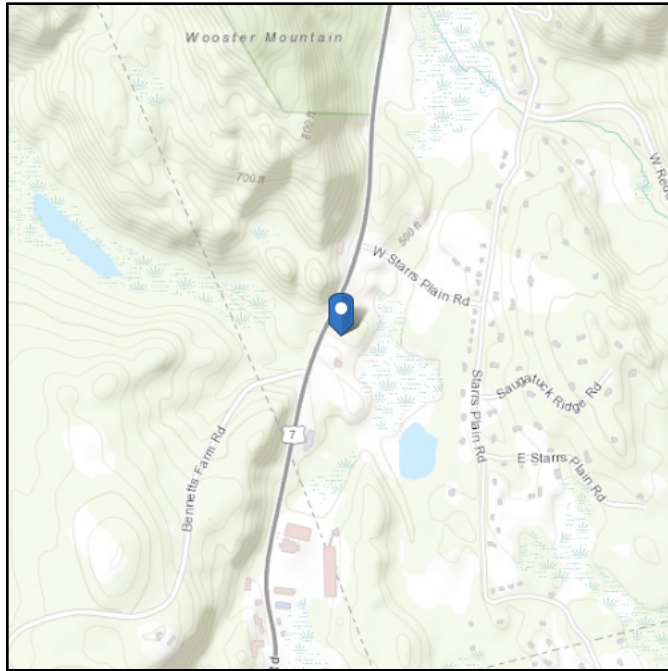
*For reference only. Per TIA rev H section 16.7, E_v is not applicable to mounts

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Elevation: 527.6 ft (NAVD 88)
Latitude: 41.336111
Longitude: -73.470667



Wind

Results:

Wind Speed	115 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	96 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed: Wed Aug 10 2022

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 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

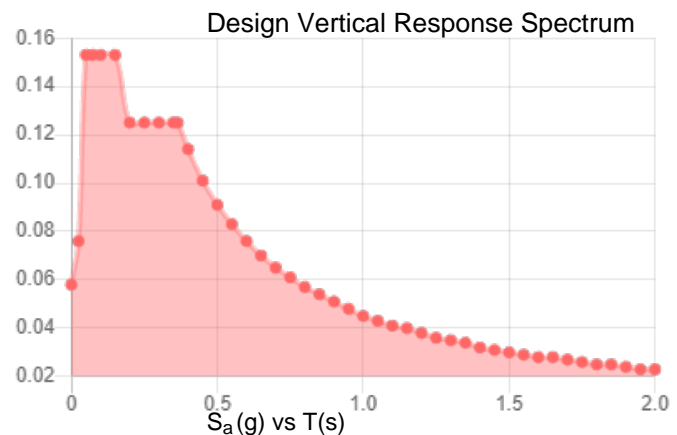
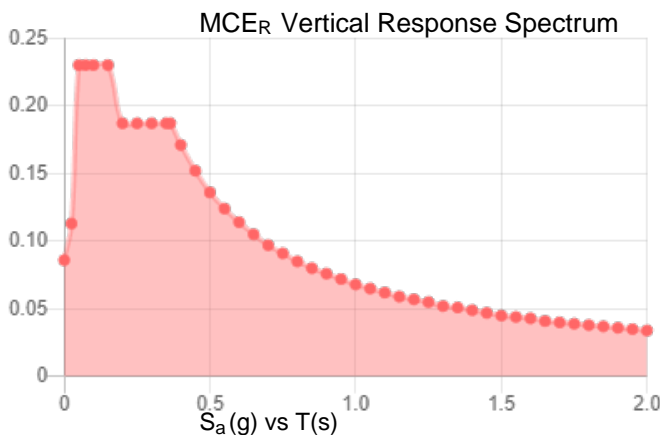
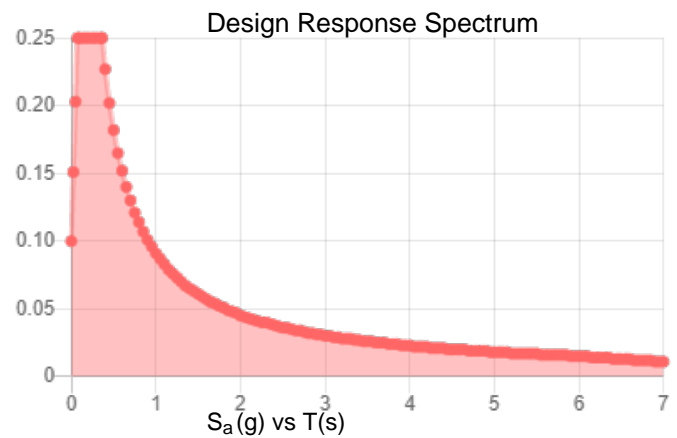
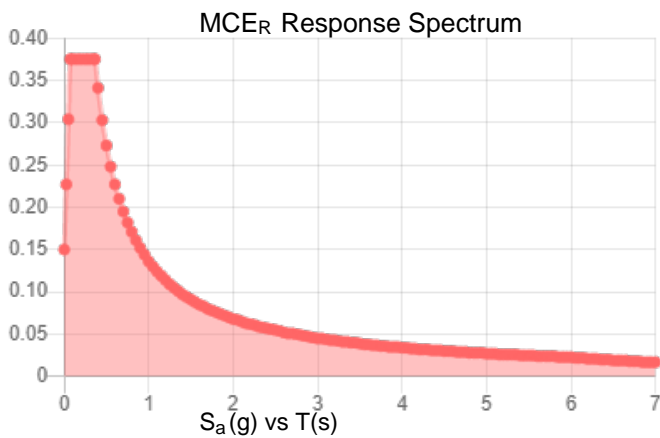
Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_s :	0.234	S_{D1} :	0.091
S_1 :	0.057	T_L :	6
F_a :	1.6	PGA :	0.137
F_v :	2.4	PGA _M :	0.209
S_{MS} :	0.375	F_{PGA} :	1.527
S_{M1} :	0.136	I_e :	1
S_{DS} :	0.25	C_v :	0.768

Seismic Design Category B



Data Accessed: Wed Aug 10 2022

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness: 1.00 in.
Concurrent Temperature: 15 F
Gust Speed 50 mph

Data Source: Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

Date Accessed: Wed Aug 10 2022

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

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

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APPENDIX C
SOFTWARE ANALYSIS OUTPUT

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	HOR1	N13	N20	270	Face Horizontal	Beam	Single Angle	A36 Gr.36	Typical
2	HOR2	N13	N6		Face Horizontal	Beam	Single Angle	A36 Gr.36	Typical
3	HOR3	N20	N6	270	Face Horizontal	Beam	Single Angle	A36 Gr.36	Typical
4	G4	N3	N1		Grating Angle	Beam	Single Angle	A36 Gr.36	Typical
5	G5	N3	N2	270	Grating Angle	Beam	Single Angle	A36 Gr.36	Typical
6	G6	N1	N2		Grating Angle	Beam	Single Angle	A36 Gr.36	Typical
7	G3	N20	N1	180	Corner Angle	Beam	Double Angle (No Gap)	A36 Gr.36	Typical
8	G2	N6	N2	180	Corner Angle	Beam	Double Angle (No Gap)	A36 Gr.36	Typical
9	G1	N13	N3	180	Corner Angle	Beam	Double Angle (No Gap)	A36 Gr.36	Typical
10	M55	N5	N4	90	Standoff (LARGE)	Beam	Channel	A36 Gr.36	Typical
11	M61	N24	N23	90	Standoff (LARGE)	Beam	Channel	A36 Gr.36	Typical
12	M62	N26	N25	90	Standoff (LARGE)	Beam	Channel	A36 Gr.36	Typical
13	M15	N19	N21		RIGID	None	None	RIGID	Typical
14	MP1	N27	N22		2.0 STD Mount Pipe	Column	Pipe	A53 Gr.B	Typical
15	M19	N33	N34		RIGID	None	None	RIGID	Typical
16	MP2	N36	N35		2.0 STD Mount Pipe	Column	Pipe	A53 Gr.B	Typical
17	M18	N29	N30		RIGID	None	None	RIGID	Typical
18	MP6	N37	N31		2.0 STD Mount Pipe	Column	Pipe	A53 Gr.B	Typical
19	MP5	N38	N39		2.0 STD Mount Pipe	Column	Pipe	A53 Gr.B	Typical
20	M23	N28	N40		RIGID	None	None	RIGID	Typical
21	M24	N42	N43		RIGID	None	None	RIGID	Typical
22	MP4	N45	N44		2.0 STD Mount Pipe	Column	Pipe	A53 Gr.B	Typical
23	MP3	N46	N47		2.0 STD Mount Pipe	Column	Pipe	A53 Gr.B	Typical
24	M27	N41	N48		RIGID	None	None	RIGID	Typical
25	M25	N53	N54		Handrail	Beam	Pipe	A53 Gr.B	Typical
26	M26	N57	N56		RIGID	None	None	RIGID	Typical
27	M28	N58	N55		RIGID	None	None	RIGID	Typical
28	M29	N63	N61		RIGID	None	None	RIGID	Typical
29	M30	N64	N62		Handrail	Beam	Pipe	A53 Gr.B	Typical
30	M31	N66	N65		RIGID	None	None	RIGID	Typical
31	M32	N71	N69		RIGID	None	None	RIGID	Typical
32	M33	N72	N70		Handrail	Beam	Pipe	A53 Gr.B	Typical
33	M34	N74	N73		RIGID	None	None	RIGID	Typical
34	M35	N59	N68	180	Handrail Corner Angle	Beam	Single Angle	A36 Gr.36	Typical
35	M36	N67	N76	180	Handrail Corner Angle	Beam	Single Angle	A36 Gr.36	Typical
36	M37	N75	N60	180	Handrail Corner Angle	Beam	Single Angle	A36 Gr.36	Typical

Hot Rolled Steel Properties

	Label	E [psi]	G [psi]	Nu	Therm. Coeff. [1e ⁶ F ⁻¹]	Density [k/ft ³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	2.9e+7	1.115e+7	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	2.9e+7	1.115e+7	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	2.9e+7	1.115e+7	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	2.9e+7	1.115e+7	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B RECT	2.9e+7	1.115e+7	0.3	0.65	0.527	46	1.4	58	1.3
6	A500 Gr.C RND	2.9e+7	1.115e+7	0.3	0.65	0.527	46	1.4	62	1.3
7	A500 Gr.C RECT	2.9e+7	1.115e+7	0.3	0.65	0.527	50	1.4	62	1.3
8	A53 Gr.B	2.9e+7	1.115e+7	0.3	0.65	0.49	35	1.6	60	1.2
9	A1085	2.9e+7	1.115e+7	0.3	0.65	0.49	50	1.4	65	1.3
10	A913 Gr.65	2.9e+7	1.115e+7	0.3	0.65	0.49	65	1.1	80	1.1

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in ²]	I _{yy} [in ⁴]	I _{zz} [in ⁴]	J [in ⁴]
1	Face Horizontal	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	0.031
2	Grating Angle	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	0.031
3	Standoff (LARGE)	C5.25X4	Beam	Channel	A36 Gr.36	Typical	4.688	7.568	20.707	0.207
4	Standoff (SMALL)	HSS4X4X4	Beam	Tube	A500 Gr.B RECT	Typical	3.37	7.8	7.8	12.8
5	2.0 STD Mount Pipe	PIPE 2.0	Column	Pipe	A53 Gr.B	Typical	1.02	0.627	0.627	1.25
6	2.5 STD Mount Pipe	PIPE 2.5	Column	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
7	Corner Plate	6X0.375	VBrace	RECT	A36 Gr.36	Typical	2.25	0.026	6.75	0.101
8	Corner Angle	LL3X3X4X0	Beam	Double Angle (No Gap)	A36 Gr.36	Typical	2.88	4.5	2.46	0.063
9	Top Support Pipe	PIPE 2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	0.627	0.627	1.25
10	Handrail	PIPE 2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
11	Handrail Corner Angle	L2.5X2.5X3	Beam	Single Angle	A36 Gr.36	Typical	0.901	0.535	0.535	0.011
12	Kicker	LL2.5X2.5X3X0	Beam	Double Angle (No Gap)	A36 Gr.36	Typical	1.8	1.91	1.07	0.023

Node Coordinates

	Label	X [in]	Y [in]	Z [in]	Detach From Diaphragm
1	N1	44.00005	-13	-23.382538	
2	N2	0.00005	-13	-99.592774	
3	N3	-43.99995	-13	-23.382538	
4	N4	0.00005	-13	-32.999838	
5	N5	0.00005	-13	0.000148	
6	N6	0.00005	-13	-146.358146	
7	N13	-84.49995	-13	0.000148	
8	N20	84.50005	-13	0.000147	
9	N23	13.671224	-13	-56.679006	
10	N24	42.25005	-13	-73.178999	
11	N25	-13.671124	-13	-56.679006	
12	N26	-42.24995	-13	-73.178999	
13	CP	0.00005	-13	-48.78595	
14	N19	21.50005	-13	0.000148	
15	N21	21.50005	-13	3.000147	
16	N22	21.50005	-35	3.000147	
17	N27	21.50005	37	3.000147	
18	N33	-59.49995	-13	0.000148	
19	N34	-59.49995	-13	3.000147	
20	N35	-59.49995	-45	3.000147	
21	N36	-59.49995	51	3.000147	
22	N28	31.50005	-13	-91.798545	
23	N29	72.00005	-13	-21.650487	
24	N30	74.598126	-13	-23.150487	
25	N31	74.598126	-45	-23.150487	
26	N37	74.598126	51	-23.150487	
27	N38	34.098126	37	-93.298545	
28	N39	34.098126	-35	-93.298545	
29	N40	34.098126	-13	-93.298545	
30	N41	-52.99995	-13	-54.559453	
31	N42	-12.49995	-13	-124.707511	
32	N43	-15.098026	-13	-126.20751	
33	N44	-15.098026	-45	-126.20751	
34	N45	-15.098026	51	-126.20751	
35	N46	-55.598026	37	-56.059453	
36	N47	-55.598026	-35	-56.059453	
37	N48	-55.598026	-13	-56.059453	
38	N49	0.00005	-13	-23.382538	
39	N50	-21.99995	-13	-61.487656	

Node Coordinates (Continued)

	Label	X [in]	Y [in]	Z [in]	Detach From Diaphragm
40	N51	22.00005	-13	-61.487656	
41	N52	0.00005	23	0.000148	
42	N53	84.00005	23	0.000148	
43	N54	-83.99995	23	0.000148	
44	N55	-59.49995	23	3.000147	
45	N56	21.50005	23	3.000147	
46	N57	21.50005	23	0.000148	
47	N58	-59.49995	23	0.000148	
48	N59	66.00005	23	0.000148	
49	N60	-65.99995	23	0.000148	
50	N61	34.098126	23	-93.298545	
51	N62	84.25005	23	-0.432865	
52	N63	31.50005	23	-91.798545	
53	N64	0.25005	23	-145.925133	
54	N65	74.598126	23	-23.150487	
55	N66	72.00005	23	-21.650487	
56	N67	9.25005	23	-130.336675	
57	N68	75.25005	23	-16.021322	
58	N69	-55.598026	23	-56.059453	
59	N70	-0.24995	23	-145.925133	
60	N71	-52.99995	23	-54.559453	
61	N72	-84.24995	23	-0.432865	
62	N73	-15.098026	23	-126.20751	
63	N74	-12.49995	23	-124.707511	
64	N75	-75.24995	23	-16.021322	
65	N76	-9.24995	23	-130.336676	

Hot Rolled Steel Design Parameters

	Label	Shape	Length [in]	Lb y-y [in]	Lb z-z [in]	Lcomp top [in]	Lcomp bot [in]	L-Torque [in]	Channel Conn.	a [in]	Function
1	HOR1	Face Horizontal	169	Segment	Segment	Segment	Segment	Segment	N/A	N/A	Lateral
2	HOR2	Face Horizontal	169	Segment	Segment	Segment	Segment	Segment	N/A	N/A	Lateral
3	HOR3	Face Horizontal	169	Segment	Segment	Segment	Segment	Segment	N/A	N/A	Lateral
4	G4	Grating Angle	88			Lbyy			N/A	N/A	Lateral
5	G5	Grating Angle	88			Lbyy			N/A	N/A	Lateral
6	G6	Grating Angle	88			Lbyy			N/A	N/A	Lateral
7	G3	Corner Angle	46.765			Lbyy			N/A	N/A	Lateral
8	G2	Corner Angle	46.765			Lbyy			N/A	N/A	Lateral
9	G1	Corner Angle	46.765			Lbyy			N/A	N/A	Lateral
10	M55	Standoff (LARGE)	33			Lbyy			N/A	N/A	Lateral
11	M61	Standoff (LARGE)	33			Lbyy			N/A	N/A	Lateral
12	M62	Standoff (LARGE)	33			Lbyy			N/A	N/A	Lateral
13	MP1	2.0 STD Mount Pipe	72						N/A	N/A	Lateral
14	MP2	2.0 STD Mount Pipe	96						N/A	N/A	Lateral
15	MP6	2.0 STD Mount Pipe	96						N/A	N/A	Lateral
16	MP5	2.0 STD Mount Pipe	72						N/A	N/A	Lateral
17	MP4	2.0 STD Mount Pipe	96						N/A	N/A	Lateral
18	MP3	2.0 STD Mount Pipe	72						N/A	N/A	Lateral
19	M25	Handrail	168			Lbyy			N/A	N/A	Lateral
20	M30	Handrail	168			Lbyy			N/A	N/A	Lateral
21	M33	Handrail	168			Lbyy			N/A	N/A	Lateral
22	M35	Handrail Corner Angle	18.5			Lbyy			N/A	N/A	Lateral
23	M36	Handrail Corner Angle	18.5			Lbyy			N/A	N/A	Lateral
24	M37	Handrail Corner Angle	18.5			Lbyy			N/A	N/A	Lateral

Material Take-Off

	Material	Size	Pieces	Length[in]	Weight[K]
1	General Members				
2	RIGID		12	36	0
3	Total General		12	36	0
4					
5	Hot Rolled Steel				
6	A36 Gr.36	C5.25X4	3	99	0.132
7	A36 Gr.36	L2.5X2.5X3	3	55.5	0.014
8	A36 Gr.36	L3X3X4	6	771	0.315
9	A36 Gr.36	LL3X3X4X0	3	140.3	0.115
10	A53 Gr.B	PIPE 2.0	6	504	0.146
11	A53 Gr.B	PIPE 2.5	3	504	0.23
12	Total HR Steel		24	2073.8	0.951

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Point	Distributed	Area(Member)
1	Self Weight	DL		-1			22		3
2	Wind Load AZI 0	WLZ					44		
3	Wind Load AZI 30	None					44		
4	Wind Load AZI 60	None					44		
5	Wind Load AZI 90	WLX					44		
6	Wind Load AZI 120	None					44		
7	Wind Load AZI 150	None					44		
8	Wind Load AZI 180	None					44		
9	Wind Load AZI 210	None					44		
10	Wind Load AZI 240	None					44		
11	Wind Load AZI 270	None					44		
12	Wind Load AZI 300	None					44		
13	Wind Load AZI 330	None					44		
14	Distr. Wind Load Z	WLZ						36	
15	Distr. Wind Load X	WLX						36	
16	Ice Weight	OL1					22	36	3
17	Ice Wind Load AZI 0	OL2					44		
18	Ice Wind Load AZI 30	None					44		
19	Ice Wind Load AZI 60	None					44		
20	Ice Wind Load AZI 90	OL3					44		
21	Ice Wind Load AZI 120	None					44		
22	Ice Wind Load AZI 150	None					44		
23	Ice Wind Load AZI 180	None					44		
24	Ice Wind Load AZI 210	None					44		
25	Ice Wind Load AZI 240	None					44		
26	Ice Wind Load AZI 270	None					44		
27	Ice Wind Load AZI 300	None					44		
28	Ice Wind Load AZI 330	None					44		
29	Distr. Ice Wind Load Z	OL2						36	
30	Distr. Ice Wind Load X	OL3						36	
31	Seismic Load Z	ELZ			-0.374		22		
32	Seismic Load X	ELX	-0.374				22		
33	Service Live Loads	LL				1			
34	Maintenance Load Lm1	LL				1			
35	Maintenance Load Lm2	LL				1			
36	Maintenance Load Lm3	LL				1			
37	Maintenance Load Lm4	LL				1			
38	Maintenance Load Lm5	LL				1			
39	Maintenance Load Lm6	LL				1			



Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Point	Distributed	Area(Member)
40	BLC 1 Transient Area Loads	None						99	
41	BLC 16 Transient Area Loads	None						99	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.4DL	Yes	Y	1	1.4								
2	1.2DL + 1WL AZI 0	Yes	Y	1	1.2	2	1	14	1	15			
3	1.2DL + 1WL AZI 30	Yes	Y	1	1.2	3	1	14	0.866	15	0.5		
4	1.2DL + 1WL AZI 60	Yes	Y	1	1.2	4	1	14	0.5	15	0.866		
5	1.2DL + 1WL AZI 90	Yes	Y	1	1.2	5	1	14		15	1		
6	1.2DL + 1WL AZI 120	Yes	Y	1	1.2	6	1	14	-0.5	15	0.866		
7	1.2DL + 1WL AZI 150	Yes	Y	1	1.2	7	1	14	-0.866	15	0.5		
8	1.2DL + 1WL AZI 180	Yes	Y	1	1.2	8	1	14	-1	15			
9	1.2DL + 1WL AZI 210	Yes	Y	1	1.2	9	1	14	-0.866	15	-0.5		
10	1.2DL + 1WL AZI 240	Yes	Y	1	1.2	10	1	14	-0.5	15	-0.866		
11	1.2DL + 1WL AZI 270	Yes	Y	1	1.2	11	1	14		15	-1		
12	1.2DL + 1WL AZI 300	Yes	Y	1	1.2	12	1	14	0.5	15	-0.866		
13	1.2DL + 1WL AZI 330	Yes	Y	1	1.2	13	1	14	0.866	15	-0.5		
14	0.9DL + 1WL AZI 0	Yes	Y	1	0.9	2	1	14	1	15			
15	0.9DL + 1WL AZI 30	Yes	Y	1	0.9	3	1	14	0.866	15	0.5		
16	0.9DL + 1WL AZI 60	Yes	Y	1	0.9	4	1	14	0.5	15	0.866		
17	0.9DL + 1WL AZI 90	Yes	Y	1	0.9	5	1	14		15	1		
18	0.9DL + 1WL AZI 120	Yes	Y	1	0.9	6	1	14	-0.5	15	0.866		
19	0.9DL + 1WL AZI 150	Yes	Y	1	0.9	7	1	14	-0.866	15	0.5		
20	0.9DL + 1WL AZI 180	Yes	Y	1	0.9	8	1	14	-1	15			
21	0.9DL + 1WL AZI 210	Yes	Y	1	0.9	9	1	14	-0.866	15	-0.5		
22	0.9DL + 1WL AZI 240	Yes	Y	1	0.9	10	1	14	-0.5	15	-0.866		
23	0.9DL + 1WL AZI 270	Yes	Y	1	0.9	11	1	14		15	-1		
24	0.9DL + 1WL AZI 300	Yes	Y	1	0.9	12	1	14	0.5	15	-0.866		
25	0.9DL + 1WL AZI 330	Yes	Y	1	0.9	13	1	14	0.866	15	-0.5		
26	1.2D + 1.0Di	Yes	Y	1	1.2	16	1						
27	1.2D + 1.0Di + 1.0Wi AZI 0	Yes	Y	1	1.2	16	1	17	1	29	1	30	
28	1.2D + 1.0Di + 1.0Wi AZI 30	Yes	Y	1	1.2	16	1	18	1	29	0.866	30	0.5
29	1.2D + 1.0Di + 1.0Wi AZI 60	Yes	Y	1	1.2	16	1	19	1	29	0.5	30	0.866
30	1.2D + 1.0Di + 1.0Wi AZI 90	Yes	Y	1	1.2	16	1	20	1	29		30	1
31	1.2D + 1.0Di + 1.0Wi AZI 120	Yes	Y	1	1.2	16	1	21	1	29	-0.5	30	0.866
32	1.2D + 1.0Di + 1.0Wi AZI 150	Yes	Y	1	1.2	16	1	22	1	29	-0.866	30	0.5
33	1.2D + 1.0Di + 1.0Wi AZI 180	Yes	Y	1	1.2	16	1	23	1	29	-1	30	
34	1.2D + 1.0Di + 1.0Wi AZI 210	Yes	Y	1	1.2	16	1	24	1	29	-0.866	30	-0.5
35	1.2D + 1.0Di + 1.0Wi AZI 240	Yes	Y	1	1.2	16	1	25	1	29	-0.5	30	-0.866
36	1.2D + 1.0Di + 1.0Wi AZI 270	Yes	Y	1	1.2	16	1	26	1	29		30	-1
37	1.2D + 1.0Di + 1.0Wi AZI 300	Yes	Y	1	1.2	16	1	27	1	29	0.5	30	-0.866
38	1.2D + 1.0Di + 1.0Wi AZI 330	Yes	Y	1	1.2	16	1	28	1	29	0.866	30	-0.5
39	(1.2 + 0.2Sds)DL + 1.0E AZI 0	Yes	Y	1	1.25	31	1	32					
40	(1.2 + 0.2Sds)DL + 1.0E AZI 30	Yes	Y	1	1.25	31	0.866	32	0.5				
41	(1.2 + 0.2Sds)DL + 1.0E AZI 60	Yes	Y	1	1.25	31	0.5	32	0.866				
42	(1.2 + 0.2Sds)DL + 1.0E AZI 90	Yes	Y	1	1.25	31		32	1				
43	(1.2 + 0.2Sds)DL + 1.0E AZI 120	Yes	Y	1	1.25	31	-0.5	32	0.866				
44	(1.2 + 0.2Sds)DL + 1.0E AZI 150	Yes	Y	1	1.25	31	-0.866	32	0.5				
45	(1.2 + 0.2Sds)DL + 1.0E AZI 180	Yes	Y	1	1.25	31	-1	32					
46	(1.2 + 0.2Sds)DL + 1.0E AZI 210	Yes	Y	1	1.25	31	-0.866	32	-0.5				
47	(1.2 + 0.2Sds)DL + 1.0E AZI 240	Yes	Y	1	1.25	31	-0.5	32	-0.866				
48	(1.2 + 0.2Sds)DL + 1.0E AZI 270	Yes	Y	1	1.25	31		32	-1				
49	(1.2 + 0.2Sds)DL + 1.0E AZI 300	Yes	Y	1	1.25	31	0.5	32	-0.866				
50	(1.2 + 0.2Sds)DL + 1.0E AZI 330	Yes	Y	1	1.25	31	0.866	32	-0.5				

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
51	(0.9 - 0.2Sds)DL + 1.0E AZI 0	Yes	Y	1	0.85	31	1	32					
52	(0.9 - 0.2Sds)DL + 1.0E AZI 30	Yes	Y	1	0.85	31	0.866	32	0.5				
53	(0.9 - 0.2Sds)DL + 1.0E AZI 60	Yes	Y	1	0.85	31	0.5	32	0.866				
54	(0.9 - 0.2Sds)DL + 1.0E AZI 90	Yes	Y	1	0.85	31		32	1				
55	(0.9 - 0.2Sds)DL + 1.0E AZI 120	Yes	Y	1	0.85	31	-0.5	32	0.866				
56	(0.9 - 0.2Sds)DL + 1.0E AZI 150	Yes	Y	1	0.85	31	-0.866	32	0.5				
57	(0.9 - 0.2Sds)DL + 1.0E AZI 180	Yes	Y	1	0.85	31	-1	32					
58	(0.9 - 0.2Sds)DL + 1.0E AZI 210	Yes	Y	1	0.85	31	-0.866	32	-0.5				
59	(0.9 - 0.2Sds)DL + 1.0E AZI 240	Yes	Y	1	0.85	31	-0.5	32	-0.866				
60	(0.9 - 0.2Sds)DL + 1.0E AZI 270	Yes	Y	1	0.85	31		32	-1				
61	(0.9 - 0.2Sds)DL + 1.0E AZI 300	Yes	Y	1	0.85	31	0.5	32	-0.866				
62	(0.9 - 0.2Sds)DL + 1.0E AZI 330	Yes	Y	1	0.85	31	0.866	32	-0.5				
63	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 0	Yes	Y	1	1	2	0.272	14	0.272	15		33	1.5
64	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 30	Yes	Y	1	1	3	0.272	14	0.236	15	0.136	33	1.5
65	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 60	Yes	Y	1	1	4	0.272	14	0.136	15	0.236	33	1.5
66	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 90	Yes	Y	1	1	5	0.272	14		15	0.272	33	1.5
67	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 120	Yes	Y	1	1	6	0.272	14	-0.136	15	0.236	33	1.5
68	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 150	Yes	Y	1	1	7	0.272	14	-0.236	15	0.136	33	1.5
69	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 180	Yes	Y	1	1	8	0.272	14	-0.272	15		33	1.5
70	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 210	Yes	Y	1	1	9	0.272	14	-0.236	15	-0.136	33	1.5
71	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 240	Yes	Y	1	1	10	0.272	14	-0.136	15	-0.236	33	1.5
72	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 270	Yes	Y	1	1	11	0.272	14		15	-0.272	33	1.5
73	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 300	Yes	Y	1	1	12	0.272	14	0.136	15	-0.236	33	1.5
74	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 330	Yes	Y	1	1	13	0.272	14	0.236	15	-0.136	33	1.5
75	1.2DL + 1.5LL	Yes	Y	1	1.2	33	1.5						
76	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	34	1.5	2	0.068	14	0.068	15	
77	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	34	1.5	3	0.068	14	0.059	15	0.034
78	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	34	1.5	4	0.068	14	0.034	15	0.059
79	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	34	1.5	5	0.068	14		15	0.068
80	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	34	1.5	6	0.068	14	-0.034	15	0.059
81	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	34	1.5	7	0.068	14	-0.059	15	0.034
82	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	34	1.5	8	0.068	14	-0.068	15	
83	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	34	1.5	9	0.068	14	-0.059	15	-0.034
84	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	34	1.5	10	0.068	14	-0.034	15	-0.059
85	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	34	1.5	11	0.068	14		15	-0.068
86	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	34	1.5	12	0.068	14	0.034	15	-0.059
87	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	34	1.5	13	0.068	14	0.059	15	-0.034
88	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	35	1.5	2	0.068	14	0.068	15	
89	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	35	1.5	3	0.068	14	0.059	15	0.034
90	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	35	1.5	4	0.068	14	0.034	15	0.059
91	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	35	1.5	5	0.068	14		15	0.068
92	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	35	1.5	6	0.068	14	-0.034	15	0.059
93	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	35	1.5	7	0.068	14	-0.059	15	0.034
94	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	35	1.5	8	0.068	14	-0.068	15	
95	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	35	1.5	9	0.068	14	-0.059	15	-0.034
96	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	35	1.5	10	0.068	14	-0.034	15	-0.059
97	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	35	1.5	11	0.068	14		15	-0.068
98	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	35	1.5	12	0.068	14	0.034	15	-0.059
99	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	35	1.5	13	0.068	14	0.059	15	-0.034
100	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	36	1.5	2	0.068	14	0.068	15	
101	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	36	1.5	3	0.068	14	0.059	15	0.034
102	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	36	1.5	4	0.068	14	0.034	15	0.059
103	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	36	1.5	5	0.068	14		15	0.068
104	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	36	1.5	6	0.068	14	-0.034	15	0.059
105	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	36	1.5	7	0.068	14	-0.059	15	0.034

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
106	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	36	1.5	8	0.068	14	-0.068	15	
107	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	36	1.5	9	0.068	14	-0.059	15	-0.034
108	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	36	1.5	10	0.068	14	-0.034	15	-0.059
109	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	36	1.5	11	0.068	14		15	-0.068
110	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	36	1.5	12	0.068	14	0.034	15	-0.059
111	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	36	1.5	13	0.068	14	0.059	15	-0.034
112	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	37	1.5	2	0.068	14	0.068	15	
113	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	37	1.5	3	0.068	14	0.059	15	0.034
114	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	37	1.5	4	0.068	14	0.034	15	0.059
115	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	37	1.5	5	0.068	14		15	0.068
116	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	37	1.5	6	0.068	14	-0.034	15	0.059
117	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	37	1.5	7	0.068	14	-0.059	15	0.034
118	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	37	1.5	8	0.068	14	-0.068	15	
119	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	37	1.5	9	0.068	14	-0.059	15	-0.034
120	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	37	1.5	10	0.068	14	-0.034	15	-0.059
121	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	37	1.5	11	0.068	14		15	-0.068
122	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	37	1.5	12	0.068	14	0.034	15	-0.059
123	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	37	1.5	13	0.068	14	0.059	15	-0.034
124	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	38	1.5	2	0.068	14	0.068	15	
125	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	38	1.5	3	0.068	14	0.059	15	0.034
126	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	38	1.5	4	0.068	14	0.034	15	0.059
127	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	38	1.5	5	0.068	14		15	0.068
128	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	38	1.5	6	0.068	14	-0.034	15	0.059
129	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	38	1.5	7	0.068	14	-0.059	15	0.034
130	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	38	1.5	8	0.068	14	-0.068	15	
131	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	38	1.5	9	0.068	14	-0.059	15	-0.034
132	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	38	1.5	10	0.068	14	-0.034	15	-0.059
133	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	38	1.5	11	0.068	14		15	-0.068
134	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	38	1.5	12	0.068	14	0.034	15	-0.059
135	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	38	1.5	13	0.068	14	0.059	15	-0.034
136	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	39	1.5	2	0.068	14	0.068	15	
137	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	39	1.5	3	0.068	14	0.059	15	0.034
138	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	39	1.5	4	0.068	14	0.034	15	0.059
139	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	39	1.5	5	0.068	14		15	0.068
140	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	39	1.5	6	0.068	14	-0.034	15	0.059
141	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	39	1.5	7	0.068	14	-0.059	15	0.034
142	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	39	1.5	8	0.068	14	-0.068	15	
143	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	39	1.5	9	0.068	14	-0.059	15	-0.034
144	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	39	1.5	10	0.068	14	-0.034	15	-0.059
145	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	39	1.5	11	0.068	14		15	-0.068
146	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	39	1.5	12	0.068	14	0.034	15	-0.059
147	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	39	1.5	13	0.068	14	0.059	15	-0.034

Envelope Node Reactions

Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC	
1	N4	max	1816.326	18	2157.807	33	859.218	2	777.682	14	1366.907	6	543.66	11
2		min	-1861.226	12	-336.882	14	-798.602	20	-5006.355	33	-1333.529	24	-517.353	17
3	N23	max	1375.535	4	2083.271	37	1821.289	3	2424.458	38	1828.059	10	4159.203	37
4		min	-1313.866	22	-330.97	18	-1808.987	9	-472.604	19	-1796.647	16	-669.394	18
5	N25	max	1242.872	18	2041.555	29	1838.223	14	2359.852	28	1556.163	2	671.23	22
6		min	-1268.059	12	-338.524	22	-1903.303	8	-512	21	-1525.284	20	-4091.977	29
7	Totals:	max	4316.012	17	5782.385	33	4441.743	14						
8		min	-4316.012	23	1770.874	51	-4441.747	8						

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

Member	Shape	Code Check	Loc[in]	LC	Shear	Check	Loc[in]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
1	HOR1	L3X3X4	0.991	84.5	8	0.209	84.5	z	8	43453.599	46656	1688.138	3755.745	1.5	H2-1
2	HOR3	L3X3X4	0.967	84.5	12	0.206	84.5	z	12	27064.022	46656	1688.138	3521.265	1.5	H2-1
3	HOR2	L3X3X4	0.932	84.5	4	0.205	84.5	y	4	43453.599	46656	1688.138	3755.745	1.5	H2-1
4	MP5	PIPE 2.0	0.759	49.5	10	0.17	49.5		12	20866.733	32130	1871.625	1871.625	1	H1-1b
5	MP3	PIPE 2.0	0.756	49.5	2	0.171	49.5		4	20866.733	32130	1871.625	1871.625	1	H1-1b
6	MP1	PIPE 2.0	0.745	49.5	6	0.18	49.5		8	20866.733	32130	1871.625	1871.625	1	H1-1b
7	M37	L2.5X2.5X3	0.716	18.5	2	0.173	0	y	3	26979.837	29192.4	872.574	1971.83	1.006	H2-1
8	M36	L2.5X2.5X3	0.713	18.5	10	0.173	0	y	11	26979.837	29192.4	872.574	1971.83	1.005	H2-1
9	M35	L2.5X2.5X3	0.708	18.5	6	0.172	0	y	7	26979.837	29192.4	872.574	1971.83	1.038	H2-1
10	MP6	PIPE 2.0	0.601	64	2	0.155	28		12	14916.096	32130	1871.625	1871.625	1	H1-1b
11	MP4	PIPE 2.0	0.592	64	5	0.151	28		4	14916.096	32130	1871.625	1871.625	1	H1-1b
12	MP2	PIPE 2.0	0.59	64	9	0.153	28		8	14916.096	32130	1871.625	1871.625	1	H1-1b
13	M61	C5.25X4	0.57	33	10	0.199	23.719	z	3	146576.5	151875	12325.223	24869.533	2.663	H1-1b
14	M62	C5.25X4	0.561	33	2	0.199	23.719	z	7	146576.5	151875	12325.223	24869.533	2.91	H1-1b
15	M55	C5.25X4	0.55	33	6	0.197	23.719	z	11	146576.5	151875	12325.223	24869.533	2.928	H1-1b
16	M30	PIPE 2.5	0.51	61.25	11	0.186	148.75		6	11606.18	50715	3596.25	3596.25	1	H1-1b
17	M25	PIPE 2.5	0.508	61.25	7	0.191	148.75		2	11606.18	50715	3596.25	3596.25	1	H1-1b
18	M33	PIPE 2.5	0.507	61.25	3	0.189	148.75		10	11606.18	50715	3596.25	3596.25	1	H1-1b
19	G4	L3X3X4	0.467	44	7	0.026	44	y	10	14376.353	46656	1688.138	3137.94	1.317	H2-1
20	G5	L3X3X4	0.464	44	3	0.025	44	z	92	14376.353	46656	1688.138	3136.116	1.314	H2-1
21	G6	L3X3X4	0.462	44	11	0.026	44	y	2	14376.353	46656	1688.138	3139.976	1.32	H2-1
22	G3	LL3X3X4X0	0.147	0	13	0.02	46.765	y	110	76393.472	93312	6480	4361.544	1	H1-1b
23	G2	LL3X3X4X0	0.147	0	4	0.02	46.765	y	126	76393.472	93312	6480	4361.544	1	H1-1b
24	G1	LL3X3X4X0	0.146	0	8	0.02	46.765	y	94	76393.472	93312	6480	4361.544	1	H1-1b

Envelope AISI S100-16: LRFD Member Cold Formed Steel Code Checks

No Data to Print...															
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APPENDIX D
ADDITIONAL CALCUATIONS

INFINIGY⁸

Bolt Calculation Tool, V1.6.3

PROJECT DATA	
Site Name:	BENNETT POND
Site Number:	842857
Connection Description:	Mount to Tower

ENVELOPE BOLT LOADS		
(LC10 M61) Bolt Tension:	4724.44	lbs
(LC33 M55) Bolt Shear:	10105.26	lbs

MAX BOLT USAGE LOADS ¹		
Bolt Tension:	0.00	lbs
Bolt Shear:	10105.26	lbs

BOLT PROPERTIES		
Bolt Type:	Bolt	-
Bolt Diameter:	0.75	in
Bolt Grade:	A325	-
# of Bolts:	2	-
Threads Excluded?	No	-

¹ Max bolt usage loads correspond to Load combination #33 on member M55 in RISA-3D, which causes the maximum demand on the bolts.

Member Information
J nodes of M55, M61, M62,

BOLT CHECK		
Tensile Strength	30101.39	
Shear Strength	19880.39	
Max Tensile Usage	15.7%	
Max Shear Usage	50.8%	
Interaction Check (Max Usage)	0.26	≤1.05
Result	Pass	

