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## Antenna Mount Analysis Report

**ATC Site Name** : **Beacon Falls**

**ATC Asset Number** : **302524**

**Engineering Number** : **13753210\_C8\_04**

**Mount Elevation** : **163 ft**

**Carrier** : **AT&T Mobility**

**Carrier Site Name** : **MRCTB056179**

**Carrier Site Number** : **MRCTB056179**

**Site Location** : **664 Rimmon Hill Road**  
**Seymour, CT 06483-2722**  
**41.40719444, -73.0793**

**County** : **New Haven**

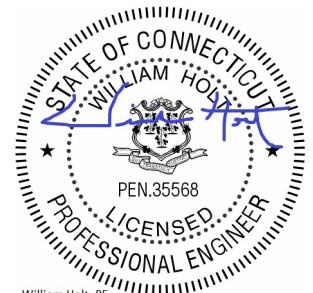
**Date** : **March 10, 2022**

**Max Usage** : **>200%**

**Result** : **Fail**

Prepared By:  
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William Holt, PE  
Director of Engineering  
License No. 35568 Expires: 01/31/2023

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## Introduction

The proposed equipment is to be mounted to the existing Platform w/ Support Rails. This proposed mounting configuration was analyzed using RISA-3D, a commercially available finite element analysis software package. A selection of input and output from our analysis is attached to the end of this report.

## Supporting Documents

<b>Structural Data</b>	Site Photos, dated February 27, 2019
<b>Previous Analyses</b>	Tower SA by CLS for ATC, Eng. #13668747_C3_01, dated May 5, 2021 Mount Analysis by CENTEK Engineering, Project #17004.39, dated April 17, 2018
<b>Loading Data</b>	ATC Application, Project #13753210, dated March 9, 2022 AT&T RFDS, RFDS ID #4818843, Version: 2, dated February 10, 2022

## Analysis

<b>Codes</b>	TIA-222-H
<b>Basic Wind Speed</b>	118 mph, $V_{ult}$ (3-Second Gust)
<b>Basic Wind Speed w/ Ice</b>	50 mph (3-Second Gust) w/ 1" Radial Ice (Escalating)
<b>Exposure Category</b>	B
<b>Topographic Factor Procedure:</b>	Method 2
<b>Feature:</b>	Flat
<b>Crest Height (H):</b>	0 ft
<b>Crest Length (L):</b>	0 ft
<b>Risk Category</b>	II
<b>Maintenance Live Load</b>	$L_M$ : 500 lb
<b>Spectral Response</b>	$S_s$ : 0.20; $S_1$ : 0.05; Site Class: D

## Conclusion

Based on the analysis, the antenna mount does not meet the requirements per the applicable codes listed above. The mount can support equipment as described in this report after the modifications listed below are completed:

- Reinforce tower to mount connection plates
- Reinforce mount pipes
- Reinforce threaded rods

The rough cost estimate, pre-MOD design, is estimated to be <\$10k. Please note, a more refined cost estimate will be provided as part of the Modification document package.

If you have any questions or require additional information, please contact American Tower via email at [Engineering@americantower.com](mailto:Engineering@americantower.com). Please include the American Tower site name, site number, and engineering number in the subject line for any questions.

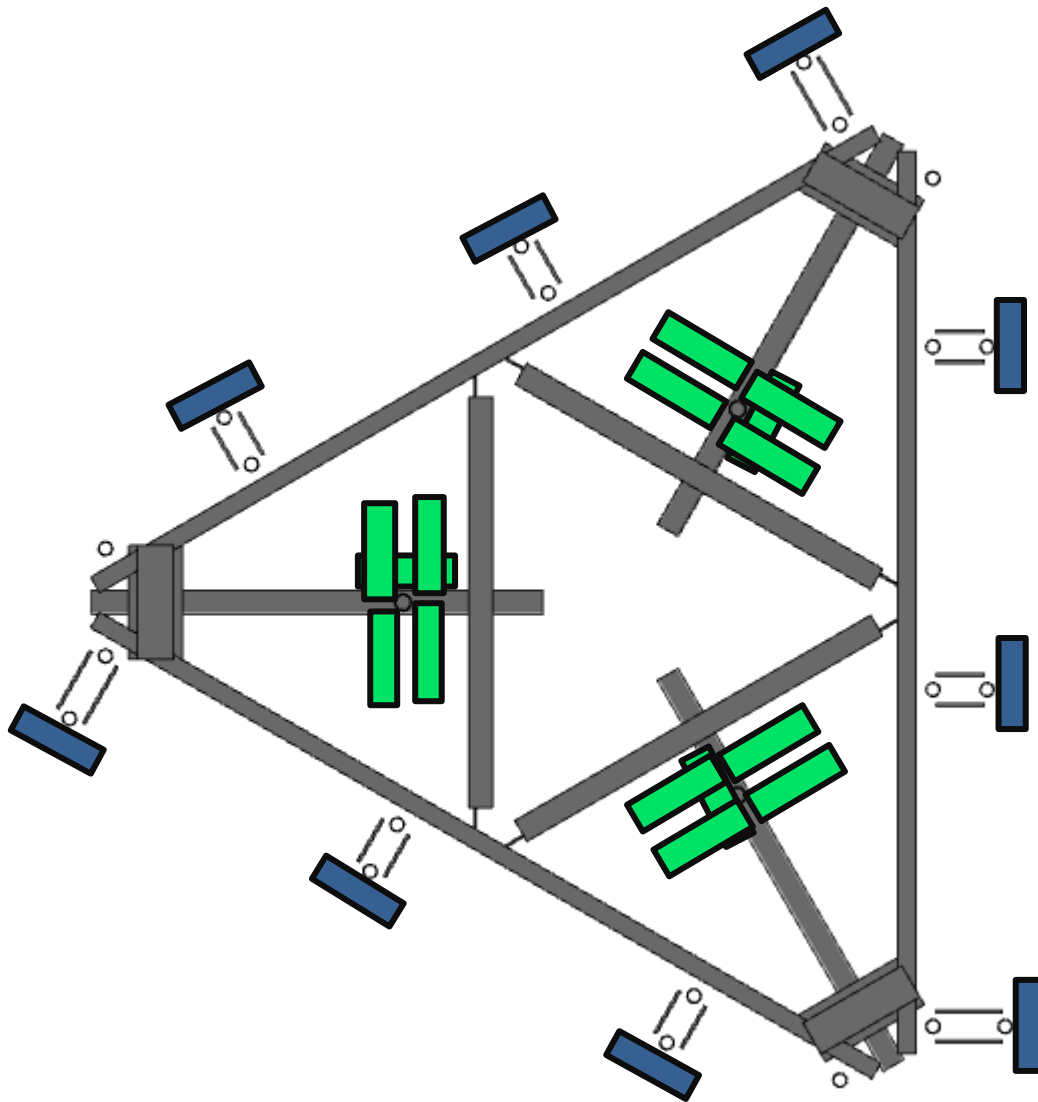
**Antenna Loading**

Elevation (ft)		Antennas	
Mount	Rad.	#	Name
163.0	166.0	3	Ericsson AIR 6449 B77D
	164.0	2	CCI DMP65R-BU8D
		2	CCI TPA65R-BU8D
		1	CCI DMP65R-BU6DA
		1	CCI TPA-65R-BU6DA-K
		1	Raycap DC9-48-60-24-8C-EV
		3	Ericsson AIR 6419 B77G
		3	Ericsson RRUS 32 B2
		3	Ericsson RRUS 32 B30
		3	Ericsson RRUS 4449 B5, B12
		3	Ericsson RRUS 4478 B14
		3	Ericsson RRUS 4426 B66
		2	Raycap DC6-48-60-18-8F

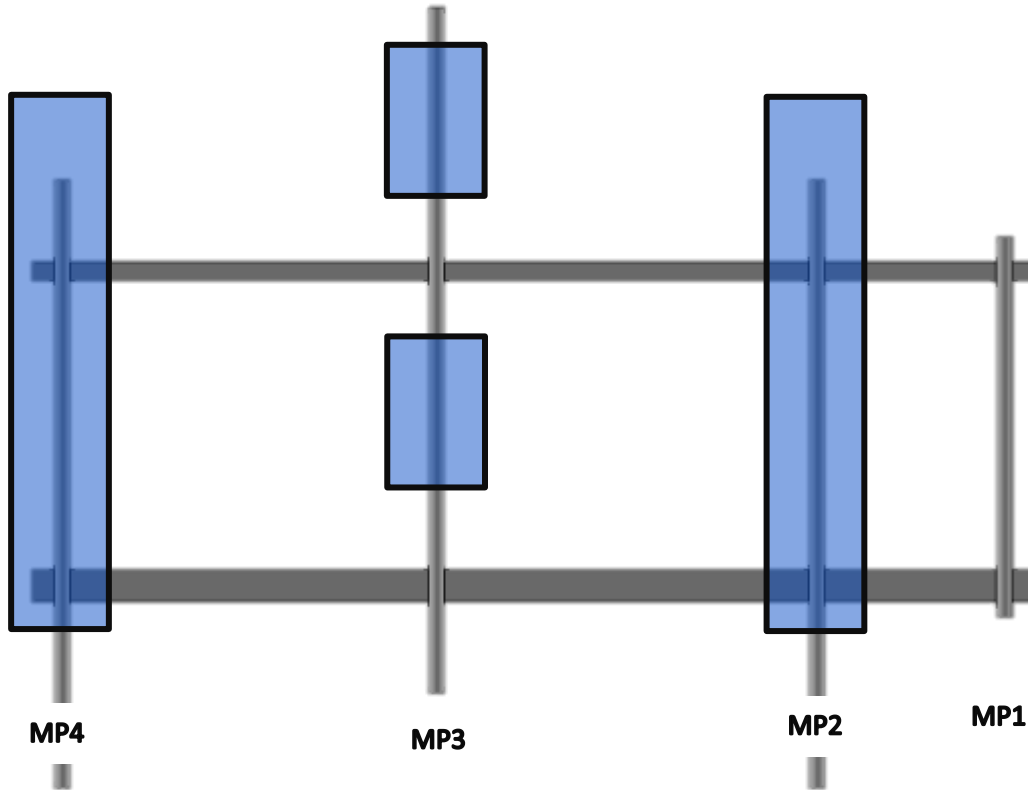
**Structure Usages**

Structural Component	Controlling Usage	Pass/Fail
Tower to Mount Connection Plates	>200%	Fail
Threaded Rods	141%	Fail
Mount Pipes	116%	Fail
Stand-Off Horizontals	87%	Pass
Platform Base	82%	Pass
Support Rail	69%	Pass

Equipment Layout Plan View



**Equipment Layout Front Elevation View (Alpha)**



Total #	Equipment	Mount Pipe Position
3	Ericsson AIR 6449 B77D	P3
3	Ericsson AIR 6419 B77G	P3
2	Cci Antennas DMP65R-BU8D	P4 (Alpha & Beta)
1	Cci Antennas DMP65R-BU6DA	P4 (Gamma)
2	Cci Antennas TPA65R-BU8D	P2 (Alpha & Beta)
1	Cci Antennas TPA-65R-BU6DA-K	P2 (Gamma)
1	Raycap DC9-48-60-24-8C-EV	Stand-off
2	Raycap DC6-48-60-18-8F	Stand-off
3	Ericsson RRUS 4426 B66	Stand-off
3	Ericsson RRUS 32 B30	Stand-off
3	Ericsson RRUS 4478 B14	Stand-off
3	Ericsson RRUS 4449 B5, B12	Stand-off
3	Ericsson RRUS 32 B2	Stand-off

### **Standard Conditions**

This analysis is inclusive of the antenna supporting frames/mounts and all recorded connections that will support the equipment listed in this report. It considers only the theoretical capacity of structural components and it is not a condition assessment. The validity of the analysis may be dependent on the accuracy of structural information supplied by others. The client is responsible for verifying this information. If any provided information is revised after completion of this analysis, Telamon Tower Engineering, PLLC should be notified immediately to revise results.

This analysis assumes the following:

1. The tower or other superstructure and mounts (if existing) were properly constructed as per the original design and have been properly maintained in accordance with applicable code standards.
2. Member sizes and strengths are accurate as supplied or are assumed as stated in the calculations.
3. In the absence of sufficient design information, all welds and connections are assumed to develop at least the capacity of the connected member, unless otherwise stated in this analysis.
4. All prior structural modifications, if any, are assumed to be correctly installed and fully effective.
5. The loading configuration is complete and accurate as supplied and/or as modeled in the previous analysis. All appurtenances are assumed to be properly installed and supported as per manufacturer requirements.
6. Some conservative assumptions may be used regarding appurtenances and their projected areas based on careful interpretation of data supplied, previous experience and standard industry practice.
7. Installation of all equipment and steel should be confirmed not to cause tower conflicts nor impede the tower climbing pegs.

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of the report. All opinions and conclusions contained herein are subject to revision based upon receipt of new or updated information. All services are provided exercising a level of care and diligence equivalent to the standard of our profession. No warranty or guarantee, either expressed or implied, is offered. All services are confidential in nature and this report will not be released to any other party without the client's consent. The use of this analysis is limited to the expressed purpose for which it was commissioned and it may not be reused, copied or disseminated for any other purpose without consent from Telamon Tower Engineering, PLLC.

All services were performed, results obtained and recommendations made in accordance with generally accepted engineering principles and practices. Telamon Tower Engineering, PLLC is not responsible for the conclusions, opinions or recommendations made by others based on the information supplied in this analysis.

It is not possible to have the fully detailed information necessary to perform a complete and thorough analysis of every structural sub-component of an existing structure. The structural analysis by Telamon Tower Engineering, PLLC verifies the adequacy of the primary members of the structure. Telamon Tower Engineering, PLLC provides a limited scope of service in that we cannot verify the adequacy of every weld, bolt, gusset, etc.

Wind & Ice Loading			
Nominal Mount Elevation (AGL), $z_{mount}$	163 ft	$K_a$	0.90
Nominal Rad Elevation (AGL), $z_{rad}$	164 ft	$K_d$	0.95
Elevation AMSL (ft)	419 ft	$K_e$	0.98
TIA Standard	H	$K_z$	1.14
Basic Wind Speed, $V_{ult}$ (bare)	118 mph	$K_{zt}$	1.00
Basic Wind Speed, $V$ (ice)	50 mph	$K_s$	1.00
Design Ice Thickness, $t_i$	1 in	$t_{iz}$	1.17 in
Exposure Category	B	$G_h$	1.00
Risk Category	II	$q_z$ (bare)	37.9 psf
Seismic Response Coeff., $C_s$	0.11	$q_z$ (ice)	6.8 psf

Live Loading	
At Mount Pipes, $L_M$	500 lb
Joint Labels Considered	1_M1
	1_M2
	1_M3
	1_M4

Section Set Label	Shape Label	$F_A$ (lb/ft)		Ice Wt. (lb/ft)
		Bare	Ice	
Offset Arm	HSS4X4X4	22.74	1.74	8.98
Bottom Corner Plate	PL9X0.5	51.16	6.96	10.35
Face Horizontal	CH 5X2X1/4	28.42	1.82	9.44
Internal Horiz Plate	PL3X0.375	17.05	3.29	4.76
Internal Horiz	L4X4X4	22.74	1.74	8.87
Handrail	L3X3X4	17.05	1.67	7.04
Top Corner Plate	0.5 X 6 PLATE	34.11	5.12	7.61
MOD SAMAST6	PIPE_2.5	9.81	3.20	5.80
MOUNT_PIPE_2.0	PIPE_2.0	8.10	2.89	5.09
Threaded Rods	1/2 SR	1.71	1.74	2.40

Appurtenances																														
Appurtenance Model	Status	Azimuth Offset (°, ⊂)	Rad Elev. Override (ft)	Swap Width & Depth	Area Factor		Qty. per Azimuth			Total Qty. Override	0° Joints		120° Joints		240° Joints		Height (in)	Width (in)	Depth (in)	Weight (Bare) (lb)	Shape	Weight of Ice (lb)	EPA <sub>A</sub> (Bare) (ft²)		EPA <sub>A</sub> (Ice) (ft²)		F <sub>A</sub> (Bare) (lb)		F <sub>A</sub> (Ice) (lb)	
					Front	Side	0°	120°	240°		1	2	1	2	1	2							N	T	N	T	N	T	N	T
AIR 6449 B77D			166	<input type="checkbox"/>			1	1	1	3	1_A3T	1_A3B	2_A3T	2_A3B	3_A3T	3_A3B	30.4	15.9	10.6	81.6	Flat	78.62	4.03	2.72	4.98	3.54	138.11	93.33	30.66	21.78
AIR 6419 B77G				<input type="checkbox"/>			1	1	1	3	1_A3T1	1_A3B1	2_A3T1	2_A3B1	3_A3T1	3_A3B1	28.3	16.1	7.9	66.1	Flat	65.41	3.80	1.94	4.71	2.66	129.74	66.21	28.90	16.35
DMP65R-BU8D				<input type="checkbox"/>			1	1		2	1_A4T	1_A4B	2_A4T	2_A4B			96	20.7	7.7	105.6	Generic	229.10	15.86	5.95	18.07	7.90	541.91	203.30	110.84	48.46
DMP65R-BU6DA				<input type="checkbox"/>					1	1					3_A4T	3_A4B	71.2	20.7	7.7	79.4	Flat	184.19	12.71	5.62	14.49	7.24	434.26	191.87	88.88	44.41
TPA65R-BU8D				<input type="checkbox"/>			1	1		2	1_A2T	1_A2B	2_A2T	2_A2B			96	21	7.8	87.5	Generic	232.41	15.91	5.97	18.12	7.94	543.62	203.99	111.14	48.72
TPA-65R-BU6DA-K				<input type="checkbox"/>					1	1					3_A2T	3_A2B	71.1	25.5	7.6	79.6	Flat	201.81	15.27	5.55	17.13	7.17	521.76	189.57	105.10	43.98
DC9-48-60-24-8C-EV				<input type="checkbox"/>			1			1	D1						31.41	10.24	18.28	26.2	Flat	87.04	2.74	4.78	3.56	5.80	93.51	163.49	21.87	35.60
DC6-48-60-18-8F				<input type="checkbox"/>				1	1	2			D2		D3		23.5	9.7	9.7	20	Round	39.21	1.11	1.11	1.51	1.51	37.86	37.86	9.29	9.29
RRUS 4426 B66				<input checked="" type="checkbox"/>		0.5	1	1	1	3	R1		R2		R3		14.96	13.19	5.8	48.4	Flat	30.10	0.73	0.82	1.18	1.12	24.78	28.09	7.21	6.87
RRUS 32 B30				<input checked="" type="checkbox"/>		0.5	1	1	1	3	R1		R2		R3		26.7	12.1	6.7	60	Flat	47.90	1.57	1.35	2.25	1.75	53.74	46.00	13.79	10.73
RRUS 4478 B14				<input checked="" type="checkbox"/>		0.5	1	1	1	3	R4		R5		R6		16.5	13.4	7.7	59.9	Flat	37.28	1.06	0.92	1.58	1.24	36.18	31.48	9.68	7.59
RRUS 4449 B5, B12				<input checked="" type="checkbox"/>		0.5	1	1	1	3	R4		R5		R6		17.9	13.19	9.44	71	Flat	47.95	1.41	0.98	1.99	1.31	48.11	33.61	12.20	8.04
RRUS 32 B2				<input type="checkbox"/>			1	1	1	3	R7		R8		R9		27.2	12.05	7	52.9	Flat	49.44	2.73	1.67	3.55	2.36	93.33	57.00	21.75	14.47

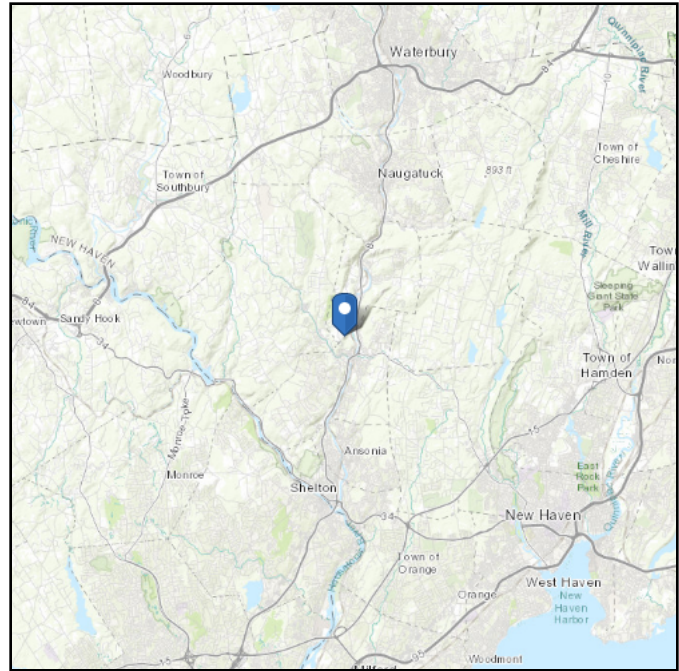
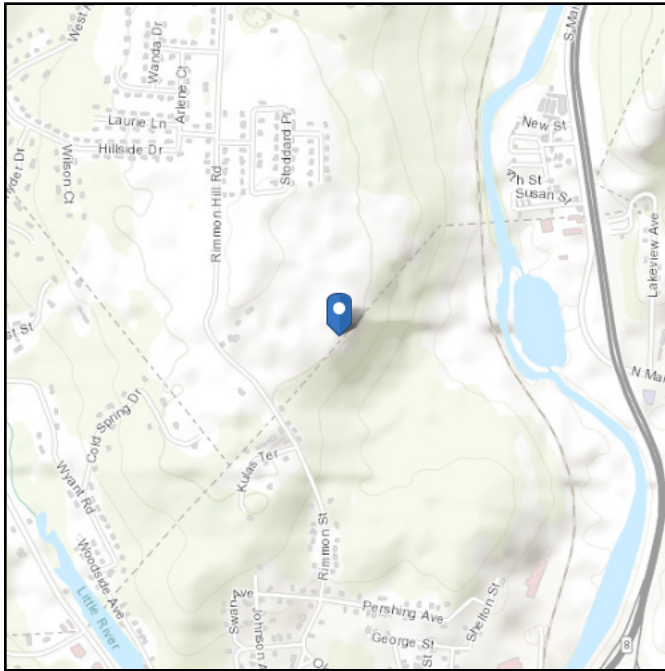


# ASCE 7 Hazards Report

**Address:**  
No Address at This Location

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

**Elevation:** 418.85 ft (NAVD 88)  
**Latitude:** 41.407194  
**Longitude:** -73.0793



## Wind

### Results:

Wind Speed	118 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	97 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: Tue Mar 01 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).

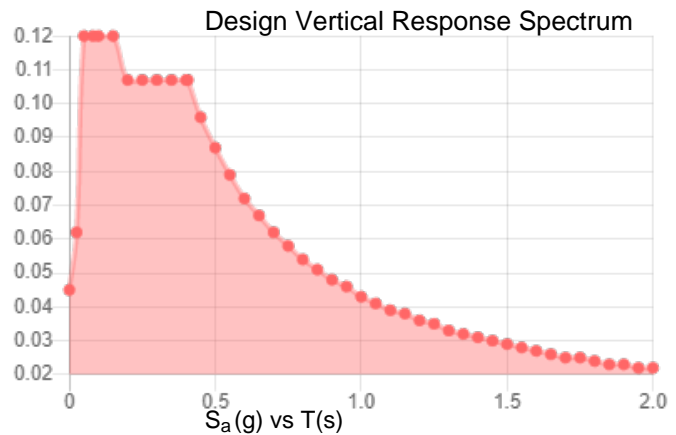
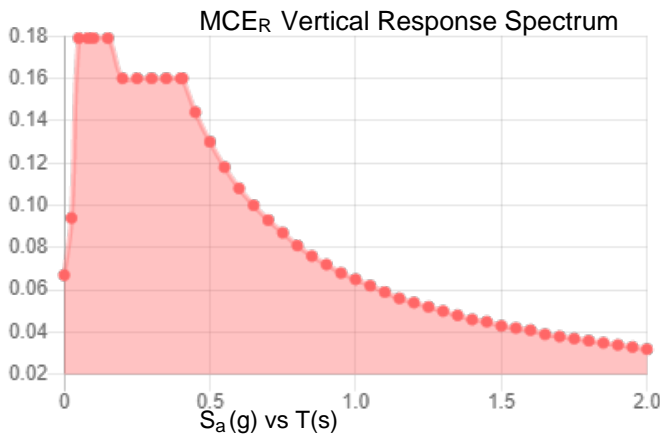
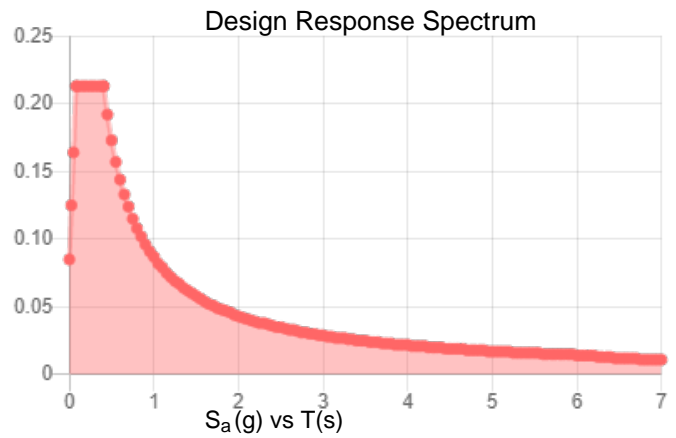
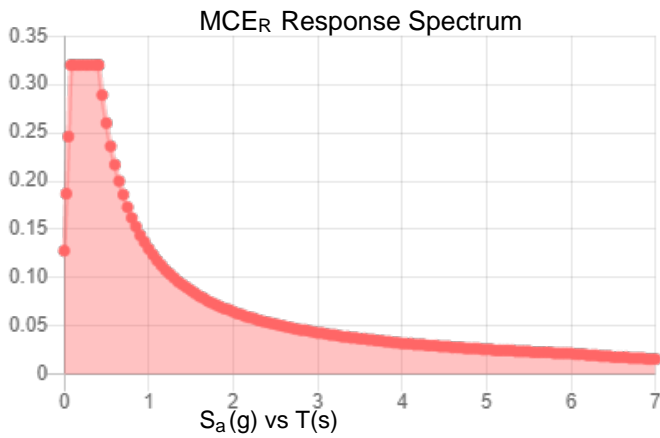
Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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

**Results:**

$S_s$ :	0.2	$S_{D1}$ :	0.087
$S_1$ :	0.054	$T_L$ :	6
$F_a$ :	1.6	PGA :	0.112
$F_v$ :	2.4	PGA <sub>M</sub> :	0.176
$S_{MS}$ :	0.32	$F_{PGA}$ :	1.576
$S_{M1}$ :	0.13	$I_e$ :	1
$S_{DS}$ :	0.213	$C_v$ :	0.7

**Seismic Design Category** B



**Data Accessed:** Tue Mar 01 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

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### 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:** Tue Mar 01 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.

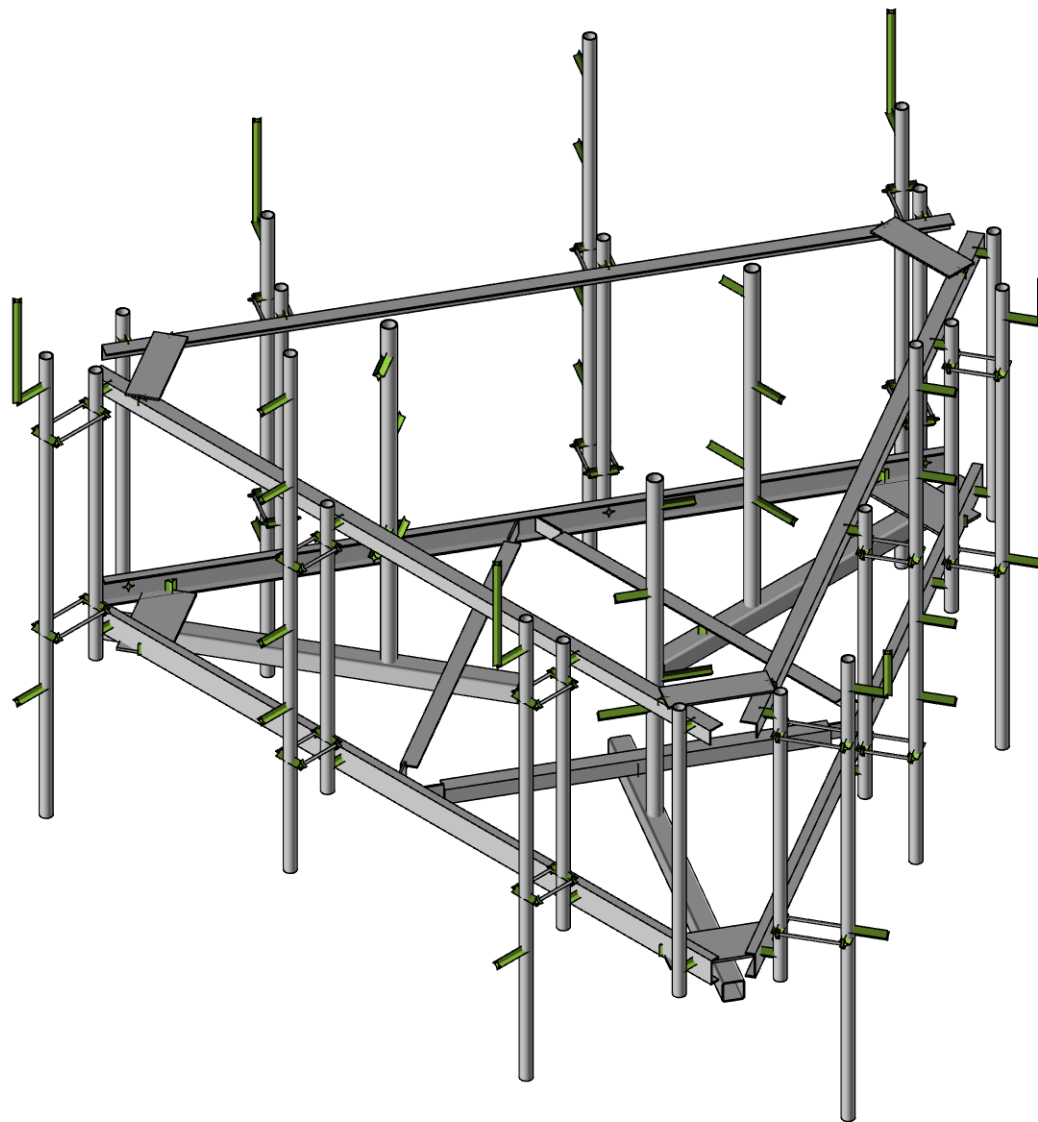
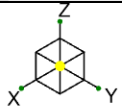
Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 500-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from 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.

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

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

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



Envelope Only Solution

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GD

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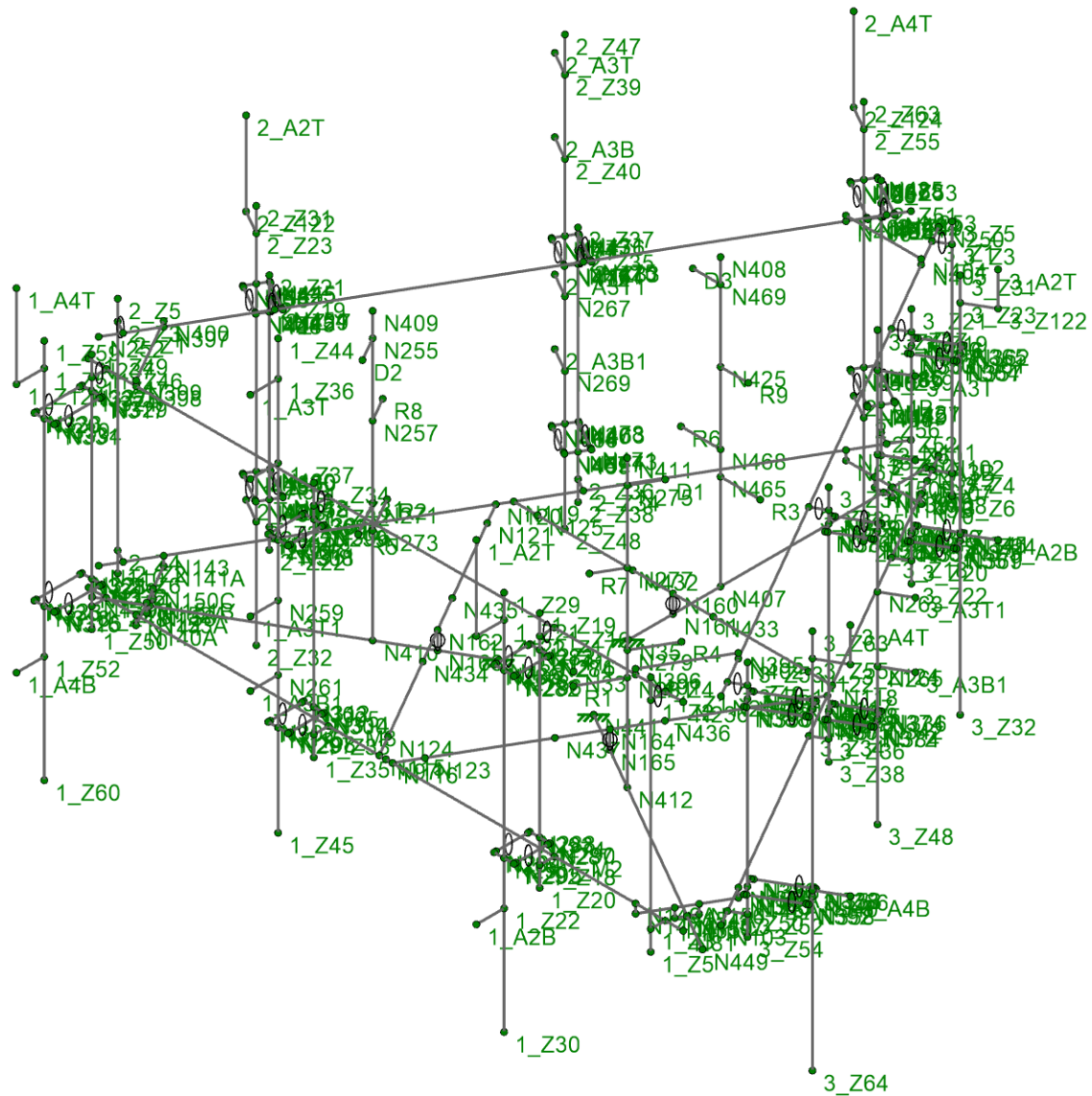
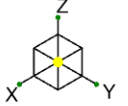
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Rendered

SK-1

Mar 10, 2022

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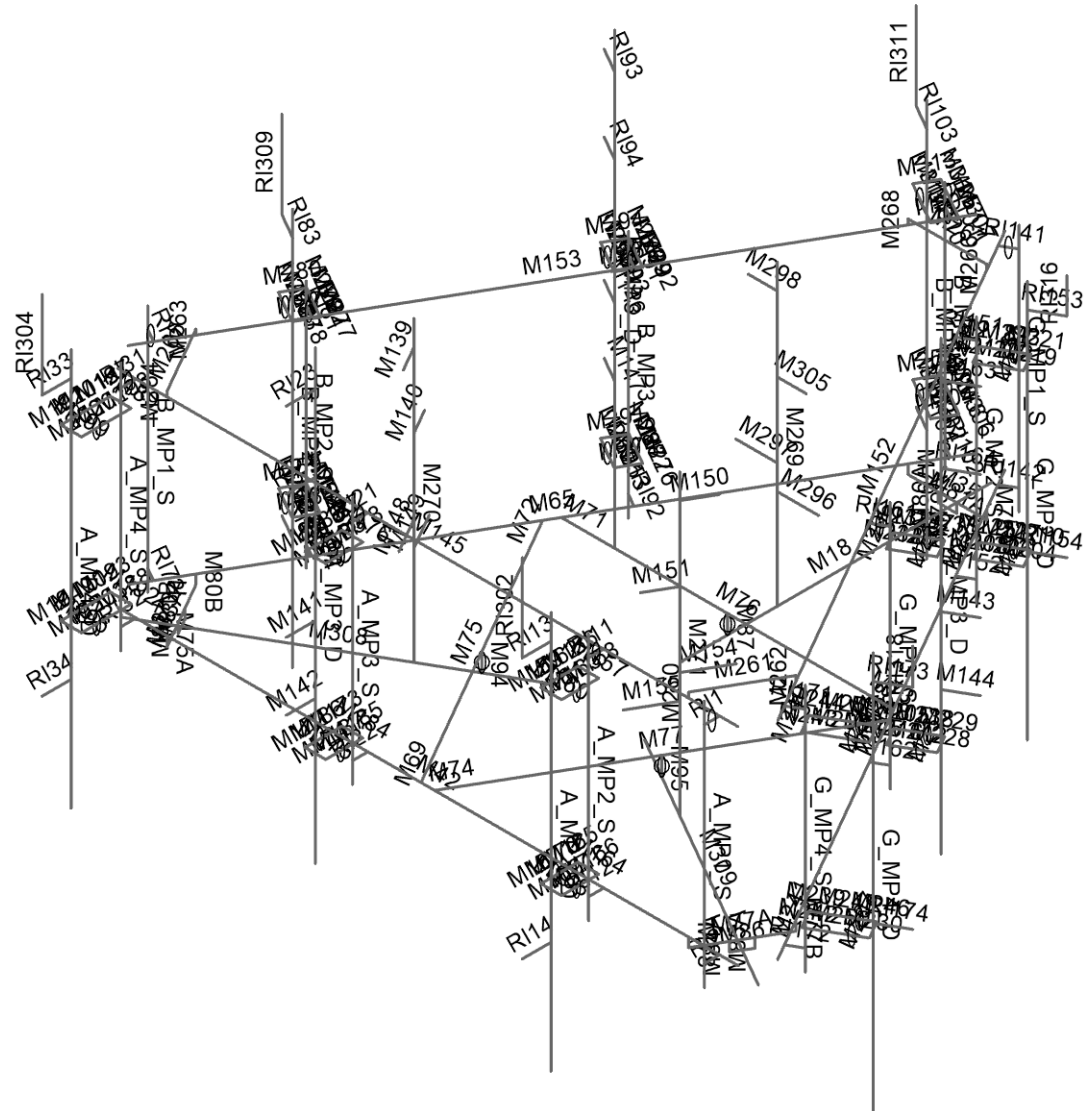
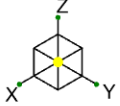


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41124-13753210\_C8\_04- Beacon Falls  
 Joint Labels

SK-2  
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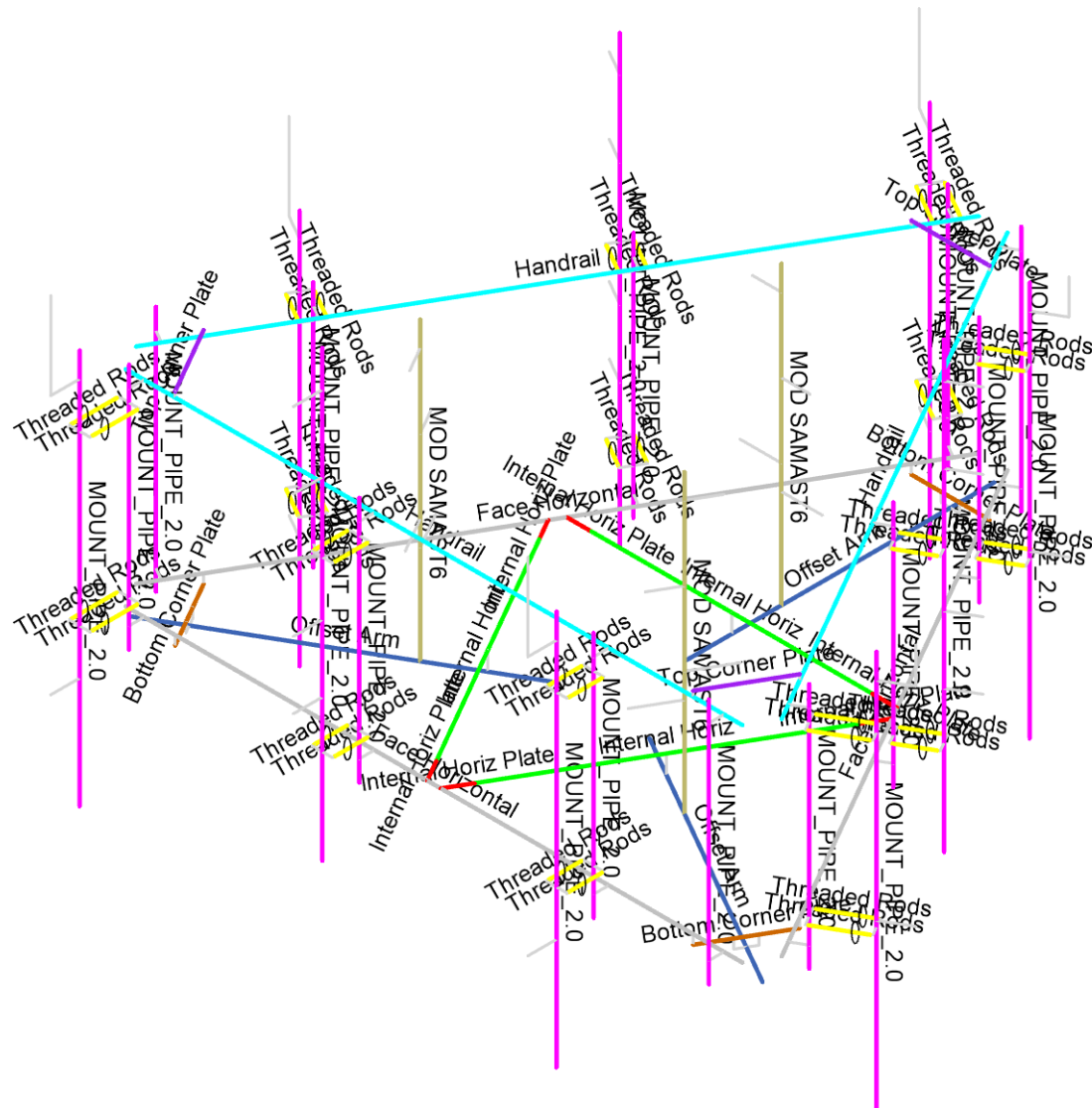
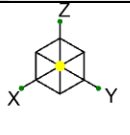
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41124-13753210\_C8\_04- Beacon Falls  
 Member Labels

SK-3  
 Mar 10, 2022  
 41124-13753210\_C8\_04-01-MA.r3d







Section Sets	
[Blue square]	Offset Arm
[Green square]	Internal Horiz
[Red square]	Internal Horiz Plate
[Grey square]	Face Horizontal
[Magenta square]	MOUNT_PIPE_2.0
[Cyan square]	Handrail
[Brown square]	Bottom Corner Plate
[Yellow square]	Threaded Rods
[Purple square]	Top Corner Plate
[Olive square]	MOD SAMAST6
[Light Green square]	RIGID

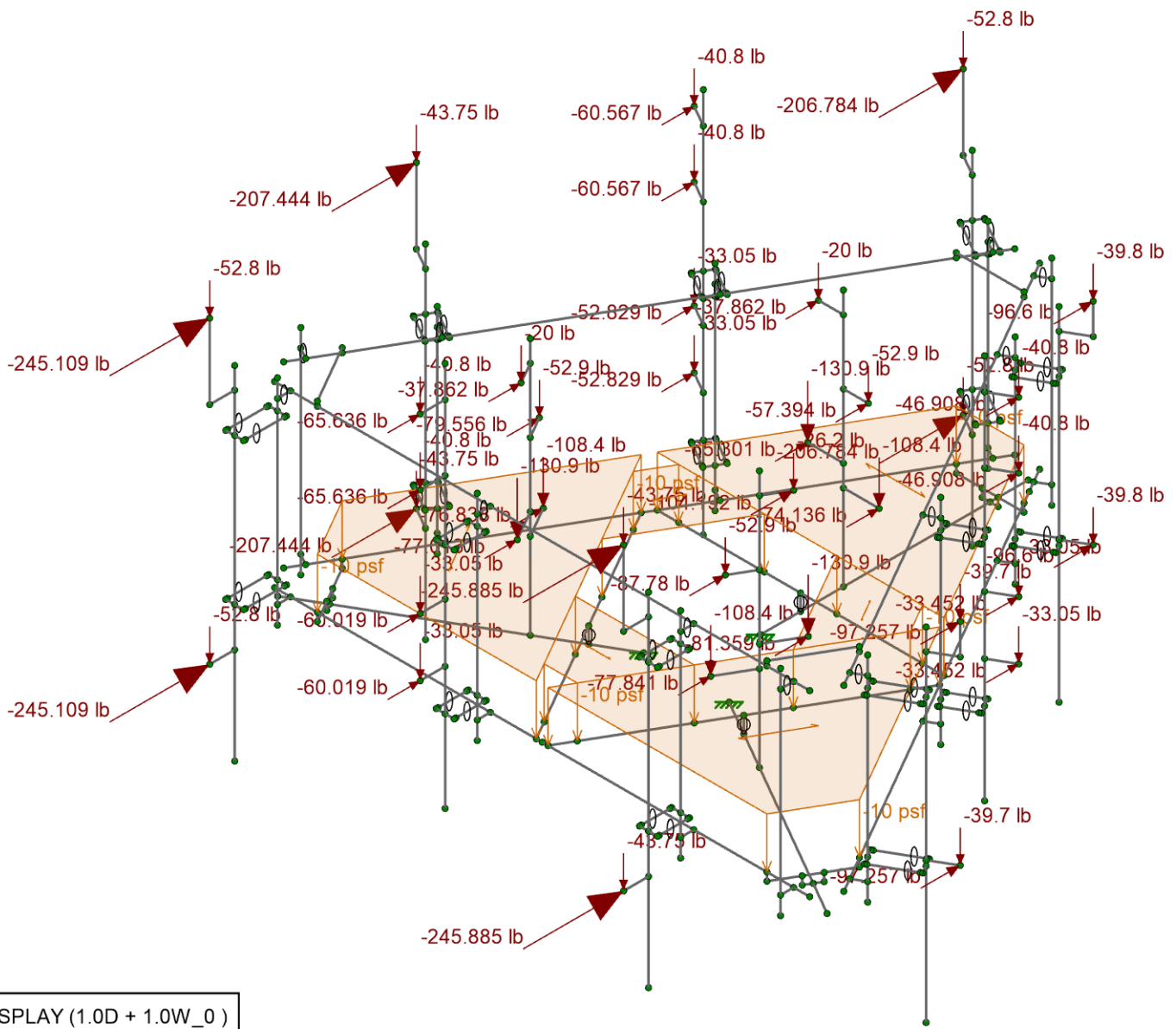
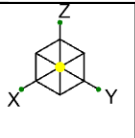
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41124-13753210\_C8\_04-01-MA

41124-13753210\_C8\_04- Beacon Falls  
  
Section Sets

SK-5  
Mar 10, 2022  
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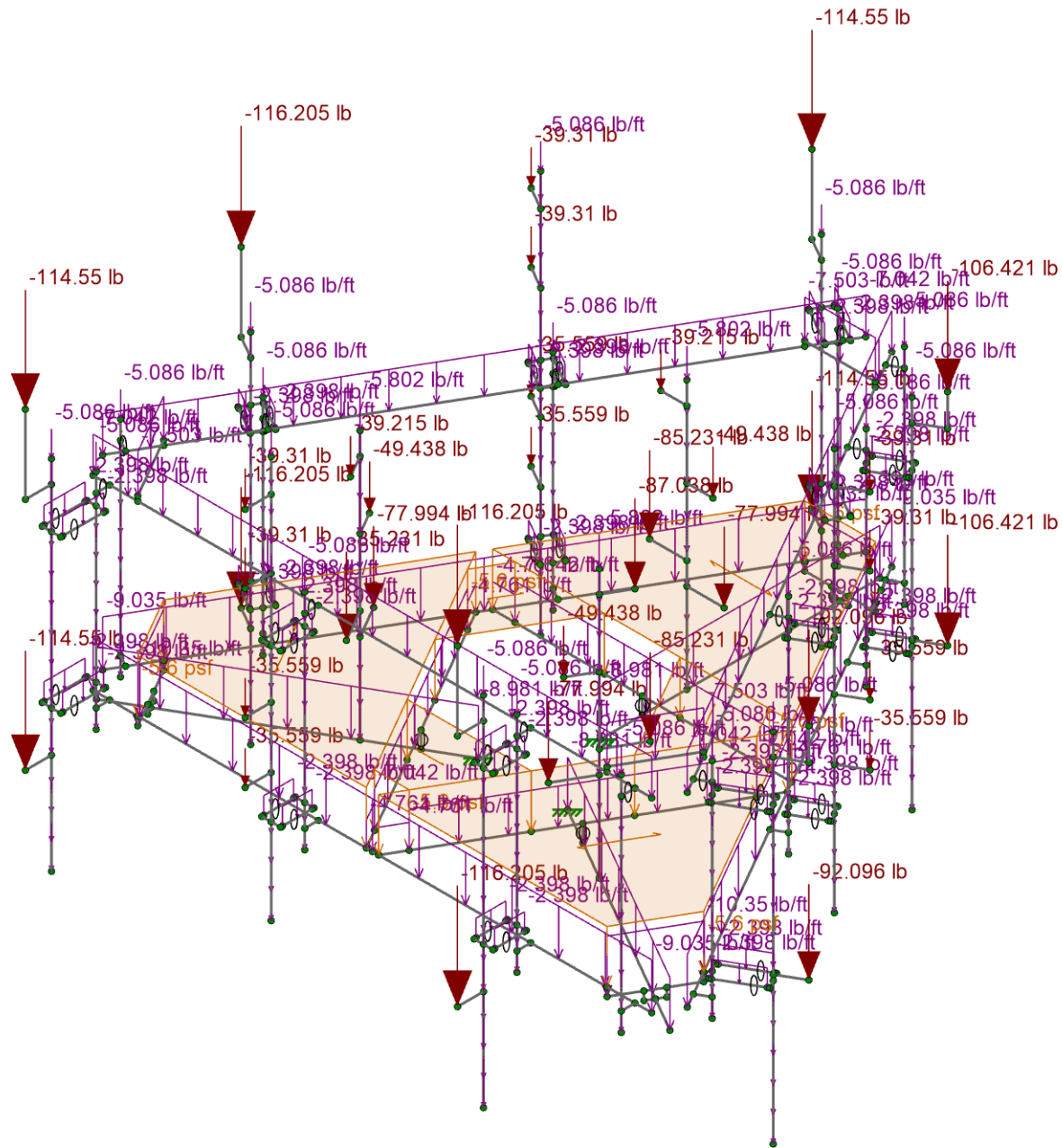
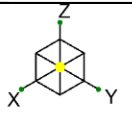




Loads: LC 1, DISPLAY (1.0D + 1.0W\_0 )  
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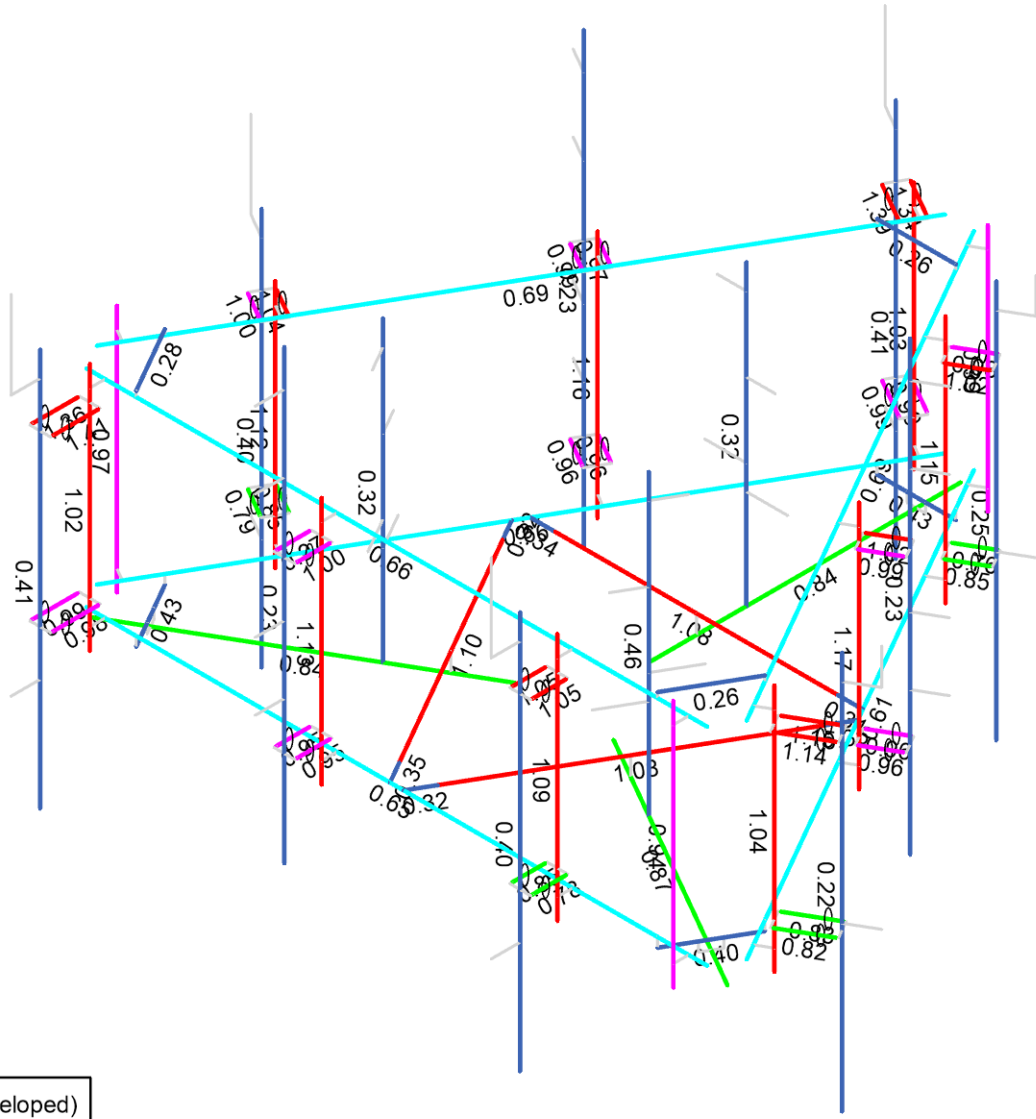
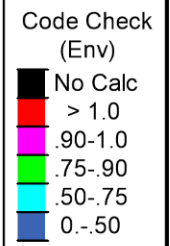
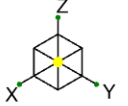
Telamon CLS	41124-13753210_C8_04- Beacon Falls	SK-6
GD		Mar 10, 2022
41124-13753210_C8_04-01-MA	Joint Loads - Dead and Normal Wind	41124-13753210_C8_04-01-MA.r3d





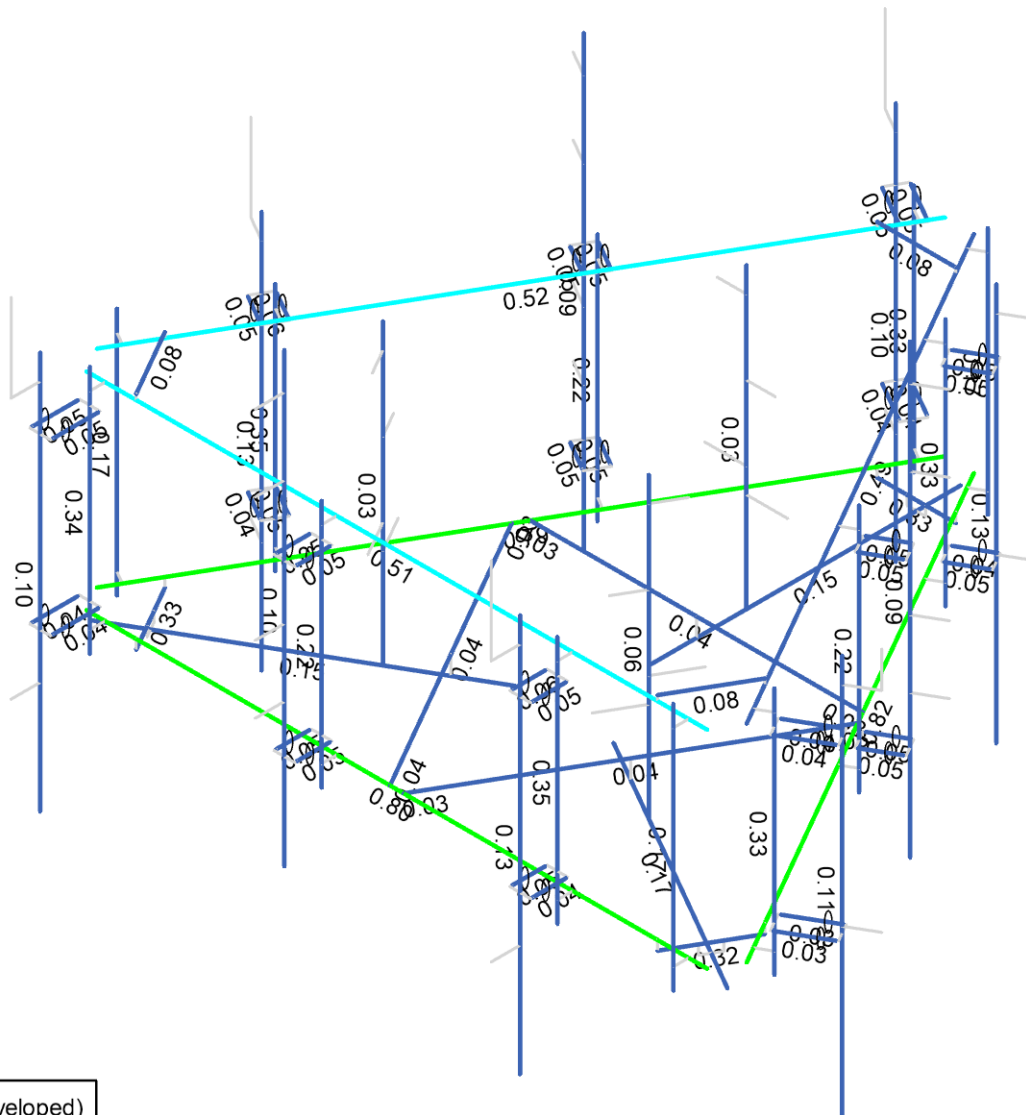
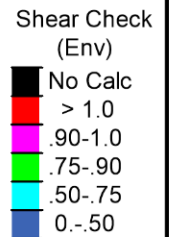
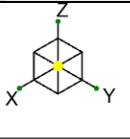
Loads: BLC 2, Ice Dead  
Envelope Only Solution

Telamon CLS	41124-13753210_C8_04- Beacon Falls	SK-8
GD		Mar 10, 2022
41124-13753210_C8_04-01-MA	Ice Dead Loads	41124-13753210_C8_04-01-MA.r3d



Member Code Checks Displayed (Enveloped)  
Envelope Only Solution

Telamon CLS	41124-13753210_C8_04- Beacon Falls	SK-9
GD		Mar 10, 2022
41124-13753210_C8_04-01-MA	Envelope Member Unity Check Results - Bending	41124-13753210_C8_04-01-MA.r3d



Member Shear Checks Displayed (Enveloped)  
Envelope Only Solution

Telamon CLS
GD
41124-13753210_C8_04-01-MA

41124-13753210_C8_04- Beacon Falls
Envelope Member Check Results - Shear

SK-10
Mar 10, 2022
41124-13753210_C8_04-01-MA.r3d

**Basic Load Cases**

	BLC Description	Category	Z Gravity	Nodal	Distributed	Area(Member)
1	Dead	DL	-1	42		6
2	Ice Dead	RL		42		6
3	BLC 1 Transient Area Loads	None			60	
4	BLC 2 Transient Area Loads	None			60	
5	Structure Wind 0°	None			71	
6	Structure Wind 30°	None			154	
7	Structure Wind 45°	None			168	
8	Structure Wind 60°	None			142	
9	Structure Wind 90°	None			77	
10	Structure Wind 120°	None			142	
11	Structure Wind 135°	None			168	
12	Structure Wind 150°	None			154	
13	Structure Wind 180°	None			71	
14	Structure Wind 210°	None			154	
15	Structure Wind 225°	None			168	
16	Structure Wind 240°	None			142	
17	Structure Wind 270°	None			77	
18	Structure Wind 300°	None			142	
19	Structure Wind 315°	None			168	
20	Structure Wind 330°	None			154	
21	Structure Wind w/ Ice 0°	None			71	
22	Structure Wind w/ Ice 30°	None			154	
23	Structure Wind w/ Ice 45°	None			168	
24	Structure Wind w/ Ice 60°	None			142	
25	Structure Wind w/ Ice 90°	None			77	
26	Structure Wind w/ Ice 120°	None			142	
27	Structure Wind w/ Ice 135°	None			168	
28	Structure Wind w/ Ice 150°	None			154	
29	Structure Wind w/ Ice 180°	None			71	
30	Structure Wind w/ Ice 210°	None			154	
31	Structure Wind w/ Ice 225°	None			168	
32	Structure Wind w/ Ice 240°	None			142	
33	Structure Wind w/ Ice 270°	None			77	
34	Structure Wind w/ Ice 300°	None			142	
35	Structure Wind w/ Ice 315°	None			168	
36	Structure Wind w/ Ice 330°	None			154	
37	Antenna Wind 0°	None		42		
38	Antenna Wind 30°	None		84		
39	Antenna Wind 45°	None		84		
40	Antenna Wind 60°	None		84		
41	Antenna Wind 90°	None		42		
42	Antenna Wind 120°	None		84		
43	Antenna Wind 135°	None		84		
44	Antenna Wind 150°	None		84		
45	Antenna Wind 180°	None		42		
46	Antenna Wind 210°	None		84		
47	Antenna Wind 225°	None		84		
48	Antenna Wind 240°	None		84		
49	Antenna Wind 270°	None		42		
50	Antenna Wind 300°	None		84		
51	Antenna Wind 315°	None		84		
52	Antenna Wind 330°	None		84		
53	Antenna Wind w/ Ice 0°	None		42		
54	Antenna Wind w/ Ice 30°	None		84		
55	Antenna Wind w/ Ice 45°	None		84		

**Basic Load Cases (Continued)**

	BLC Description	Category	Z Gravity	Nodal	Distributed	Area(Member)
56	Antenna Wind w/ Ice 60°	None		84		
57	Antenna Wind w/ Ice 90°	None		42		
58	Antenna Wind w/ Ice 120°	None		84		
59	Antenna Wind w/ Ice 135°	None		84		
60	Antenna Wind w/ Ice 150°	None		84		
61	Antenna Wind w/ Ice 180°	None		42		
62	Antenna Wind w/ Ice 210°	None		84		
63	Antenna Wind w/ Ice 225°	None		84		
64	Antenna Wind w/ Ice 240°	None		84		
65	Antenna Wind w/ Ice 270°	None		42		
66	Antenna Wind w/ Ice 300°	None		84		
67	Antenna Wind w/ Ice 315°	None		84		
68	Antenna Wind w/ Ice 330°	None		84		
69	Seismic X	ELX		42	84	
70	Seismic Y	ELY		42	84	
71	Seismic Z	ELZ		42	84	
72	Maintenance Live 500 (1)	OL1		1		
73	Maintenance Live 500 (2)	OL2		1		
74	Maintenance Live 500 (3)	OL3		1		
75	Maintenance Live 500 (4)	OL4		1		

**Load Combinations**

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	DISPLAY (1.0D + 1.0W_0°)	Yes	Y	DL	1	37	1				
2	1.4D	Yes	Y	DL	1.4						
3	1.2D + 1.0W_0°	Yes	Y	DL	1.2	5	1	37	1		
4	1.2D + 1.0W_30°	Yes	Y	DL	1.2	6	1	38	1		
5	1.2D + 1.0W_45°	Yes	Y	DL	1.2	7	1	39	1		
6	1.2D + 1.0W_60°	Yes	Y	DL	1.2	8	1	40	1		
7	1.2D + 1.0W_90°	Yes	Y	DL	1.2	9	1	41	1		
8	1.2D + 1.0W_120°	Yes	Y	DL	1.2	10	1	42	1		
9	1.2D + 1.0W_135°	Yes	Y	DL	1.2	11	1	43	1		
10	1.2D + 1.0W_150°	Yes	Y	DL	1.2	12	1	44	1		
11	1.2D + 1.0W_180°	Yes	Y	DL	1.2	13	-1	45	-1		
12	1.2D + 1.0W_210°	Yes	Y	DL	1.2	14	-1	46	-1		
13	1.2D + 1.0W_225°	Yes	Y	DL	1.2	15	-1	47	-1		
14	1.2D + 1.0W_240°	Yes	Y	DL	1.2	16	-1	48	-1		
15	1.2D + 1.0W_270°	Yes	Y	DL	1.2	17	-1	49	-1		
16	1.2D + 1.0W_300°	Yes	Y	DL	1.2	18	-1	50	-1		
17	1.2D + 1.0W_315°	Yes	Y	DL	1.2	19	-1	51	-1		
18	1.2D + 1.0W_330°	Yes	Y	DL	1.2	20	-1	52	-1		
19	1.2D + 1.0Di + 1.0Wi_0°	Yes	Y	DL	1.2	21	1	53	1	RL	1
20	1.2D + 1.0Di + 1.0Wi_30°	Yes	Y	DL	1.2	22	1	54	1	RL	1
21	1.2D + 1.0Di + 1.0Wi_45°	Yes	Y	DL	1.2	23	1	55	1	RL	1
22	1.2D + 1.0Di + 1.0Wi_60°	Yes	Y	DL	1.2	24	1	56	1	RL	1
23	1.2D + 1.0Di + 1.0Wi_90°	Yes	Y	DL	1.2	25	1	57	1	RL	1
24	1.2D + 1.0Di + 1.0Wi_120°	Yes	Y	DL	1.2	26	1	58	1	RL	1
25	1.2D + 1.0Di + 1.0Wi_135°	Yes	Y	DL	1.2	27	1	59	1	RL	1
26	1.2D + 1.0Di + 1.0Wi_150°	Yes	Y	DL	1.2	28	1	60	1	RL	1
27	1.2D + 1.0Di + 1.0Wi_180°	Yes	Y	DL	1.2	29	-1	61	-1	RL	1
28	1.2D + 1.0Di + 1.0Wi_210°	Yes	Y	DL	1.2	30	-1	62	-1	RL	1
29	1.2D + 1.0Di + 1.0Wi_225°	Yes	Y	DL	1.2	31	-1	63	-1	RL	1
30	1.2D + 1.0Di + 1.0Wi_240°	Yes	Y	DL	1.2	32	-1	64	-1	RL	1
31	1.2D + 1.0Di + 1.0Wi_270°	Yes	Y	DL	1.2	33	-1	65	-1	RL	1
32	1.2D + 1.0Di + 1.0Wi_300°	Yes	Y	DL	1.2	34	-1	66	-1	RL	1



**Load Combinations (Continued)**

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
33	1.2D + 1.0Di + 1.0Wi 315°	Yes	Y	DL	1.2	35	-1	67	-1	RL	1
34	1.2D + 1.0Di + 1.0Wi 330°	Yes	Y	DL	1.2	36	-1	68	-1	RL	1
35	1.2D + 1.0Ev + 1.0Eh 0°	Yes	Y	DL	1.243	ELX	-1	ELY			
36	1.2D + 1.0Ev + 1.0Eh 30°	Yes	Y	DL	1.243	ELX	-0.866	ELY	0.5		
37	1.2D + 1.0Ev + 1.0Eh 45°	Yes	Y	DL	1.243	ELX	-0.707	ELY	0.707		
38	1.2D + 1.0Ev + 1.0Eh 60°	Yes	Y	DL	1.243	ELX	-0.5	ELY	0.866		
39	1.2D + 1.0Ev + 1.0Eh 90°	Yes	Y	DL	1.243	ELX		ELY	1		
40	1.2D + 1.0Ev + 1.0Eh 120°	Yes	Y	DL	1.243	ELX	0.5	ELY	0.866		
41	1.2D + 1.0Ev + 1.0Eh 135°	Yes	Y	DL	1.243	ELX	0.707	ELY	0.707		
42	1.2D + 1.0Ev + 1.0Eh 150°	Yes	Y	DL	1.243	ELX	0.866	ELY	0.5		
43	1.2D + 1.0Ev + 1.0Eh 180°	Yes	Y	DL	1.243	ELX	1	ELY			
44	1.2D + 1.0Ev + 1.0Eh 210°	Yes	Y	DL	1.243	ELX	0.866	ELY	-0.5		
45	1.2D + 1.0Ev + 1.0Eh 225°	Yes	Y	DL	1.243	ELX	0.707	ELY	-0.707		
46	1.2D + 1.0Ev + 1.0Eh 240°	Yes	Y	DL	1.243	ELX	0.5	ELY	-0.866		
47	1.2D + 1.0Ev + 1.0Eh 270°	Yes	Y	DL	1.243	ELX		ELY	-1		
48	1.2D + 1.0Ev + 1.0Eh 300°	Yes	Y	DL	1.243	ELX	-0.5	ELY	-0.866		
49	1.2D + 1.0Ev + 1.0Eh 315°	Yes	Y	DL	1.243	ELX	-0.707	ELY	-0.707		
50	1.2D + 1.0Ev + 1.0Eh 330°	Yes	Y	DL	1.243	ELX	-0.866	ELY	-0.5		
51	0.9D - 1.0Ev + 1.0Eh 0°	Yes	Y	DL	0.857	ELX	-1	ELY			
52	0.9D - 1.0Ev + 1.0Eh 30°	Yes	Y	DL	0.857	ELX	-0.866	ELY	0.5		
53	0.9D - 1.0Ev + 1.0Eh 45°	Yes	Y	DL	0.857	ELX	-0.707	ELY	0.707		
54	0.9D - 1.0Ev + 1.0Eh 60°	Yes	Y	DL	0.857	ELX	-0.5	ELY	0.866		
55	0.9D - 1.0Ev + 1.0Eh 90°	Yes	Y	DL	0.857	ELX		ELY	1		
56	0.9D - 1.0Ev + 1.0Eh 120°	Yes	Y	DL	0.857	ELX	0.5	ELY	0.866		
57	0.9D - 1.0Ev + 1.0Eh 135°	Yes	Y	DL	0.857	ELX	0.707	ELY	0.707		
58	0.9D - 1.0Ev + 1.0Eh 150°	Yes	Y	DL	0.857	ELX	0.866	ELY	0.5		
59	0.9D - 1.0Ev + 1.0Eh 180°	Yes	Y	DL	0.857	ELX	1	ELY			
60	0.9D - 1.0Ev + 1.0Eh 210°	Yes	Y	DL	0.857	ELX	0.866	ELY	-0.5		
61	0.9D - 1.0Ev + 1.0Eh 225°	Yes	Y	DL	0.857	ELX	0.707	ELY	-0.707		
62	0.9D - 1.0Ev + 1.0Eh 240°	Yes	Y	DL	0.857	ELX	0.5	ELY	-0.866		
63	0.9D - 1.0Ev + 1.0Eh 270°	Yes	Y	DL	0.857	ELX		ELY	-1		
64	0.9D - 1.0Ev + 1.0Eh 300°	Yes	Y	DL	0.857	ELX	-0.5	ELY	-0.866		
65	0.9D - 1.0Ev + 1.0Eh 315°	Yes	Y	DL	0.857	ELX	-0.707	ELY	-0.707		
66	0.9D - 1.0Ev + 1.0Eh 330°	Yes	Y	DL	0.857	ELX	-0.866	ELY	-0.5		
67	1.2D + 1.5Lm 1 + 1.0Wm 0°	Yes	Y	DL	1.2	5	0.068	37	0.068	OL1	1.5
68	1.2D + 1.5Lm 1 + 1.0Wm 30°	Yes	Y	DL	1.2	6	0.068	38	0.068	OL1	1.5
69	1.2D + 1.5Lm 1 + 1.0Wm 45°	Yes	Y	DL	1.2	7	0.068	39	0.068	OL1	1.5
70	1.2D + 1.5Lm 1 + 1.0Wm 60°	Yes	Y	DL	1.2	8	0.068	40	0.068	OL1	1.5
71	1.2D + 1.5Lm 1 + 1.0Wm 90°	Yes	Y	DL	1.2	9	0.068	41	0.068	OL1	1.5
72	1.2D + 1.5Lm 1 + 1.0Wm 120°	Yes	Y	DL	1.2	10	0.068	42	0.068	OL1	1.5
73	1.2D + 1.5Lm 1 + 1.0Wm 135°	Yes	Y	DL	1.2	11	0.068	43	0.068	OL1	1.5
74	1.2D + 1.5Lm 1 + 1.0Wm 150°	Yes	Y	DL	1.2	12	0.068	44	0.068	OL1	1.5
75	1.2D + 1.5Lm 1 + 1.0Wm 180°	Yes	Y	DL	1.2	13	-0.068	45	-0.068	OL1	1.5
76	1.2D + 1.5Lm 1 + 1.0Wm 210°	Yes	Y	DL	1.2	14	-0.068	46	-0.068	OL1	1.5
77	1.2D + 1.5Lm 1 + 1.0Wm 225°	Yes	Y	DL	1.2	15	-0.068	47	-0.068	OL1	1.5
78	1.2D + 1.5Lm 1 + 1.0Wm 240°	Yes	Y	DL	1.2	16	-0.068	48	-0.068	OL1	1.5
79	1.2D + 1.5Lm 1 + 1.0Wm 270°	Yes	Y	DL	1.2	17	-0.068	49	-0.068	OL1	1.5
80	1.2D + 1.5Lm 1 + 1.0Wm 300°	Yes	Y	DL	1.2	18	-0.068	50	-0.068	OL1	1.5
81	1.2D + 1.5Lm 1 + 1.0Wm 315°	Yes	Y	DL	1.2	19	-0.068	51	-0.068	OL1	1.5
82	1.2D + 1.5Lm 1 + 1.0Wm 330°	Yes	Y	DL	1.2	20	-0.068	52	-0.068	OL1	1.5
83	1.2D + 1.5Lm 2 + 1.0Wm 0°	Yes	Y	DL	1.2	5	0.068	37	0.068	OL2	1.5
84	1.2D + 1.5Lm 2 + 1.0Wm 30°	Yes	Y	DL	1.2	6	0.068	38	0.068	OL2	1.5
85	1.2D + 1.5Lm 2 + 1.0Wm 45°	Yes	Y	DL	1.2	7	0.068	39	0.068	OL2	1.5
86	1.2D + 1.5Lm 2 + 1.0Wm 60°	Yes	Y	DL	1.2	8	0.068	40	0.068	OL2	1.5
87	1.2D + 1.5Lm 2 + 1.0Wm 90°	Yes	Y	DL	1.2	9	0.068	41	0.068	OL2	1.5



**Load Combinations (Continued)**

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
88	1.2D + 1.5Lm 2 + 1.0Wm 120°	Yes	Y	DL	1.2	10	0.068	42	0.068	OL2	1.5
89	1.2D + 1.5Lm 2 + 1.0Wm 135°	Yes	Y	DL	1.2	11	0.068	43	0.068	OL2	1.5
90	1.2D + 1.5Lm 2 + 1.0Wm 150°	Yes	Y	DL	1.2	12	0.068	44	0.068	OL2	1.5
91	1.2D + 1.5Lm 2 + 1.0Wm 180°	Yes	Y	DL	1.2	13	-0.068	45	-0.068	OL2	1.5
92	1.2D + 1.5Lm 2 + 1.0Wm 210°	Yes	Y	DL	1.2	14	-0.068	46	-0.068	OL2	1.5
93	1.2D + 1.5Lm 2 + 1.0Wm 225°	Yes	Y	DL	1.2	15	-0.068	47	-0.068	OL2	1.5
94	1.2D + 1.5Lm 2 + 1.0Wm 240°	Yes	Y	DL	1.2	16	-0.068	48	-0.068	OL2	1.5
95	1.2D + 1.5Lm 2 + 1.0Wm 270°	Yes	Y	DL	1.2	17	-0.068	49	-0.068	OL2	1.5
96	1.2D + 1.5Lm 2 + 1.0Wm 300°	Yes	Y	DL	1.2	18	-0.068	50	-0.068	OL2	1.5
97	1.2D + 1.5Lm 2 + 1.0Wm 315°	Yes	Y	DL	1.2	19	-0.068	51	-0.068	OL2	1.5
98	1.2D + 1.5Lm 2 + 1.0Wm 330°	Yes	Y	DL	1.2	20	-0.068	52	-0.068	OL2	1.5
99	1.2D + 1.5Lm 3 + 1.0Wm 0°	Yes	Y	DL	1.2	5	0.068	37	0.068	OL3	1.5
100	1.2D + 1.5Lm 3 + 1.0Wm 30°	Yes	Y	DL	1.2	6	0.068	38	0.068	OL3	1.5
101	1.2D + 1.5Lm 3 + 1.0Wm 45°	Yes	Y	DL	1.2	7	0.068	39	0.068	OL3	1.5
102	1.2D + 1.5Lm 3 + 1.0Wm 60°	Yes	Y	DL	1.2	8	0.068	40	0.068	OL3	1.5
103	1.2D + 1.5Lm 3 + 1.0Wm 90°	Yes	Y	DL	1.2	9	0.068	41	0.068	OL3	1.5
104	1.2D + 1.5Lm 3 + 1.0Wm 120°	Yes	Y	DL	1.2	10	0.068	42	0.068	OL3	1.5
105	1.2D + 1.5Lm 3 + 1.0Wm 135°	Yes	Y	DL	1.2	11	0.068	43	0.068	OL3	1.5
106	1.2D + 1.5Lm 3 + 1.0Wm 150°	Yes	Y	DL	1.2	12	0.068	44	0.068	OL3	1.5
107	1.2D + 1.5Lm 3 + 1.0Wm 180°	Yes	Y	DL	1.2	13	-0.068	45	-0.068	OL3	1.5
108	1.2D + 1.5Lm 3 + 1.0Wm 210°	Yes	Y	DL	1.2	14	-0.068	46	-0.068	OL3	1.5
109	1.2D + 1.5Lm 3 + 1.0Wm 225°	Yes	Y	DL	1.2	15	-0.068	47	-0.068	OL3	1.5
110	1.2D + 1.5Lm 3 + 1.0Wm 240°	Yes	Y	DL	1.2	16	-0.068	48	-0.068	OL3	1.5
111	1.2D + 1.5Lm 3 + 1.0Wm 270°	Yes	Y	DL	1.2	17	-0.068	49	-0.068	OL3	1.5
112	1.2D + 1.5Lm 3 + 1.0Wm 300°	Yes	Y	DL	1.2	18	-0.068	50	-0.068	OL3	1.5
113	1.2D + 1.5Lm 3 + 1.0Wm 315°	Yes	Y	DL	1.2	19	-0.068	51	-0.068	OL3	1.5
114	1.2D + 1.5Lm 3 + 1.0Wm 330°	Yes	Y	DL	1.2	20	-0.068	52	-0.068	OL3	1.5
115	1.2D + 1.5Lm 4 + 1.0Wm 0°	Yes	Y	DL	1.2	5	0.068	37	0.068	OL4	1.5
116	1.2D + 1.5Lm 4 + 1.0Wm 30°	Yes	Y	DL	1.2	6	0.068	38	0.068	OL4	1.5
117	1.2D + 1.5Lm 4 + 1.0Wm 45°	Yes	Y	DL	1.2	7	0.068	39	0.068	OL4	1.5
118	1.2D + 1.5Lm 4 + 1.0Wm 60°	Yes	Y	DL	1.2	8	0.068	40	0.068	OL4	1.5
119	1.2D + 1.5Lm 4 + 1.0Wm 90°	Yes	Y	DL	1.2	9	0.068	41	0.068	OL4	1.5
120	1.2D + 1.5Lm 4 + 1.0Wm 120°	Yes	Y	DL	1.2	10	0.068	42	0.068	OL4	1.5
121	1.2D + 1.5Lm 4 + 1.0Wm 135°	Yes	Y	DL	1.2	11	0.068	43	0.068	OL4	1.5
122	1.2D + 1.5Lm 4 + 1.0Wm 150°	Yes	Y	DL	1.2	12	0.068	44	0.068	OL4	1.5
123	1.2D + 1.5Lm 4 + 1.0Wm 180°	Yes	Y	DL	1.2	13	-0.068	45	-0.068	OL4	1.5
124	1.2D + 1.5Lm 4 + 1.0Wm 210°	Yes	Y	DL	1.2	14	-0.068	46	-0.068	OL4	1.5
125	1.2D + 1.5Lm 4 + 1.0Wm 225°	Yes	Y	DL	1.2	15	-0.068	47	-0.068	OL4	1.5
126	1.2D + 1.5Lm 4 + 1.0Wm 240°	Yes	Y	DL	1.2	16	-0.068	48	-0.068	OL4	1.5
127	1.2D + 1.5Lm 4 + 1.0Wm 270°	Yes	Y	DL	1.2	17	-0.068	49	-0.068	OL4	1.5
128	1.2D + 1.5Lm 4 + 1.0Wm 300°	Yes	Y	DL	1.2	18	-0.068	50	-0.068	OL4	1.5
129	1.2D + 1.5Lm 4 + 1.0Wm 315°	Yes	Y	DL	1.2	19	-0.068	51	-0.068	OL4	1.5
130	1.2D + 1.5Lm 4 + 1.0Wm 330°	Yes	Y	DL	1.2	20	-0.068	52	-0.068	OL4	1.5

**Hot Rolled Steel Properties**

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e <sup>5</sup> F <sup>-1</sup> ]	Density [k/ft <sup>3</sup> ]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
3	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.4	65	1.3
8	SAE J429 Grade 2	29000	11154	0.3	0.65	0.49	57	1.5	74	1.2

**Hot Rolled Steel Section Sets**

	Label	Shape	Type	Design List	Material	Design Rule	Area [in <sup>2</sup> ]	Iyy [in <sup>4</sup> ]	Izz [in <sup>4</sup> ]	J [in <sup>4</sup> ]
1	Offset Arm	HSS4X4X4	None	None	A500 Gr.B Rect	Typical	3.37	7.8	7.8	12.8
2	Internal Horiz	L3X3X4	Beam	None	A36 Gr.36	Typical	1.44	1.23	1.23	0.031
3	Internal Horiz Plate	PL3X0.375	None	None	A36 Gr.36	Typical	1.125	0.013	0.844	0.049
4	Face Horizontal	C5X6.7	HBrace	None	A36 Gr.36	Typical	1.97	0.47	7.48	0.055
5	MOUNT_PIPE_2.0	PIPE_2.0	None	None	A53 Gr.B	Typical	1.02	0.627	0.627	1.25
6	Handrail	L3X3X4	None	None	A36 Gr.36	Typical	1.44	1.23	1.23	0.031
7	Bottom Corner Plate	PL9X0.5	None	None	A36 Gr.36	Typical	4.5	0.094	30.375	0.362
8	Threaded Rods	1/2 SR	None	None	A36 Gr.36	Typical	0.196	0.003	0.003	0.006
9	Top Corner Plate	0.38 X 6 Plate	Column	None	A36 Gr.36	Typical	2.28	0.027	6.84	0.105
10	MOD SAMAST6	PIPE_2.5	None	None	A53 Gr.B	Typical	1.61	1.45	1.45	2.89

**Hot Rolled Steel Design Parameters**

	Label	Shape	Length [in]	Lb y-y [in]	Lb z-z [in]	Function
1	M18	Offset Arm	75.1			Lateral
2	M35	Bottom Corner Plate	18.978			Lateral
3	M42	Face Horizontal	150	61.35	57	Lateral
4	M58	Face Horizontal	150	61.35	57	Lateral
5	M65	Face Horizontal	150	61.35	57	Lateral
6	M69	Internal Horiz Plate	6			Lateral
7	M70	Internal Horiz Plate	6			Lateral
8	M71	Internal Horiz Plate	6			Lateral
9	M72	Internal Horiz Plate	6			Lateral
10	M73	Internal Horiz Plate	6			Lateral
11	M74	Internal Horiz Plate	6			Lateral
12	M75	Internal Horiz	68.328			Lateral
13	M76	Internal Horiz	68.328			Lateral
14	M77	Internal Horiz	68.328			Lateral
15	M145	Handrail	150		57	Lateral
16	M152	Handrail	150		57	Lateral
17	M153	Handrail	150		57	Lateral
18	M73A	Bottom Corner Plate	18.978			Lateral
19	M77A	Bottom Corner Plate	18.978			Lateral
20	M265	Top Corner Plate	18.978			Lateral
21	M261	Top Corner Plate	18.978			Lateral
22	M267	Top Corner Plate	18.978			Lateral
23	M269	MOD SAMAST6	72			Lateral
24	M270	MOD SAMAST6	72			Lateral
25	M271	MOD SAMAST6	72			Lateral
26	M308	Offset Arm	75.1			Lateral
27	M309	Offset Arm	75.1			Lateral
28	A_MP1_S	MOUNT_PIPE_2.0	60			Lateral
29	A_MP2_S	MOUNT_PIPE_2.0	60			Lateral
30	A_MP2_D	MOUNT_PIPE_2.0	96			Lateral
31	A_MP3_S	MOUNT_PIPE_2.0	60			Lateral
32	A_MP3_D	MOUNT_PIPE_2.0	108			Lateral
33	A_MP4_S	MOUNT_PIPE_2.0	60			Lateral
34	A_MP4_D	MOUNT_PIPE_2.0	96			Lateral
35	B_MP1_S	MOUNT_PIPE_2.0	60			Lateral
36	B_MP2_S	MOUNT_PIPE_2.0	60			Lateral
37	B_MP2_D	MOUNT_PIPE_2.0	96			Lateral
38	B_MP3_S	MOUNT_PIPE_2.0	60			Lateral
39	B_MP3_D	MOUNT_PIPE_2.0	108			Lateral
40	B_MP4_S	MOUNT_PIPE_2.0	60			Lateral
41	B_MP4_D	MOUNT_PIPE_2.0	96			Lateral

**Hot Rolled Steel Design Parameters (Continued)**

	Label	Shape	Length [in]	Lb y-y [in]	Lb z-z [in]	Function
42	G MP1 S	MOUNT_PIPE_2.0	60			Lateral
43	G MP2 S	MOUNT_PIPE_2.0	60			Lateral
44	G MP2 D	MOUNT_PIPE_2.0	96			Lateral
45	G MP3 S	MOUNT_PIPE_2.0	60			Lateral
46	G MP3 D	MOUNT_PIPE_2.0	108			Lateral
47	G MP4 S	MOUNT_PIPE_2.0	60			Lateral
48	G MP4 D	MOUNT_PIPE_2.0	96			Lateral
49	M162	Threaded Rods	8			Lateral
50	M163	Threaded Rods	8			Lateral
51	M170	Threaded Rods	8			Lateral
52	M171	Threaded Rods	8			Lateral
53	M182	Threaded Rods	8			Lateral
54	M183	Threaded Rods	8			Lateral
55	M186	Threaded Rods	8			Lateral
56	M187	Threaded Rods	8			Lateral
57	M190	Threaded Rods	11			Lateral
58	M201	Threaded Rods	11			Lateral
59	M202	Threaded Rods	11			Lateral
60	M203	Threaded Rods	11			Lateral
61	M209	Threaded Rods	11			Lateral
62	M212	Threaded Rods	8			Lateral
63	M222	Threaded Rods	8			Lateral
64	M223	Threaded Rods	8			Lateral
65	M226	Threaded Rods	8			Lateral
66	M227	Threaded Rods	8			Lateral
67	M236	Threaded Rods	8			Lateral
68	M237	Threaded Rods	8			Lateral
69	M238	Threaded Rods	8			Lateral
70	M249	Threaded Rods	11			Lateral
71	M250	Threaded Rods	11			Lateral
72	M251	Threaded Rods	11			Lateral
73	M257	Threaded Rods	11			Lateral
74	M272	Threaded Rods	8			Lateral
75	M282	Threaded Rods	8			Lateral
76	M283	Threaded Rods	8			Lateral
77	M286	Threaded Rods	8			Lateral
78	M287	Threaded Rods	8			Lateral
79	M299	Threaded Rods	8			Lateral
80	M300	Threaded Rods	8			Lateral
81	M301	Threaded Rods	8			Lateral
82	M315	Threaded Rods	11			Lateral
83	M316	Threaded Rods	11			Lateral
84	M317	Threaded Rods	11			Lateral

**Member Advanced Data**

	Label	I Release	J Release	T/C Only	Physical	Deflection Ratio Options	Seismic DR
1	M18				Yes	** NA **	None
2	M35				Yes	** NA **	None
3	M42				Yes	** NA **	None
4	M58				Yes	** NA **	None
5	M65				Yes	** NA **	None
6	M69				Yes	** NA **	None
7	M70				Yes	** NA **	None
8	M71				Yes	** NA **	None
9	M72				Yes	** NA **	None

**Member Advanced Data (Continued)**

	Label	I Release	J Release	T/C Only	Physical	Deflection Ratio Options	Seismic DR
10	M73				Yes	** NA **	None
11	M74				Yes	** NA **	None
12	M75				Yes	N/A	None
13	M76				Yes	N/A	None
14	M77				Yes	N/A	None
15	M145				Yes	** NA **	None
16	M152				Yes	** NA **	None
17	M153				Yes	** NA **	None
18	M73A				Yes	** NA **	None
19	M75A				Yes	** NA **	None
20	M77A				Yes	** NA **	None
21	M78				Yes	** NA **	None
22	M77B				Yes	** NA **	None
23	M78A				Yes	** NA **	None
24	M79				Yes	** NA **	None
25	M80B				Yes	** NA **	None
26	M79A				Yes	** NA **	None
27	M80A				Yes	** NA **	None
28	M81A				Yes	** NA **	None
29	M81B				Yes	** NA **	None
30	M82A				Yes	** NA **	None
31	M83A				Yes	** NA **	None
32	M84A				Yes	** NA **	None
33	M85A				Yes	** NA **	None
34	M86				Yes	** NA **	None
35	M87	AIIPIN	BenPIN	Compression Only	Yes	** NA **	None
36	M94	AIIPIN	BenPIN	Compression Only	Yes	** NA **	None
37	M95	AIIPIN	BenPIN	Compression Only	Yes	** NA **	None
38	M263				Yes	** NA **	None
39	M264				Yes	** NA **	None
40	M265				Yes	** NA **	None
41	M260				Yes	** NA **	None
42	M261				Yes	** NA **	None
43	M262				Yes	** NA **	None
44	M266				Yes	** NA **	None
45	M267				Yes	** NA **	None
46	M268				Yes	** NA **	None
47	M269				Yes	** NA **	None
48	M270				Yes	** NA **	None
49	M271				Yes	** NA **	None
50	M296				Yes	** NA **	None
51	M297				Yes	** NA **	None
52	M298				Yes	** NA **	None
53	M305				Yes	** NA **	None
54	M308				Yes	** NA **	None
55	M309				Yes	** NA **	None
56	RI2				Yes	** NA **	None
57	RI1		OOOXOO		Yes	** NA **	None
58	A_MP1_S				Yes	** NA **	None
59	RI12				Yes	** NA **	None
60	RI11		OOOXOO		Yes	** NA **	None
61	A_MP2_S				Yes	** NA **	None
62	RI13				Yes	** NA **	None
63	RI14				Yes	** NA **	None
64	A_MP2_D				Yes	** NA **	None

**Member Advanced Data (Continued)**

	Label	I Release	J Release	T/C Only	Physical	Deflection Ratio Options	Seismic DR
65	RI22				Yes	** NA **	None
66	RI21		OOOXOO		Yes	** NA **	None
67	A MP3 S				Yes	** NA **	None
68	RI23				Yes	** NA **	None
69	RI24				Yes	** NA **	None
70	A MP3 D				Yes	** NA **	None
71	RI32				Yes	** NA **	None
72	RI31		OOOXOO		Yes	** NA **	None
73	A MP4 S				Yes	** NA **	None
74	RI33				Yes	** NA **	None
75	RI34				Yes	** NA **	None
76	A MP4 D				Yes	** NA **	None
77	RI72				Yes	** NA **	None
78	RI71		OOOXOO		Yes	** NA **	None
79	B MP1 S				Yes	** NA **	None
80	RI82				Yes	** NA **	None
81	RI81		OOOXOO		Yes	** NA **	None
82	B MP2 S				Yes	** NA **	None
83	RI83				Yes	** NA **	None
84	RI84				Yes	** NA **	None
85	B MP2 D				Yes	** NA **	None
86	RI92				Yes	** NA **	None
87	RI91		OOOXOO		Yes	** NA **	None
88	B MP3 S				Yes	** NA **	None
89	RI93				Yes	** NA **	None
90	RI94				Yes	** NA **	None
91	B MP3 D				Yes	** NA **	None
92	RI102				Yes	** NA **	None
93	RI101		OOOXOO		Yes	** NA **	None
94	B MP4 S				Yes	** NA **	None
95	RI103				Yes	** NA **	None
96	RI104				Yes	** NA **	None
97	B MP4 D				Yes	** NA **	None
98	RI142				Yes	** NA **	None
99	RI141		OOOXOO		Yes	** NA **	None
100	G MP1 S				Yes	** NA **	None
101	RI152				Yes	** NA **	None
102	RI151		OOOXOO		Yes	** NA **	None
103	G MP2 S				Yes	** NA **	None
104	RI153				Yes	** NA **	None
105	RI154				Yes	** NA **	None
106	G MP2 D				Yes	** NA **	None
107	RI162				Yes	** NA **	None
108	RI161		OOOXOO		Yes	** NA **	None
109	G MP3 S				Yes	** NA **	None
110	RI163				Yes	** NA **	None
111	RI164				Yes	** NA **	None
112	G MP3 D				Yes	** NA **	None
113	RI172				Yes	** NA **	None
114	RI171		OOOXOO		Yes	** NA **	None
115	G MP4 S				Yes	** NA **	None
116	RI173				Yes	** NA **	None
117	RI174				Yes	** NA **	None
118	G MP4 D				Yes	** NA **	None
119	RI302				Yes	** NA **	None

**Member Advanced Data (Continued)**

	Label	I Release	J Release	T/C Only	Physical	Deflection Ratio Options	Seismic DR
120	RI304				Yes	** NA **	None
121	RI309				Yes	** NA **	None
122	RI311				Yes	** NA **	None
123	RI316				Yes	** NA **	None
124	RI318				Yes	** NA **	None
125	M141				Yes	** NA **	None
126	M142				Yes	** NA **	None
127	M143				Yes	** NA **	None
128	M144				Yes	** NA **	None
129	M146				Yes	** NA **	None
130	M147				Yes	** NA **	None
131	M139				Yes	** NA **	None
132	M140				Yes	** NA **	None
133	M148				Yes	** NA **	None
134	M149				Yes	** NA **	None
135	M150				Yes	** NA **	None
136	M151				Yes	** NA **	None
137	M154				Yes	** NA **	None
138	M155				Yes	** NA **	None
139	M156				Yes	** NA **	None
140	M157				Yes	** NA **	None
141	M158				Yes	** NA **	None
142	M159				Yes	** NA **	None
143	M160				Yes	** NA **	None
144	M161				Yes	** NA **	None
145	M162		OOOXOO		Yes	** NA **	None
146	M163		OOOXOO		Yes	** NA **	None
147	M164				Yes	** NA **	None
148	M165				Yes	** NA **	None
149	M166				Yes	** NA **	None
150	M167				Yes	** NA **	None
151	M168				Yes	** NA **	None
152	M169				Yes	** NA **	None
153	M170		OOOXOO		Yes	** NA **	None
154	M171		OOOXOO		Yes	** NA **	None
155	M172				Yes	** NA **	None
156	M173				Yes	** NA **	None
157	M174				Yes	** NA **	None
158	M175				Yes	** NA **	None
159	M176				Yes	** NA **	None
160	M177				Yes	** NA **	None
161	M178				Yes	** NA **	None
162	M179				Yes	** NA **	None
163	M180				Yes	** NA **	None
164	M181				Yes	** NA **	None
165	M182		OOOXOO		Yes	** NA **	None
166	M183		OOOXOO		Yes	** NA **	None
167	M184				Yes	** NA **	None
168	M185				Yes	** NA **	None
169	M186		OOOXOO		Yes	** NA **	None
170	M187		OOOXOO		Yes	** NA **	None
171	M188				Yes	** NA **	None
172	M189				Yes	** NA **	None
173	M190		OOOXOO		Yes	** NA **	None
174	M191				Yes	** NA **	None

**Member Advanced Data (Continued)**

	Label	I Release	J Release	T/C Only	Physical	Deflection Ratio Options	Seismic DR
175	M192				Yes	** NA **	None
176	M193				Yes	** NA **	None
177	M194				Yes	** NA **	None
178	M195				Yes	** NA **	None
179	M196				Yes	** NA **	None
180	M197				Yes	** NA **	None
181	M198				Yes	** NA **	None
182	M199				Yes	** NA **	None
183	M200				Yes	** NA **	None
184	M201		OOOXOO		Yes	** NA **	None
185	M202		OOOXOO		Yes	** NA **	None
186	M203		OOOXOO		Yes	** NA **	None
187	M204				Yes	** NA **	None
188	M205				Yes	** NA **	None
189	M206				Yes	** NA **	None
190	M207				Yes	** NA **	None
191	M208				Yes	** NA **	None
192	M209		OOOXOO		Yes	** NA **	None
193	M210				Yes	** NA **	None
194	M211				Yes	** NA **	None
195	M212		OOOXOO		Yes	** NA **	None
196	M213				Yes	** NA **	None
197	M214				Yes	** NA **	None
198	M215				Yes	** NA **	None
199	M216				Yes	** NA **	None
200	M217				Yes	** NA **	None
201	M218				Yes	** NA **	None
202	M219				Yes	** NA **	None
203	M220				Yes	** NA **	None
204	M221				Yes	** NA **	None
205	M222		OOOXOO		Yes	** NA **	None
206	M223		OOOXOO		Yes	** NA **	None
207	M224				Yes	** NA **	None
208	M225				Yes	** NA **	None
209	M226		OOOXOO		Yes	** NA **	None
210	M227		OOOXOO		Yes	** NA **	None
211	M228				Yes	** NA **	None
212	M229				Yes	** NA **	None
213	M230				Yes	** NA **	None
214	M231				Yes	** NA **	None
215	M232				Yes	** NA **	None
216	M233				Yes	** NA **	None
217	M234				Yes	** NA **	None
218	M235				Yes	** NA **	None
219	M236		OOOXOO		Yes	** NA **	None
220	M237		OOOXOO		Yes	** NA **	None
221	M238		OOOXOO		Yes	** NA **	None
222	M239				Yes	** NA **	None
223	M240				Yes	** NA **	None
224	M241				Yes	** NA **	None
225	M242				Yes	** NA **	None
226	M243				Yes	** NA **	None
227	M244				Yes	** NA **	None
228	M245				Yes	** NA **	None
229	M246				Yes	** NA **	None



**Member Advanced Data (Continued)**

	Label	I Release	J Release	T/C Only	Physical	Deflection Ratio Options	Seismic DR
230	M247				Yes	** NA **	None
231	M248				Yes	** NA **	None
232	M249		OOOXOO		Yes	** NA **	None
233	M250		OOOXOO		Yes	** NA **	None
234	M251		OOOXOO		Yes	** NA **	None
235	M252				Yes	** NA **	None
236	M253				Yes	** NA **	None
237	M254				Yes	** NA **	None
238	M255				Yes	** NA **	None
239	M256				Yes	** NA **	None
240	M257		OOOXOO		Yes	** NA **	None
241	M258				Yes	** NA **	None
242	M259				Yes	** NA **	None
243	M272		OOOXOO		Yes	** NA **	None
244	M273				Yes	** NA **	None
245	M274				Yes	** NA **	None
246	M275				Yes	** NA **	None
247	M276				Yes	** NA **	None
248	M277				Yes	** NA **	None
249	M278				Yes	** NA **	None
250	M279				Yes	** NA **	None
251	M280				Yes	** NA **	None
252	M281				Yes	** NA **	None
253	M282		OOOXOO		Yes	** NA **	None
254	M283		OOOXOO		Yes	** NA **	None
255	M284				Yes	** NA **	None
256	M285				Yes	** NA **	None
257	M286		OOOXOO		Yes	** NA **	None
258	M287		OOOXOO		Yes	** NA **	None
259	M288				Yes	** NA **	None
260	M289				Yes	** NA **	None
261	M290				Yes	** NA **	None
262	M291				Yes	** NA **	None
263	M292				Yes	** NA **	None
264	M293				Yes	** NA **	None
265	M294				Yes	** NA **	None
266	M295				Yes	** NA **	None
267	M299		OOOXOO		Yes	** NA **	None
268	M300		OOOXOO		Yes	** NA **	None
269	M301		OOOXOO		Yes	** NA **	None
270	M302				Yes	** NA **	None
271	M303				Yes	** NA **	None
272	M304				Yes	** NA **	None
273	M306				Yes	** NA **	None
274	M307				Yes	** NA **	None
275	M310				Yes	** NA **	None
276	M311				Yes	** NA **	None
277	M312				Yes	** NA **	None
278	M313				Yes	** NA **	None
279	M314				Yes	** NA **	None
280	M315		OOOXOO		Yes	** NA **	None
281	M316		OOOXOO		Yes	** NA **	None
282	M317		OOOXOO		Yes	** NA **	None



**Node Boundary Conditions**

Node 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 N35	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2 N438	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3 N441	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

**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 N35	max 213.515	3	862.823	15	3587.094	19	1327.674	7	12846.996	3	2338.858	7
2	min -8748.453	27	-870.062	7	-86.275	11	-1404.171	15	-5482.716	11	-2364.519	15
3 N441	max 4383.065	33	7547.587	32	3579.77	24	11495.726	8	3289.727	17	2529.188	13
4	min -167.02	8	-73.777	8	-106.645	16	-5296.364	16	-6832.956	9	-2547.897	5
5 N438	max 4370.998	21	196.312	14	3658.034	30	4548.269	6	2714.083	5	2345.386	18
6	min -15.832	13	-7566.824	22	-30.859	6	-11096.574	14	-6566.515	13	-2354.585	10
7 Totals:	max 6418.609	3	6403.732	15	9614.313	27						
8	min -6418.342	11	-6403.768	7	3454.613	51						

**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 M202	1/2 SR	1.408	11	6	0.054	0	6	4231.801	6361.74	53.015	53.015	2.237	H1-1b	
2 M317	1/2 SR	1.386	11	11	0.053	0	11	4231.801	6361.74	53.015	53.015	2.237	H1-1b	
3 M201	1/2 SR	1.36	11	6	0.053	0	6	4231.801	6361.74	53.015	53.015	2.234	H1-1b	
4 M257	1/2 SR	1.343	11	11	0.053	0	11	4231.801	6361.74	53.015	53.015	2.235	H1-1b	
5 G_MP3_S	PIPE 2.0	1.169	54.947	17	0.22	54.947	16	23808.54	32130	1871.625	1871.625	1.818	H1-1b	
6 B_MP3_S	PIPE 2.0	1.16	54.947	12	0.221	54.947	11	23808.54	32130	1871.625	1871.625	1.697	H1-1b	
7 G_MP2_S	PIPE 2.0	1.149	54.947	17	0.334	5.053	7	23808.54	32130	1871.625	1871.625	1.749	H1-1b	
8 M251	1/2 SR	1.147	0	8	0.044	0	8	4231.801	6361.74	53.015	53.015	2.241	H1-1b	
9 M209	1/2 SR	1.138	0	16	0.045	0	16	4231.801	6361.74	53.015	53.015	2.248	H1-1b	
10A_MP3_S	PIPE 2.0	1.133	54.947	7	0.218	54.947	5	23808.54	32130	1871.625	1871.625	1.746	H1-1b	
11B_MP2_S	PIPE 2.0	1.119	54.947	12	0.345	5.053	18	23808.54	32130	1871.625	1871.625	1.885	H1-1b	
12 M75	L3X3X4	1.101	34.164	30	0.044	34.164	z 31	22751.101	46656	1688.138	3325.579	1.298	H2-1	
13A_MP2_S	PIPE 2.0	1.094	54.947	7	0.353	5.053	12	23808.54	32130	1871.625	1871.625	1.768	H1-1b	
14 M76	L3X3X4	1.085	34.164	19	0.043	34.164	z 20	22751.101	46656	1688.138	3325.038	1.297	H2-1	
15 M77	L3X3X4	1.084	34.164	24	0.043	34.164	z 25	22751.101	46656	1688.138	3324.716	1.296	H2-1	
16 M162	1/2 SR	1.054	8	5	0.056	0	6	5127.778	6361.74	53.015	53.015	2.218	H1-1b	
17 M163	1/2 SR	1.051	8	5	0.053	0	6	5127.778	6361.74	53.015	53.015	2.211	H1-1b	
18 M282	1/2 SR	1.041	8	11	0.055	0	11	5127.778	6361.74	53.015	53.015	2.248	H1-1b	
19G_MP4_S	PIPE 2.0	1.039	54.947	9	0.334	7.895	11	23808.54	32130	1871.625	1871.625	1.82	H1-1b	
20B_MP4_S	PIPE 2.0	1.028	54.947	12	0.332	7.895	6	23808.54	32130	1871.625	1871.625	1.81	H1-1b	
21 M237	1/2 SR	1.025	0	9	0.054	0	9	5127.778	6361.74	53.015	53.015	2.244	H1-1b	
22A_MP4_S	PIPE 2.0	1.021	54.947	15	0.341	7.895	17	23808.54	32130	1871.625	1871.625	1.764	H1-1b	
23 M222	1/2 SR	1.021	0	16	0.054	0	16	5127.778	6361.74	53.015	53.015	2.267	H1-1b	
24 M283	1/2 SR	1.002	8	11	0.052	0	11	5127.778	6361.74	53.015	53.015	2.239	H1-1b	
25 M183	1/2 SR	1	0	15	0.053	0	15	5127.778	6361.74	53.015	53.015	2.253	H1-1b	
26 M300	1/2 SR	0.994	0	4	0.053	0	4	5127.778	6361.74	53.015	53.015	2.253	H1-1b	
27 M190	1/2 SR	0.994	11	29	0.039	0	30	4231.801	6361.74	53.015	53.015	2.253	H1-1b	
28G_MP1_S	PIPE 2.0	0.99	54.947	17	0.171	54.947	8	23808.54	32130	1871.625	1871.625	1.796	H1-1b	
29 M236	1/2 SR	0.99	0	17	0.054	0	17	5127.778	6361.74	53.015	53.015	2.266	H1-1b	
30 M315	1/2 SR	0.986	11	28	0.039	0	28	4231.801	6361.74	53.015	53.015	2.259	H1-1b	
31 M316	1/2 SR	0.986	11	19	0.039	0	19	4231.801	6361.74	53.015	53.015	2.255	H1-1b	
32 M223	1/2 SR	0.979	0	8	0.05	0	8	5127.778	6361.74	53.015	53.015	2.241	H1-1b	
33 M203	1/2 SR	0.977	11	23	0.039	0	23	4231.801	6361.74	53.015	53.015	2.258	H1-1b	
34 M182	1/2 SR	0.972	8	6	0.053	0	6	5127.778	6361.74	53.015	53.015	2.259	H1-1b	
35 M299	1/2 SR	0.971	8	11	0.053	0	11	5127.778	6361.74	53.015	53.015	2.26	H1-1b	

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

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
36	B_MP1_S	PIPE 2.0	0.966	54.947	12	0.172	54.947	3	23808.54	32130	1871.625	1871.625	1.62	H1-1b
37	M301	1/2 SR	0.965	8	12	0.052	0	12	5127.778	6361.74	53.015	53.015	2.271	H1-1b
38	M238	1/2 SR	0.962	8	18	0.052	0	18	5127.778	6361.74	53.015	53.015	2.271	H1-1b
39	M272	1/2 SR	0.962	8	3	0.05	0	3	5127.778	6361.74	53.015	53.015	2.259	H1-1b
40	M212	1/2 SR	0.959	8	8	0.05	0	8	5127.778	6361.74	53.015	53.015	2.259	H1-1b
41	M186	1/2 SR	0.952	8	14	0.05	0	14	5127.778	6361.74	53.015	53.015	2.259	H1-1b
42	M187	1/2 SR	0.948	8	7	0.052	0	7	5127.778	6361.74	53.015	53.015	2.271	H1-1b
43	A_MP1_S	PIPE 2.0	0.943	54.947	7	0.17	54.947	13	23808.54	32130	1871.625	1871.625	1.687	H1-1b
44	M309	HSS4X4X4	0.868	0	8	0.173	0	y 6	118424.664	139518	16180.5	16180.5	2.119	H1-1b
45	M286	1/2 SR	0.853	8	3	0.046	0	3	5127.778	6361.74	53.015	53.015	2.257	H1-1b
46	M226	1/2 SR	0.847	0	9	0.046	0	9	5127.778	6361.74	53.015	53.015	2.267	H1-1b
47	M170	1/2 SR	0.846	8	14	0.045	0	14	5127.778	6361.74	53.015	53.015	2.256	H1-1b
48	M18	HSS4X4X4	0.842	0	3	0.149	0	y 16	118424.664	139518	16180.5	16180.5	2.093	H1-1b
49	M308	HSS4X4X4	0.836	0	14	0.15	0	y 11	118424.664	139518	16180.5	16180.5	2.095	H1-1b
50	M249	1/2 SR	0.833	11	33	0.033	0	33	4231.801	6361.74	53.015	53.015	2.256	H1-1b
51	M250	1/2 SR	0.819	11	24	0.033	0	25	4231.801	6361.74	53.015	53.015	2.253	H1-1b
52	M287	1/2 SR	0.792	8	31	0.042	0	29	5127.778	6361.74	53.015	53.015	2.249	H1-1b
53	M171	1/2 SR	0.781	8	26	0.041	0	24	5127.778	6361.74	53.015	53.015	2.249	H1-1b
54	M227	1/2 SR	0.762	8	17	0.04	0	17	5127.778	6361.74	53.015	53.015	2.251	H1-1b
55	M153	L3X3X4	0.692	137.368	12	0.518	11.842	z 16	4948.021	46656	1688.138	2765.343	1.5	H2-1
56	M152	L3X3X4	0.691	137.368	18	0.488	11.842	z 5	4948.021	46656	1688.138	2765.343	1.5	H2-1
57	M145	L3X3X4	0.661	137.368	7	0.515	11.842	z 11	4948.021	46656	1688.138	2765.343	1.5	H2-1
58	M65	C5X6.7	0.657	145.263	10	0.791	73.421	y 12	27817.692	63828	1603.791	8381.998	1.805	H1-1b
59	M42	C5X6.7	0.653	145.263	4	0.798	76.579	y 15	27817.692	63828	1603.791	8309.669	1.79	H1-1b
60	M58	C5X6.7	0.613	145.263	15	0.815	73.421	y 18	27817.692	63828	1603.791	8202.3	1.767	H1-1b
61	M271	PIPE 2.5	0.462	72	8	0.058	47.747	8	37773.818	50715	3596.25	3596.25	3	H1-1b
62	M73A	PL9X0.5	0.432	7.192	13	0.334	11.786	y 24	58680.451	145800	1518.75	27337.5	1.973	H1-1b
63	M35	PL9X0.5	0.426	7.192	18	0.328	11.786	y 29	58680.451	145800	1518.75	27337.5	2.039	H1-1b
64	A_MP4_D	PIPE 2.0	0.409	17.179	12	0.1	17.179	17	14916.096	32130	1871.625	1871.625	1.7	H1-1b
65	B_MP4_D	PIPE 2.0	0.408	17.179	18	0.096	17.179	7	14916.096	32130	1871.625	1871.625	1.904	H1-1b
66	B_MP2_D	PIPE 2.0	0.402	16.674	17	0.126	17.179	16	14916.096	32130	1871.625	1871.625	1.882	H1-1b
67	A_MP2_D	PIPE 2.0	0.401	16.674	12	0.128	17.179	11	14916.096	32130	1871.625	1871.625	1.679	H1-1b
68	M77A	PL9X0.5	0.4	7.192	8	0.325	11.786	y 19	58680.451	145800	1518.75	27337.5	2.269	H1-1b
69	M70	PL3X0.375	0.355	0	10	0.034	6	y 25	31007.302	36450	284.766	2278.125	1.397	H1-1b
70	M69	PL3X0.375	0.35	0	15	0.035	6	y 31	31007.302	36450	284.766	2278.125	1.383	H1-1b
71	M71	PL3X0.375	0.344	0	4	0.034	6	y 20	31007.302	36450	284.766	2278.125	1.403	H1-1b
72	M270	PIPE 2.5	0.321	72	17	0.027	72	15	37773.818	50715	3596.25	3596.25	2.449	H1-1b
73	M72	PL3X0.375	0.321	6	13	0.034	0	y 29	31006.994	36450	284.766	2278.125	1.515	H1-1b
74	M269	PIPE 2.5	0.32	72	7	0.027	72	5	37773.818	50715	3596.25	3596.25	2.45	H1-1b
75	M74	PL3X0.375	0.316	6	8	0.032	0	y 24	31006.994	36450	284.766	2278.125	1.68	H1-1b
76	M73	PL3X0.375	0.312	6	3	0.033	0	y 19	31006.994	36450	284.766	2278.125	1.652	H1-1b
77	M265	0.38 X 6 Plate	0.275	0	17	0.084	18.978	y 10	17208.828	73872	584.82	9234	1.547	H1-1b
78	M267	0.38 X 6 Plate	0.264	0	7	0.082	18.978	y 15	17208.828	73872	584.82	9234	1.856	H1-1b
79	M261	0.38 X 6 Plate	0.263	0	12	0.084	18.978	y 4	17208.828	73872	584.82	9234	1.84	H1-1b
80	G_MP2_D	PIPE 2.0	0.246	17.179	7	0.129	57.6	5	14916.096	32130	1871.625	1871.625	2.171	H1-1b
81	B_MP3_D	PIPE 2.0	0.231	44.337	17	0.094	84.695	11	12143.947	32130	1871.625	1871.625	2.082	H1-1b
82	A_MP3_D	PIPE 2.0	0.231	44.337	12	0.095	73.895	13	12143.947	32130	1871.625	1871.625	1.934	H1-1b
83	G_MP3_D	PIPE 2.0	0.231	44.337	7	0.094	84.695	16	12143.947	32130	1871.625	1871.625	2.105	H1-1b
84	G_MP4_D	PIPE 2.0	0.215	17.179	7	0.113	57.6	15	14916.096	32130	1871.625	1871.625	2.195	H1-1b

# TOWER-MOUNT CONNECTION ANALYSIS

v.1.0.0

SITE INFORMATION	
Site ID	302524
Site Name	Beacon Falls
Project ID	41124-13753210_C8_04-01-MA

ANALYSIS PARAMETERS	
TIA Revision	H

APPLIED FORCES FROM R3D		
Member Label	M309-LC9	
Member End Label	I	
Force-X	F <sub>x</sub> , lbs	-5.1
Force-Y	F <sub>y</sub> , lbs	3295.9
Force-Z	F <sub>z</sub> , lbs	-153.1
Moment X-X	M <sub>x</sub> , lbs-ft	-427.1
Moment Y-Y	M <sub>y</sub> , lbs-ft	314.1
Moment Z-Z	M <sub>z</sub> , lbs-ft	12926.2

STANDOFF MEMBER PROPERTIES	
Standoff Member Type	Square/Rect. HSS
Standoff Member Shape	HSS4X4X1/4
Standoff Member Grade	A500-46 Gr.B Rect.
Member to Plate Weld Size, in	3/16

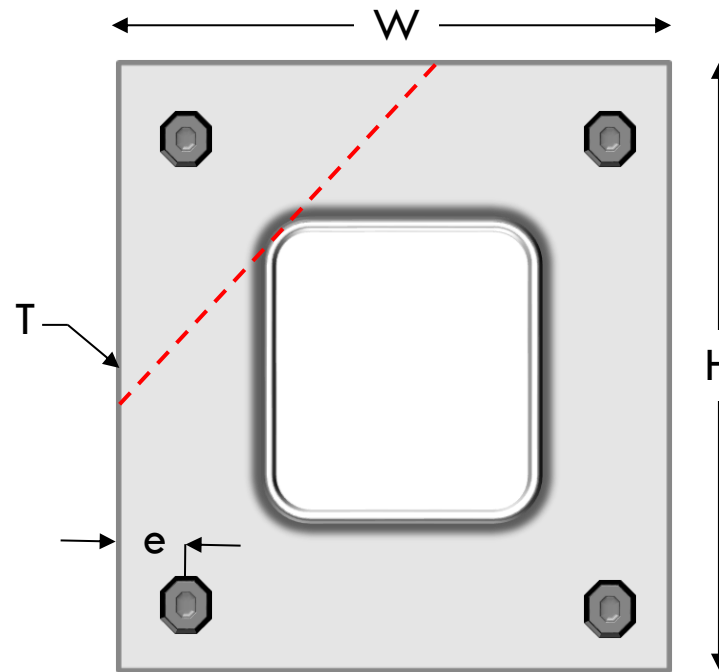
BOLT & PLATE PROPERTIES	
Bolt Quantity	4
Bolt Edge Distance (e), in	1.00
Nominal Bolt Diameter (ØDb), in	0.625
Bolt Grade	A325
Plate Height (H), in	8.00
Plate Width (W), in	8.00
Plate Thickness (T), in	0.50
Plate Grade	A36

BOLT ANALYSIS	
Shear Demand (V <sub>u</sub> ), k	0.90
Shear Capacity (ΦR <sub>nv</sub> ), k	13.81
Tension Demand (T <sub>u</sub> ), k	18.29
Tension Capacity (ΦR <sub>nt</sub> ), k	20.34
Shear Utilization	6.5%
Tension Utilization	89.9%
Interaction Utilization	81.3%

PLATE ANALYSIS	
Moment Demand (M <sub>u</sub> ), k-in	25.86
Flexural Capacity (ΦM <sub>n</sub> ), k-in	11.46
Plate Utilization	225.8%



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MATERIAL PROPERTIES	
Standoff Member - Yield Strength (F <sub>y</sub> ), ksi	46
Standoff Member - Ultimate Strength (F <sub>u</sub> ), ksi	58
Bolt - Yield Strength (F <sub>y</sub> ), ksi	92
Bolt - Tensile Strength (F <sub>u</sub> ), ksi	120
Plate - Yield Strength (F <sub>y</sub> ), ksi	36
Plate - Ultimate Strength (F <sub>u</sub> ), ksi	58

PASS

FAIL