Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

Date: December 2, 2022

Mount Analysis Report – Rev 2

Project Information:

Carrier:	Dish Wireless
Site Number:	NJJER0112OB
Site Address:	15 Great Pasture Road, Danbury, Fairfield County, CT 06810
Site Type:	Platform w/ Railing Mount on Monopole

Tectonic Project Number: 10710.NJJER0112OB – Rev 2

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. Inc. is pleased to submit this **"Mount Analysis Report"** to determine the structural integrity of the above-mentioned proposed mount.

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:

Mount: **Sufficient – 41%**

This analysis has been performed in accordance with the 2022 Connecticut State Building Code and the 2021 International Building Code based upon an ultimate 3-second gust wind speed of 120 mph per Appendix P as required for use in the ANSI/TIA-222-H Standard. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II was used in this analysis.

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

Structural analysis prepared by: Armand Pineiro / Ian Marinaccio

Respectfully submitted by:
Tectonic Engineering Consultants, Geologists & Land Surveyors D.P.C. Inc.

Edward N. Iamiceli, P.E.
Managing Director - Structural

STATE OF CONNECTICUT
EDWARD N. IAMICELI
PEN.0028473
LICENSED
PROFESSIONAL ENGINEER

Project Contact Info

1279 Route 300 | Newburgh, NY 12550
845.567.6656 Tel | 845.567.8703 Fax

tectonicengineering.com
Equal Opportunity Employer

TABLE OF CONTENTS

1) INTRODUCTION

Analysis of the proposed antenna mounts due to the loading of the proposed antennas, equipment, and related appurtenances. The proposed mount is a platform mount manufactured by CommScope, P/N: MC-PK8-DSH with handrail.

2) ANALYSIS CRITERIA

TIA-222 Revision:	**TIA-222-H**
Risk Category:	**II**
Wind Speed:	**93 mph**
Exposure Category:	**C**
Topographic Factor:	**1.0**
Ice Thickness:	**1.0 in**
Wind Speed with Ice:	**50 mph**
Service Load:	**60 mph**

Table 1 - Proposed Equipment Loading Information

Mounting Level (ft)	Carrier Designation	Number of Antennas	Antenna Manufacturer	Antenna Model	Proposed Mount Type	Note
110.0	Dish Wireless	3	JMA	MX08FRO665-21	CommScope MC-PK8-DSH w/ HR	1
		3	Fujitsu	TA08025-B604 RRH		
		3	Fujitsu	TA08025-B605 RRH		
		1	Raycap	RDIDC-9181-PF-48		

Note:
1) Proposed equipment to be installed on the proposed mounts.

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Dated
Mount Assembly Drawings	CommScope, P/N: MC-PK8- DSH	03/17/2021
RFDS	Dish Wireless	06/09/2021
Field Notes & Photos	Tectonic	07/27/2021
Construction Drawings	Tectonic	08/03/2022

3.1) Analysis Method

A tool internally developed, using Microsoft Excel, was used to calculate wind loading on all appurtenances and mount members. This information was then used in conjunction with another program, RISA-3D, which is a commercially available analysis software package, used to check the antenna mounting system and calculate member stresses for various loading cases. The selected output from the analysis is included in Appendices B and C.

3.2) Assumptions

1) The antenna mounting system was properly fabricated, installed, and maintained in good condition in accordance with its original design, TIA Standards, and/or manufacturer's specifications.
2) The configuration of antennas, mounts, and other appurtenances are as specified in Tables 1 and 2.
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) Member length and sizes are based solely on the assembly drawing by CommScope, referenced above.

5) Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (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. Tectonic should be notified to determine the effect on the structural integrity of the mount.

4) ANALYSIS RESULTS

Table 3 - Mount Component Stresses vs. Capacity (Platform Mount)

Notes	Component	Mount Centerline (ft)	% Capacity	Pass / Fail
1	Standoff End Plate	110.0	30	Pass
	Grating Support Angle		13	Pass
	Face Horizontal		21	Pass
	Mount Pipe		28	Pass
	Standoff Channel		31	Pass
	Standoff		27	Pass
	Rail Connector		22	Pass
	Railing		22	Pass
2	Collar Connection		41	Pass
Structure Rating (max from all components) =				**41 %**

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

4.1) Result / Conclusions

The proposed platform mount has adequate capacity to support the proposed antenna and equipment installation as detailed in the following report.

This structural analysis only includes evaluation of the antenna mounts and not the monopole. The monopole is to be analyzed under a separate structural analysis by others.

Contractor shall field verify existing conditions and recommendations as noted on the construction drawings and notify the design engineer of any discrepancies prior to construction. Any further changes to the antenna and/or appurtenance configuration should be reviewed with respect to their effect on structural loads prior to implementation.

APPENDIX A

SOFTWARE INPUT CALCULATIONS

Municipality	Basic Design Wind Speeds, V (mph)				Allowable Stress Design Wind Speeds, V_{asd} (mph)				Ground Snow Load p_g (psf)	MCE Ground Accelerations		Wind-Borne Debris Region[1]		Hurricane-Prone Region
	Risk Cat. I	Risk Cat. II	Risk Cat. III	Risk Cat. IV	Risk Cat. I	Risk Cat. II	Risk Cat. III	Risk Cat. IV		S_S (g)	S_1 (g)	Risk Cat. III Occup. I-2	Risk Cat. IV	
Cornwall	105	115	125	130	81	89	97	101	40	0.172	0.054			
Coventry	110	120	130	135	85	93	101	105	30	0.188	0.055			Yes
Cromwell	110	120	130	135	85	93	101	105	30	0.207	0.056			Yes
Danbury	110	120	125	130	85	93	97	101	30	0.225	0.056			Yes
Darien	110	120	130	135	85	93	101	105	30	0.250	0.057		Type B	Yes
Deep River	115	125	135	140	89	97	105	108	30	0.210	0.054			Yes
Derby	110	120	130	135	85	93	101	105	30	0.202	0.054			Yes
Durham	110	120	130	135	85	93	101	105	30	0.211	0.055			Yes
East Granby	110	120	125	130	85	93	97	101	35	0.173	0.054			Yes
East Haddam	115	125	135	135	89	97	105	105	30	0.214	0.056			Yes
East Hampton	110	125	130	135	85	97	101	105	30	0.210	0.056			Yes
East Hartford	110	120	130	135	85	93	101	105	30	0.191	0.055			Yes
East Haven	110	125	135	135	85	97	105	105	30	0.200	0.053	Type B	Type B	Yes
East Lyme	120	130	135	140	93	101	105	108	30	0.198	0.053	Type B	Type B	Yes
East Windsor	110	120	130	135	85	93	101	105	30	0.177	0.055			Yes
Eastford	110	120	130	135	85	93	101	105	40	0.180	0.055			Yes
Easton	110	120	130	135	85	93	101	105	30	0.218	0.055			Yes
Ellington	110	120	130	135	85	93	101	105	35	0.178	0.055			Yes
Enfield	110	120	125	130	85	93	97	101	35	0.172	0.055			Yes
Essex	115	125	135	140	89	97	105	108	30	0.207	0.054			Yes
Fairfield	110	120	130	135	85	93	101	105	30	0.219	0.055		Type B	Yes
Farmington	110	120	130	135	85	93	101	105	35	0.188	0.055			Yes
Franklin	115	125	135	140	89	97	105	108	30	0.195	0.054			Yes
Glastonbury	110	120	130	135	85	93	101	105	30	0.200	0.055			Yes
Goshen	110	115	125	130	85	89	97	101	40	0.172	0.054			
Granby	110	120	125	130	85	93	97	101	35	0.171	0.054			Yes
Greenwich	110	120	130	135	85	93	101	105	30	0.274	0.059		Type B	Yes
Griswold	120	125	135	140	93	97	105	108	30	0.189	0.054			Yes
Groton	120	130	140	140	93	101	108	108	30	0.190	0.052	Type B	Type A	Yes
Guilford	115	125	135	140	89	97	105	108	30	0.204	0.054	Type B	Type B	Yes
Haddam	115	125	135	135	89	97	105	105	30	0.214	0.055			Yes
Hamden	110	120	130	135	85	93	101	105	30	0.202	0.054			Yes

Seismic

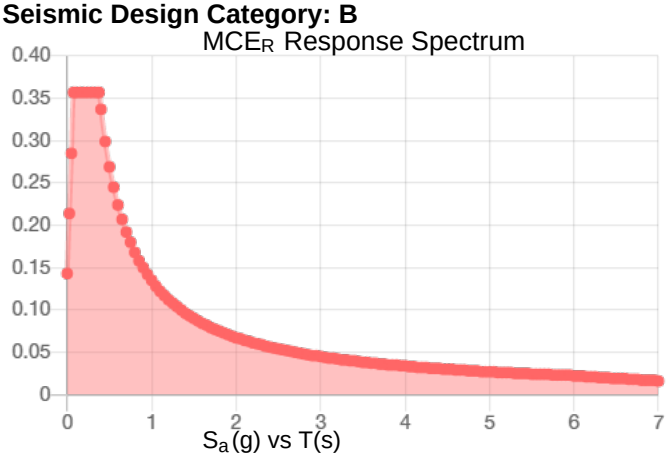
D - Default (see Section 11.4.3)

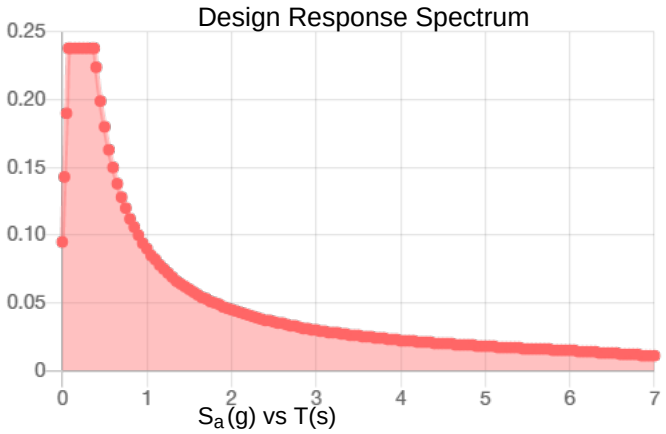
Site Soil Class:

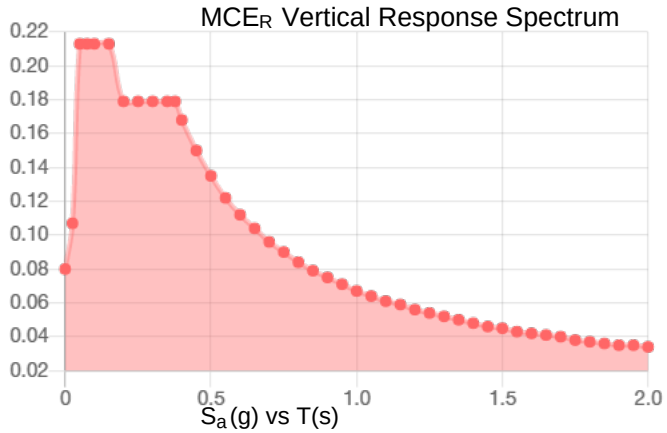
Results:

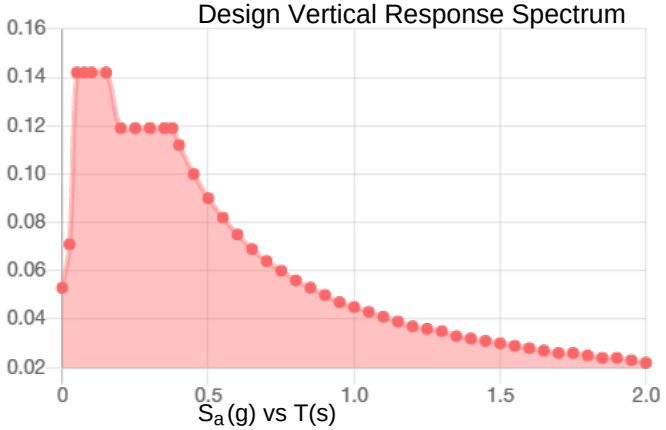
S_S :	0.223	S_{D1} :	0.09
S_1 :	0.056	T_L :	6
F_a :	1.6	PGA :	0.128
F_v :	2.4	PGA_M :	0.198
S_{MS} :	0.357	F_{PGA} :	1.543
S_{M1} :	0.135	I_e :	1
S_{DS} :	0.238	C_v :	0.746

Seismic Design Category: B









Data Accessed: **Mon Nov 28 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:	Mon Nov 28 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.

Job No.:	10710.NJJER01120B - Rev 2		
Sheet No.:	1	of	4
Calculated By:	AMP	Date :	12/02/22
Checked By:	IM	Date :	12/02/22

WIND AND ICE LOADS PER TIA-222-H

W.O.	10710.NJJER01120B - Rev 2
Project Name	NJJER01120B
Location	15 Great Pasture Road, Danbury, CT 06810
County	Fairfield

Tower Type	MP	Monopole
Structure Height	144.0	ft
Supporting Str Height	GM	ft Or ground mounted
Risk Category	II	Moderate risk
Exposure Category	C	Open terrain
Topo Category	1	Flat or rolling terrain
Height of crest	0	ft
Mean elevation (z_s)	386.01	ft

Basic Wind Speed (3-sec gust):		
Without ice	120	mph
With ice	50	mph
Maintenance Wind	30	mph
Ice thickness	1.00	in

Importance Factor	
Ice thickness	1.00
Earthquake	1.00
Supporting Data:	
K_s	1.00
K_e	0.99
K_c	1.00
K_t	N/A
f	N/A
z_g	900
α	9.5
$K_{z,min}$	0.85
K_d	0.95
G_h	1.00

Height	z (ft)	110
	Kh	N/A
	Kzt	1.00
	K_z	1.29
	K_{iz}	1.13
Wind Pressure, qz (psf)	No Ice	44.59
	With Ice	7.74
	Service	2.79
(t_{iz})	Ice Thk	1.13
Appurtenances (qzGh)	No Ice	44.59
	With Ice	7.74
	Service	2.79

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

Job No. 10710.NJJER01120B - Rev 2
Sheet No. 2 of 4
Calculated By AMP Date : 12/02/22
Checked By IM Date : 12/02/22

Shielding factor, Ka 0.9 Section 16.6

WIND WITHOUT ICE

Antenna Configuration	(E) or (P)	Qty per Sector	z (ft)	Length or Diameter (ft)	Width (in)	Depth (in)	Flat or Cylindrical?	Antenna $(Ca)_N$	Antenna $(Ca)_T$	Face Normal $(A_a)_N$ (ft^2)	Windward Face Normal $(C_aA_a)_N$ (ft^2)	Side Face $(Aa)_T$ (ft^2)	Wind ward Side Face (CaAa)T (ft^2)	Normal Antenna Wind Load Each (lb)	Transverse Antenna Wind Load Each (lb)	Antenna Weight (lb)	Total Weight (lb)
MX08FRO665-21	**P**	**1**	110	6.00	20.00	8.00	Flat	1.25	1.47	10.00	11.24	4.00	5.28	501	235	82.5	82.5
TA08025-B604	**P**	**1**	110	1.24	15.70	7.80	Flat	1.20	1.20	1.62	1.75	0.81	0.87	78	39	63.9	63.9
TA08025-B605	**P**	**1**	110	1.24	15.70	9.00	Flat	1.20	1.20	1.62	1.75	0.93	1.01	78	45	74.9	74.9
RDIDC-9181-PF-48	**P**	**1**	110	1.58	14.39	8.15	Flat	1.20	1.20	1.90	2.05	1.07	1.16	91	52	21.8	21.8
										$\sum(CaA_A)_N$	16.80	$\sum(CaA_A)_T$	8.32	749	371		243

WIND WITH ICE Ice Thk = 1.13 in

Antenna Configuration	(E) or (P)	Qty per Sector	z (ft)	Length or Diameter (ft)	Width (in)	Depth (in)	Flat or Cylindrical?	Antenna $(Ca)_N$	Antenna $(Ca)_T$	Face Normal $(A_a)_N$ (ft^2)	Windward Face Normal $(C_aA_a)_N$ (ft^2)	Side Face $(A_a)_T$ (ft^2)	Windward Side Face (CaAa)T (ft^2)	Normal Antenna Wind Load Each (lb)	Transverse Antenna Wind Load Each (lb)	Ice Area for Weight (ft^2)	Ice Weight Alone (lbs)
MX08FRO665-21	P	1	110.00	6.19	22.26	10.26	Flat	1.24	1.41	11.48	12.78	5.29	6.70	99	52	28.0	147.4
TA08025-B604	P	1	110.00	1.43	17.96	10.06	Flat	1.20	1.20	2.14	2.31	1.20	1.29	18	10	4.9	25.6
TA08025-B605	P	1	110.00	1.43	17.96	11.26	Flat	1.20	1.20	2.14	2.31	1.34	1.45	18	11	5.1	26.9
RDIDC-9181-PF-48	P	1	110.00	1.77	16.65	10.41	Flat	1.20	1.20	2.45	2.65	1.53	1.66	21	13	5.9	31.3
										$\sum(CaA_A)_N$	20.05	$\sum(CaA_A)_T$	11.10	155	86		231

MAINTENANCE WIND

Antenna Configuration	(E) or (P)	Qty per Sector	z (ft)	Length or Diameter (ft)	Width (in)	Depth (in)	Flat or Cylindrical?	Antenna $(Ca)_N$	Antenna $(Ca)_T$	Face Normal $(A_a)_N$ (ft^2)	Windward Face Normal $(C_aA_a)_N$ (ft^2)	Side Face $(A_a)_T$ (ft^2)	Windward Side Face (CaAa)T (ft^2)	Normal Antenna Wind Load Each (lb)	Transverse Antenna Wind Load Each (lb)
MX08FRO665-21	P	1	110	6.00	20.00	8.00	Flat	1.25	1.47	10.00	11.24	4.00	5.28	31	15
TA08025-B604	P	1	110	1.24	15.70	7.80	Flat	1.20	1.20	1.62	1.75	0.81	0.87	5	2
TA08025-B605	P	1	110	1.24	15.70	9.00	Flat	1.20	1.20	1.62	1.75	0.93	1.01	5	3
RDIDC-9181-PF-48	P	1	110	1.58	14.39	8.15	Flat	1.20	1.20	1.90	2.05	1.07	1.16	6	3
										$\sum(CaA_A)_N$	16.80	$\sum(CaA_A)_T$	8.32		

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

Job No.	10710.NJJER01120B - R		
Sheet No.	3	of	4
Calculated By	AMP	Date :	12/02/22
Checked By	IM	Date :	12/02/22

Mounting System Information

							Reduction Factor =	0.9	Section 16.6		
Mount Part	**Projected Width (in)**	**Depth (in)**	**Flat or Cylindrical?**	**Force Coefficient**	**Projected Area (ft^2)**	**Wind Force (lbs/ft)**	**Ice Weight Area (ft^2)**	**Ice Weight (lbs/ft)**	**Projected Area with Ice (ft^2)**	**Wind Force Ice (lbs/ft)**	**Maintenance Wind Force (lbs/ft)**
6.5"x3/8" Plate	6.50	0.38	Flat	2	1.08	43.5	1.15	6.0	1.46	11.3	3.0
6"x3/8" Plate	6.00	0.38	Flat	2	1.00	40.1	1.06	5.6	1.38	10.7	2.8
L2x2x1/4	2.00	2.00	Flat	2	0.33	13.4	0.67	3.5	0.71	5.5	0.9
Horizonal Pipe 3.5 dia x.16	3.50	3.50	Cylindrical	1.2	0.35	14.0	0.92	4.8	0.58	4.5	1.0
2.5 Std Mount Pipe	2.88	2.88	Cylindrical	1.2	0.29	11.5	0.75	4.0	0.51	4.0	0.8
Channel(3.38x2.06)	3.38	2.06	Flat	2	0.56	22.6	0.91	4.8	0.94	7.3	1.6
HSS 4x4x3/8	4.00	4.00	Flat	2	0.67	26.8	1.33	7.0	1.04	8.1	1.9
Rail Connector L6.6x4.45x1/4	6.60	4.45	Flat	2	1.10	44.1	1.84	9.7	1.48	11.4	3.1
2.5 Std Pipe Rail	2.88	2.88	Cylindrical	1.2	0.29	11.5	0.75	4.0	0.51	4.0	0.8

Note: The member sizes are based on the assembly drawings by Commscope, date 03/17/21

Job No.	10710.NJJER01120B - Rev 2			
Sheet No.	4	of	4	
Calculated By	AMP	Date :	12/02/22	
Checked By	IM	Date :	12/02/22	

Seismic Check

Tower Information

Tower Type:	MP	
Structure Height	144.0	ft
Supporting Structure Height	GM	ft
Mount Height	110.0	ft

Geographic Information

City:	Danbury		
State:	Connecticut		
County:	Fairfield		
Latitude:	-73.422172	Longitude:	-73.422172

Seismic Information

Risk Category	II		
Importance Factor	1.00		
Site Soil Classificaiton	D		Table 2-10
S_s	0.223		https://asce7hazardtool.online/
S_1	0.056		
F_a	1.6		(Table 2-11, interpolation allowed)
F_V	2.4		(Table 2-12, interpolation allowed)
S_{DS}	0.238		Section 2.7.5
S_{D1}	0.09		
R	2.00		Section 16.7
As	1.00		Section 16.7 & 2.7.8
Cs	0.12	>	0.03

Equivalent Lateral Force Procedure

Equipment (Discrete Appurtenances)

Antenna Configuration	(E) or (P)	Qty per Sector	z (ft)	Antenna Weight (lb)	Shear Vs= Cs*W (lbs)	Vert. Seismic load (Ev, lbs)	Seismic load (Eh, lbs)
MX08FRO665-21	**P**	**1**	110	83	10	4	10
TA08025-B604	**P**	**1**	110	64	8	3	8
TA08025-B605	**P**	**1**	110	75	9	4	9
RDIDC-9181-PF-48	**P**	**1**	110	22	3	1	3

Mounting System (Discrete Appurtenances)

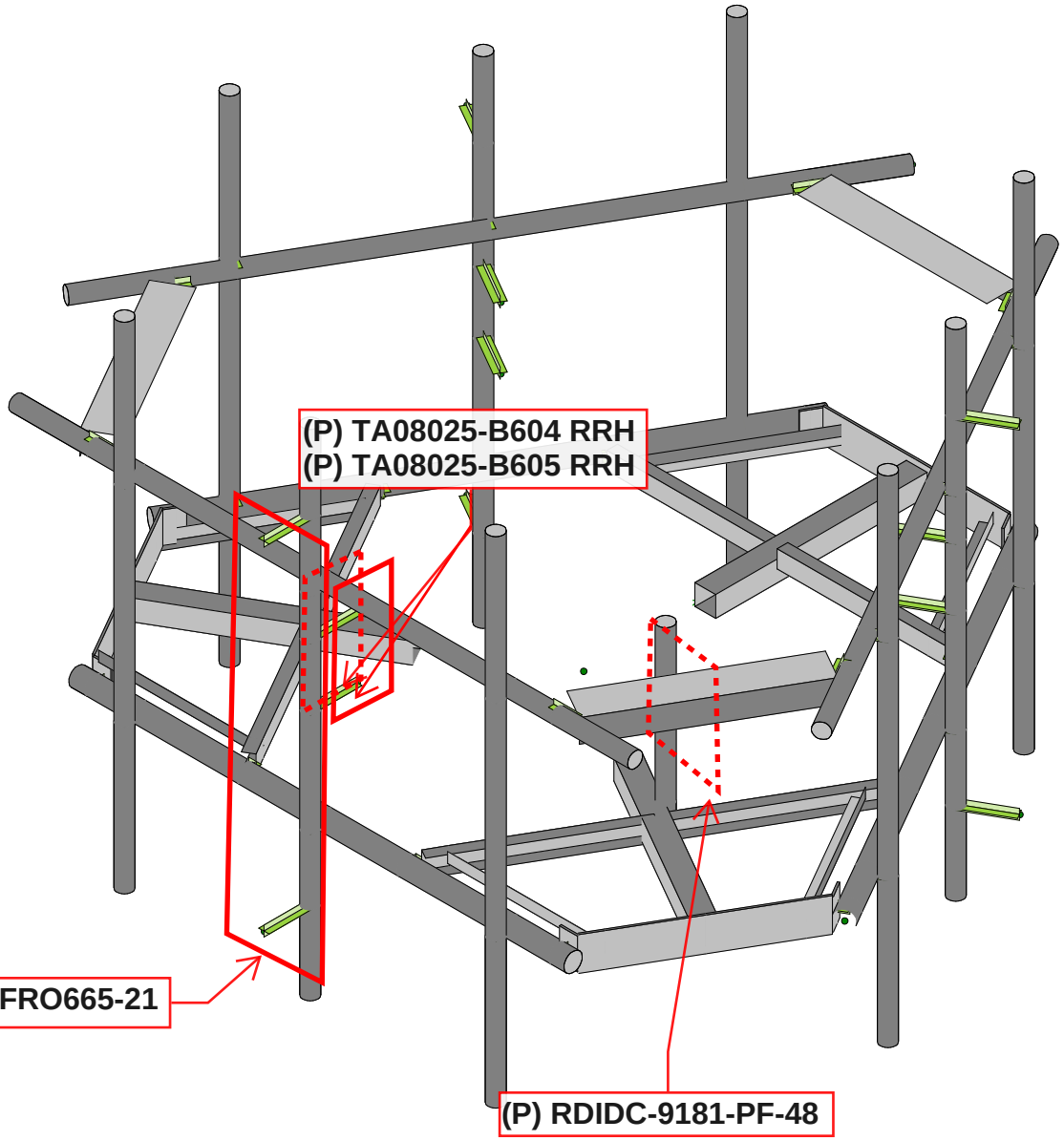
Ev =0.2S_{DS} * D	0.0476 x D	"D" is the dead weight of the mount members.
Eh= rho * Q_E	0.12 x W	"W" total weight of structure above ground

Notes:

1. Wind loads govern over Seismic loads

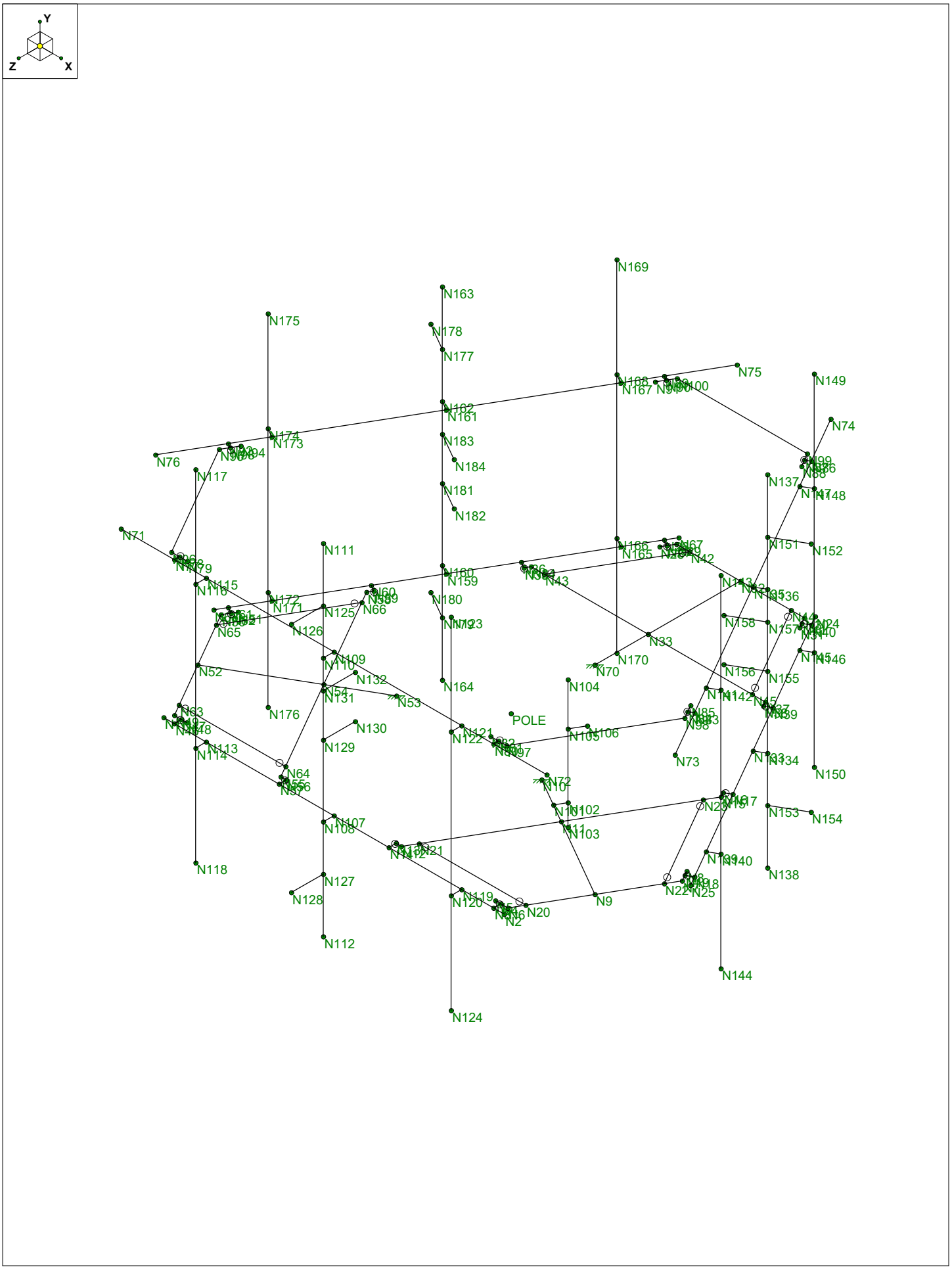
APPENDIX B

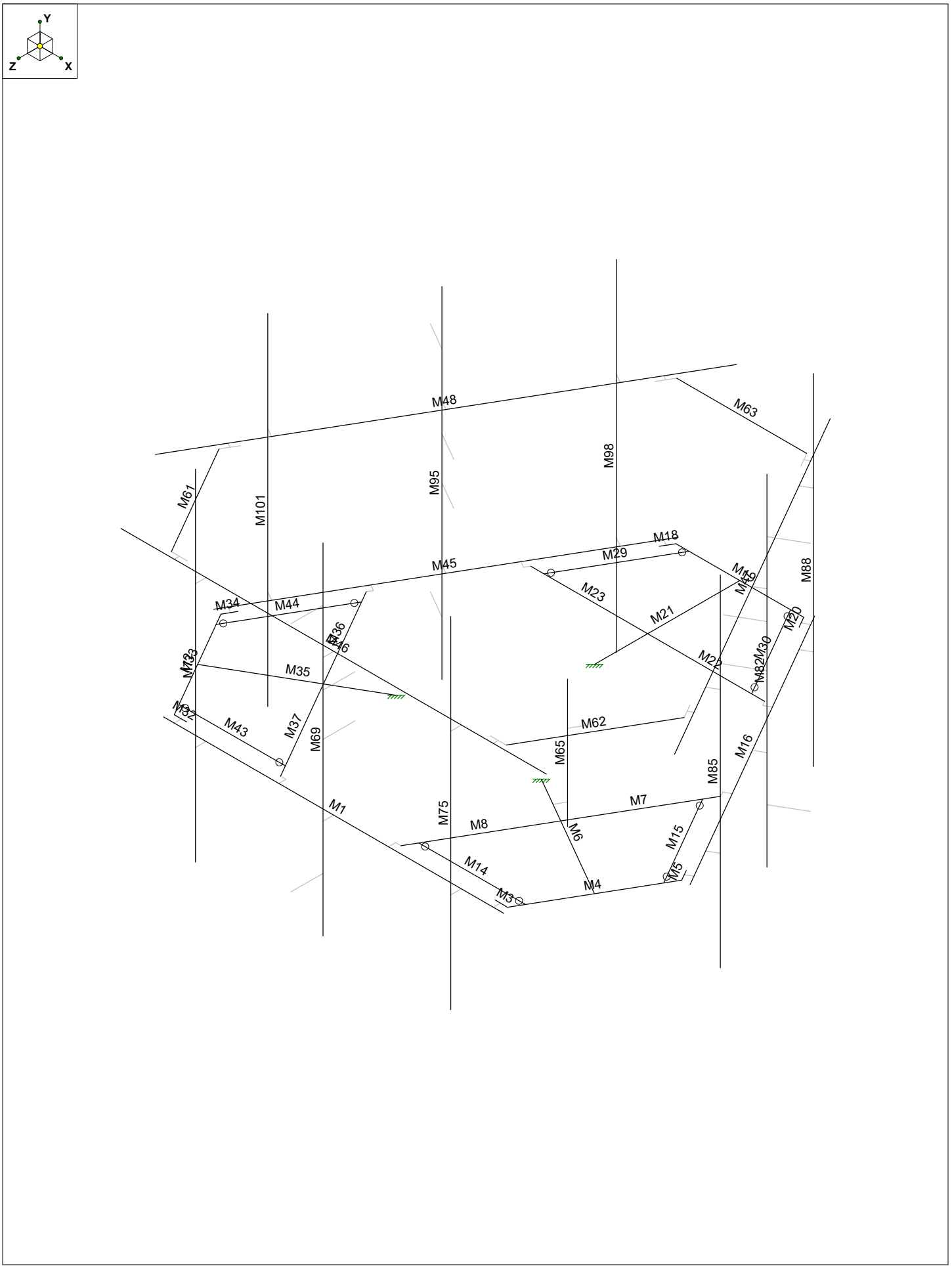
WIRE FRAME AND RENDERED MODELS

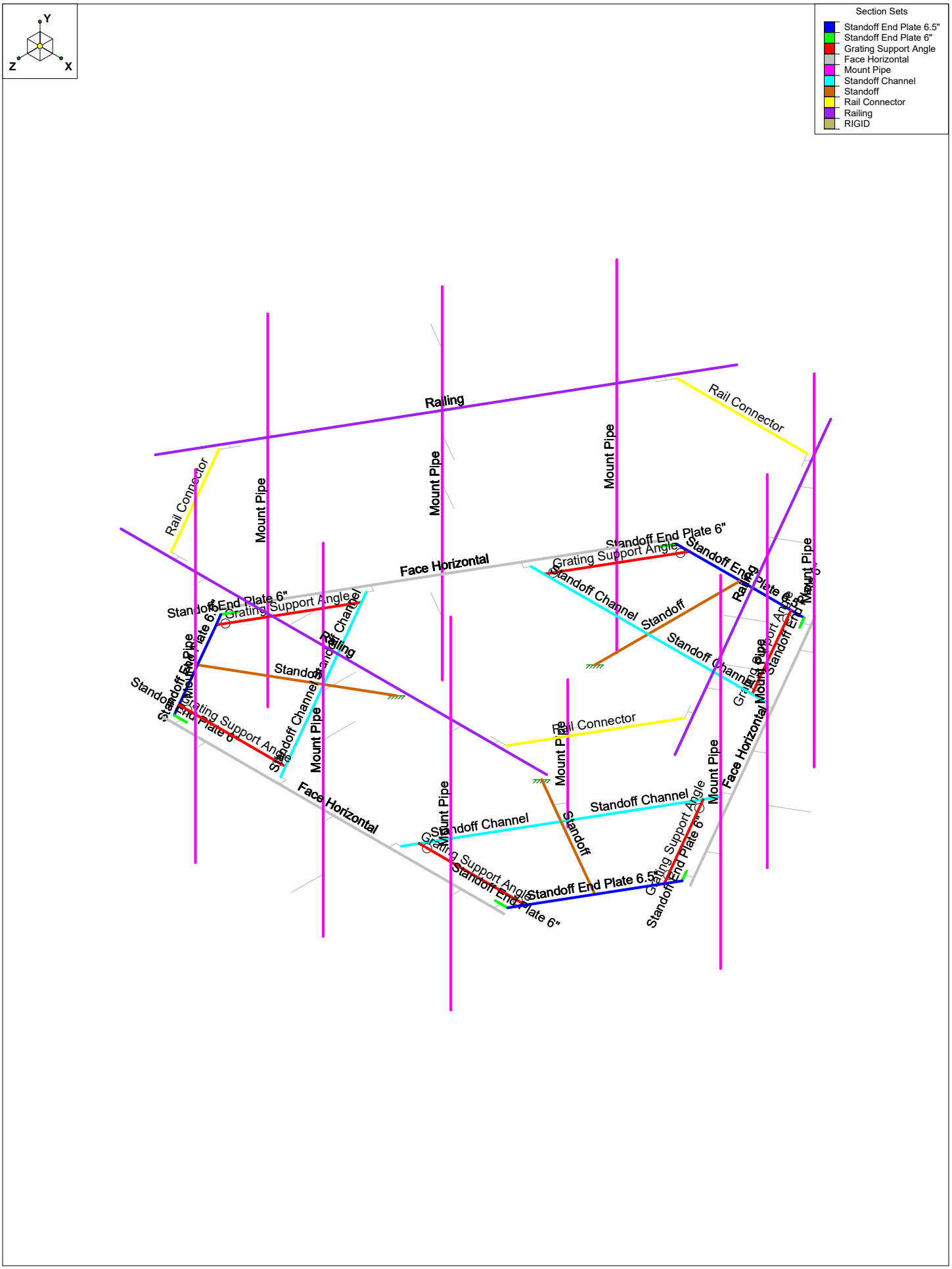


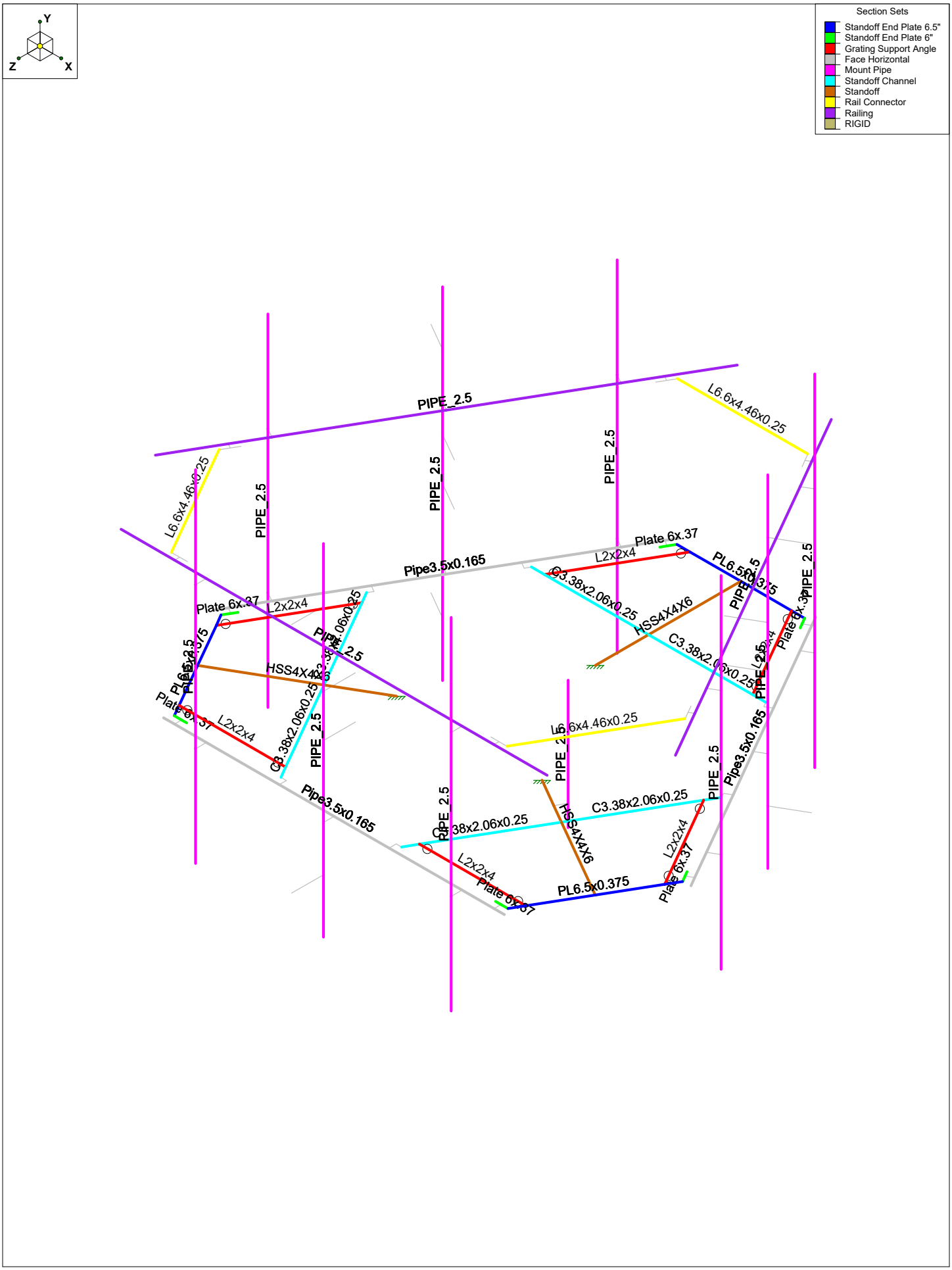
(P) PROPOSED

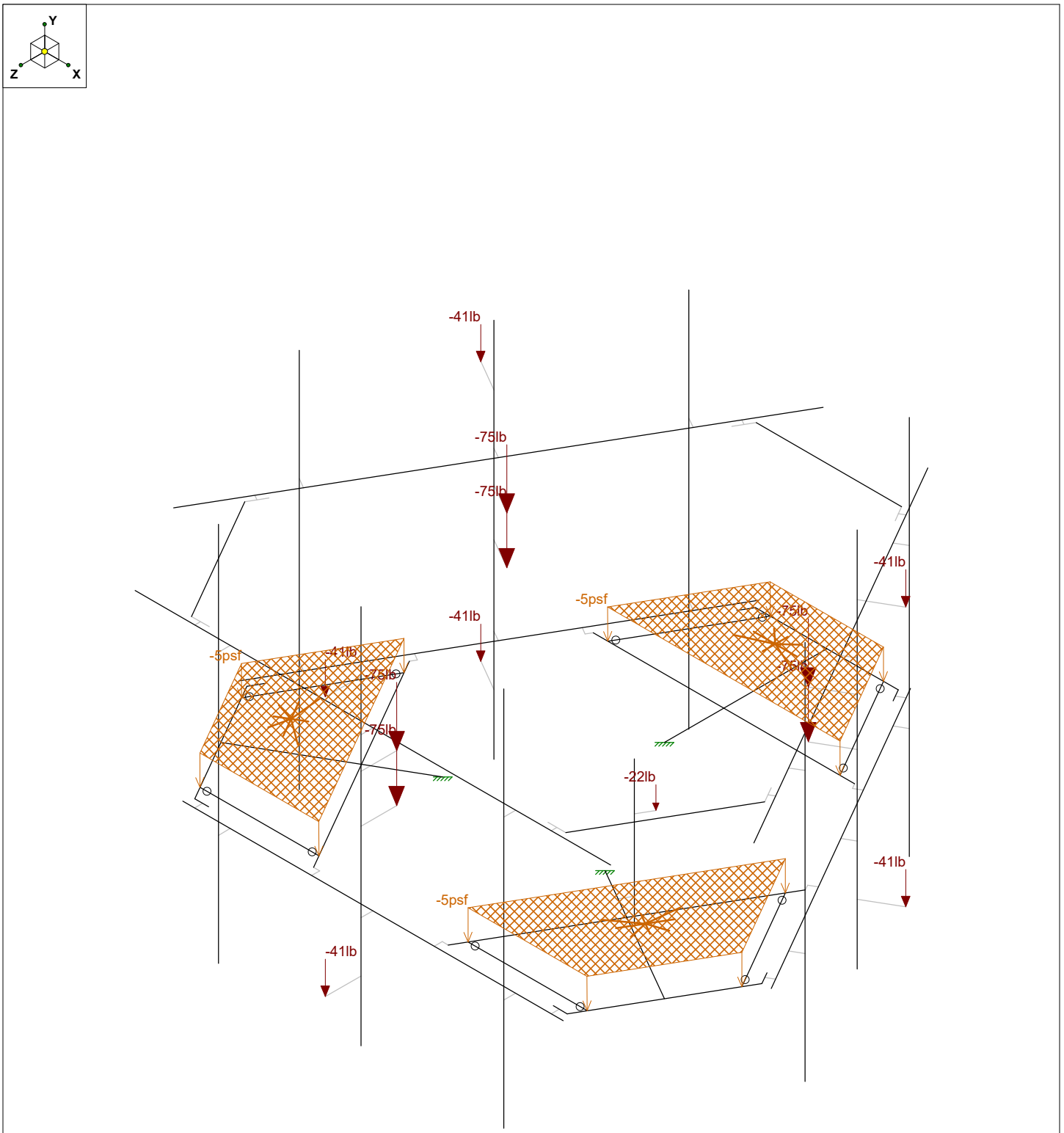
NOTES:
1) PROPOSED ANTENNAS AND MOUNTING PIPES HAVE BEEN VERTICALLY CENTERED ALONG THE PROPOSED MOUNT (NO OFFSET)
2) LISTED PROPOSED APPURTENANCES ABOVE ARE TYPICAL FOR ALL SECTORS


Y
Z
X
N169
N163
N175
N178
N177
N75
N149
N74
N162
N161
N174
N173
N183
N76
N184
N117
N181
N137
N182
N71
N111
N151
N152
N160
N159
N115
N116
N172
N171
N125
N66
N180
N65
N126
N33
N158
N136
N109
N110
N52
N132
N54
N131
N53
N164
N104
N170
N70
N156
N155
N63
N176
POLE
N130
N121
N122
N106
N105
N98
N73
N129
N114
N113
N64
N72
N150
N102
N153
N154
N107
N108
N103
N118
N127
N128
N119
N120
N20
N9
N2
N112
N144
N124

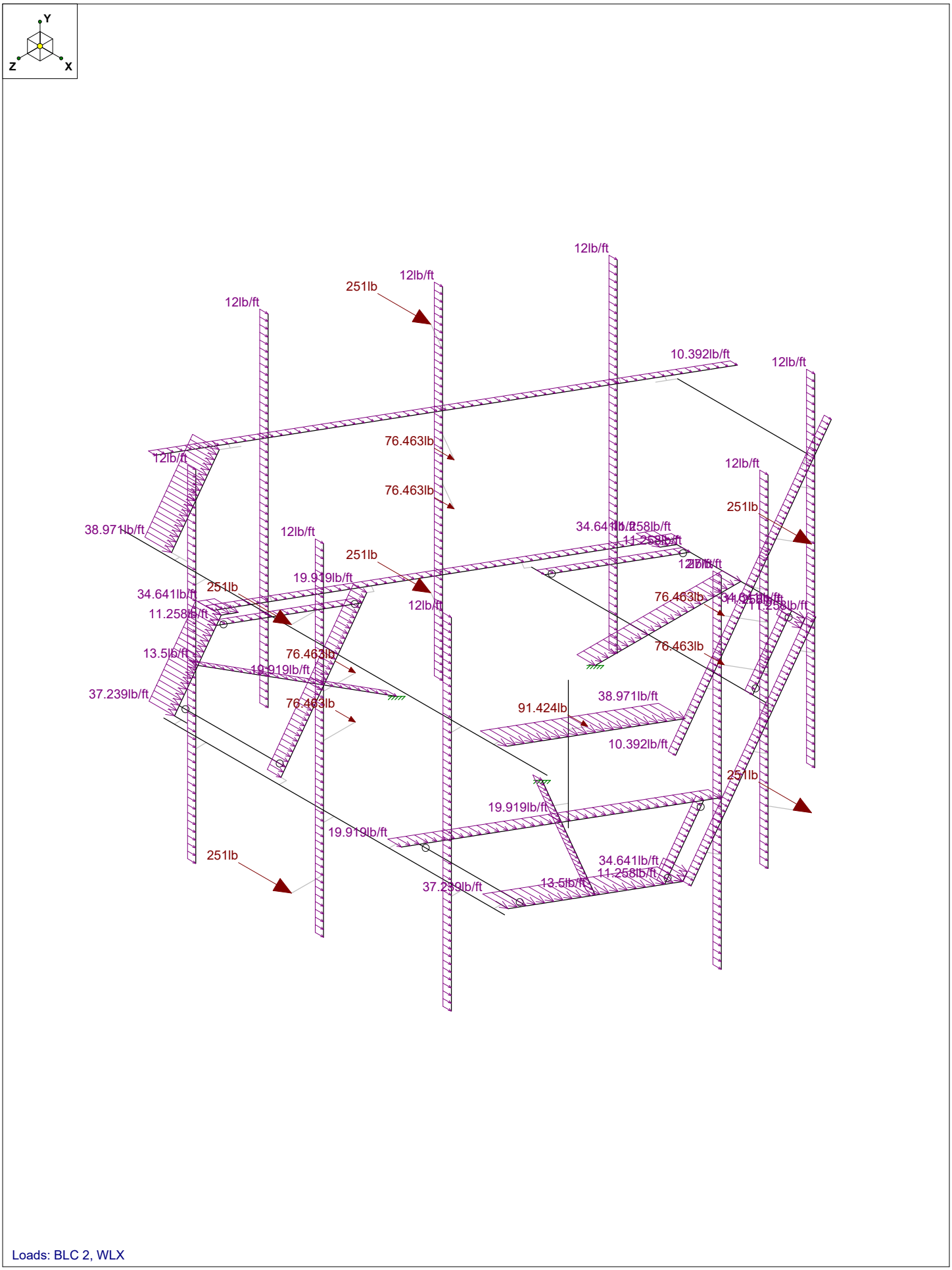

Y
Z
X
M48
M63
M61
M101
M95
M98
M18
M29
M45
M34
M44
M23
M21
M88
M20
M35
M22
M62
M43
M37
M69
M65
M16
M85
M1
M75
M7
M8
M6
M15
M14
M4
M5
M3


Y
Z
X
Section Sets
Standoff End Plate 6.5"
Standoff End Plate 6"
Grating Support Angle
Face Horizontal
Mount Pipe
Standoff Channel
Standoff
Rail Connector
Railing
RIGID
Railing
Rail Connector
Mount Pipe
Mount Pipe
Mount Pipe
Face Horizontal
Standoff End Plate 6"
Grating Support Angle
Standoff End Plate 6"
Grating Support Angle
Standoff Channel
Standoff
Standoff Channel
Railing
Mount Pipe
Standoff End Plate 6"
Grating Support Angle
Standoff End Plate 6"
Grating Support Angle
Standoff Channel
Mount Pipe
Face Horizontal
Rail Connector
Mount Pipe
Face Horizontal
Mount Pipe
Standoff Channel
Standoff
Grating Support Angle
Standoff End Plate 6"
Standoff End Plate 6.5"
Mount Pipe
Face Horizontal
Grating Support Angle
Standoff End Plate 6"

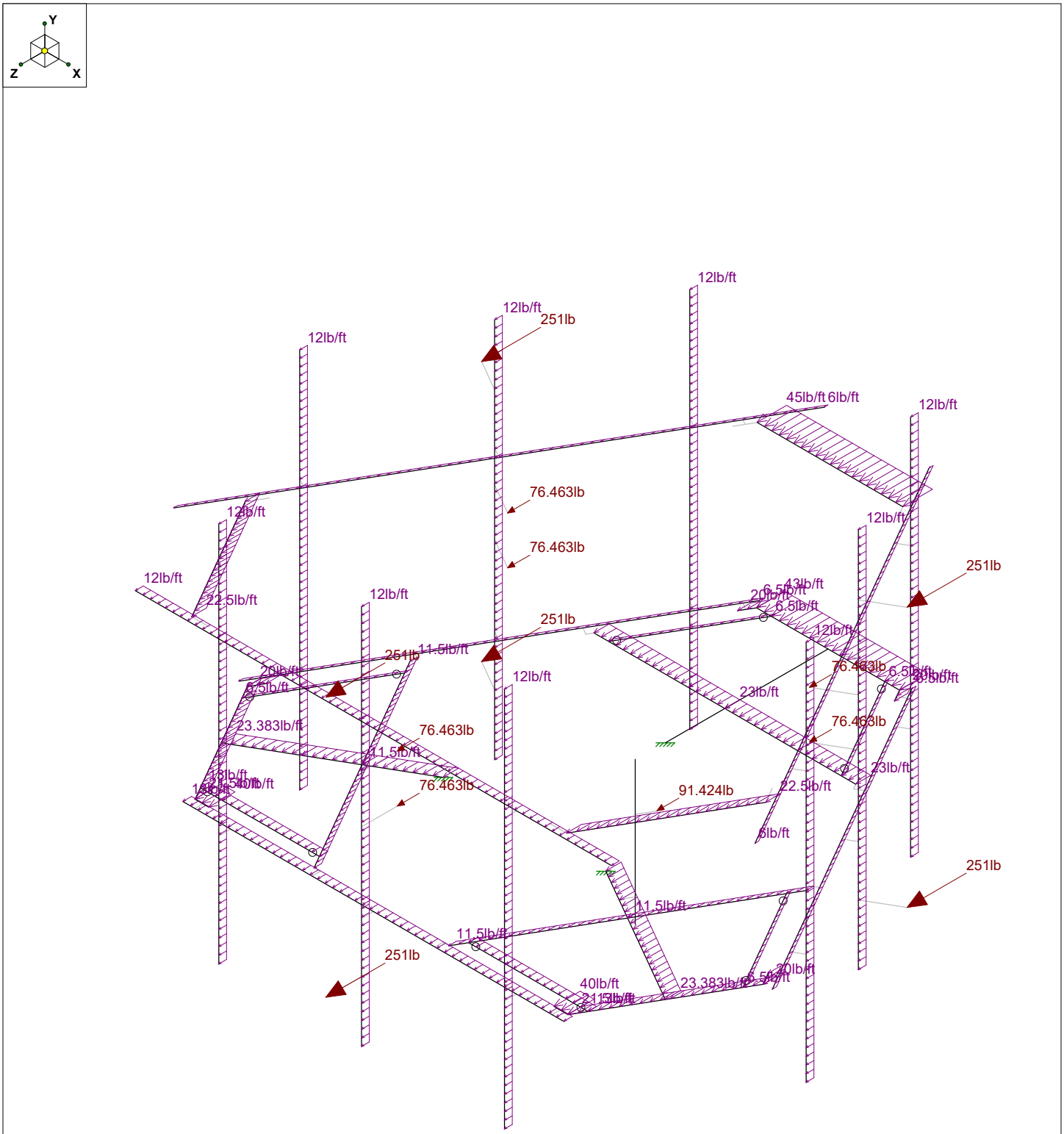

Y
Z
X
Section Sets
Standoff End Plate 6.5"
Standoff End Plate 6"
Grating Support Angle
Face Horizontal
Mount Pipe
Standoff Channel
Standoff
Rail Connector
Railing
RIGID
PIPE_2.5
L6.6x4.46x0.25
Plate 6x.37
L2x2x4
Pipe3.5x0.165
C3.38x2.06x0.25
HSS4X4X6
PL6.5x0.375



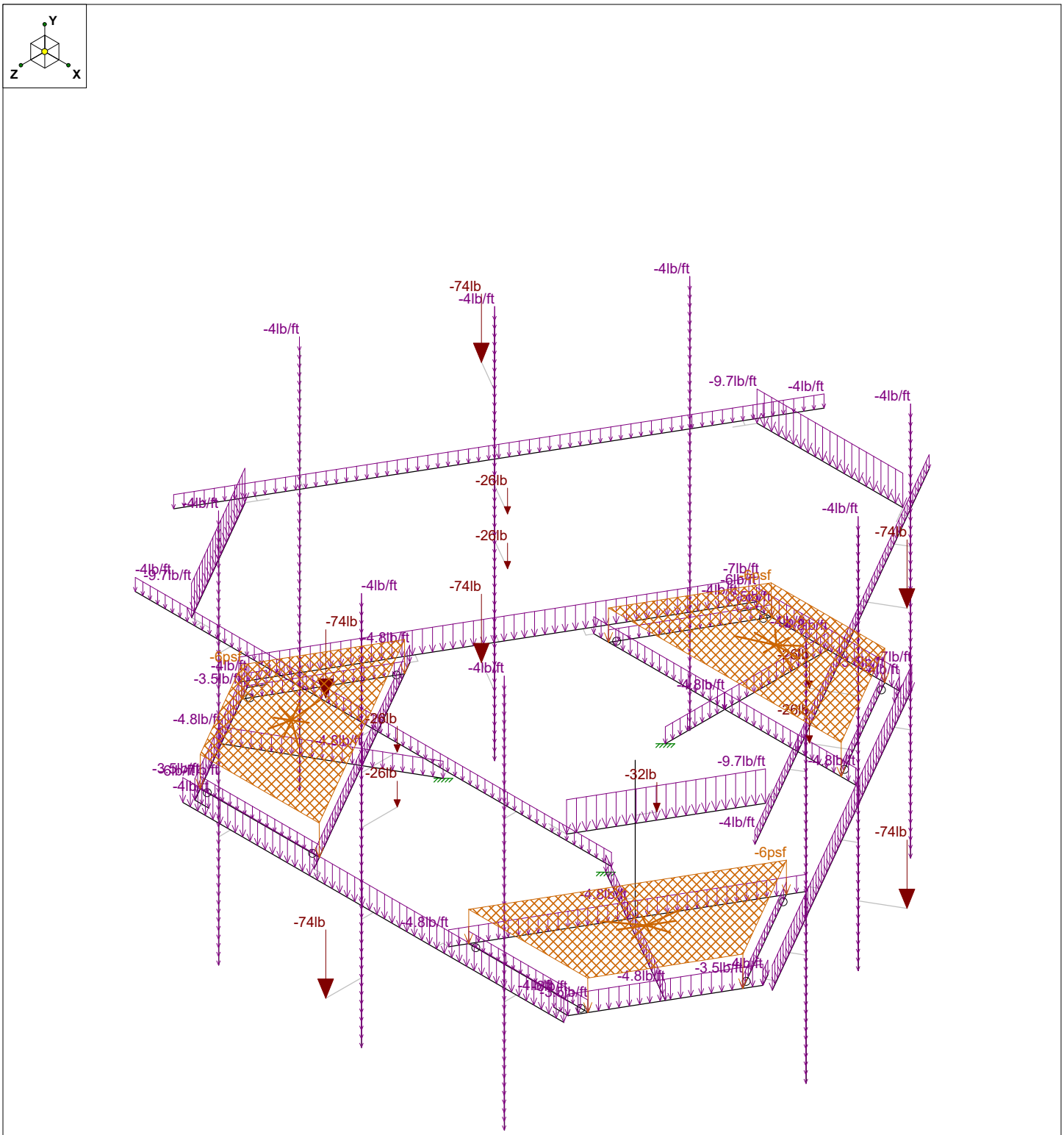
Loads: BLC 1, DL



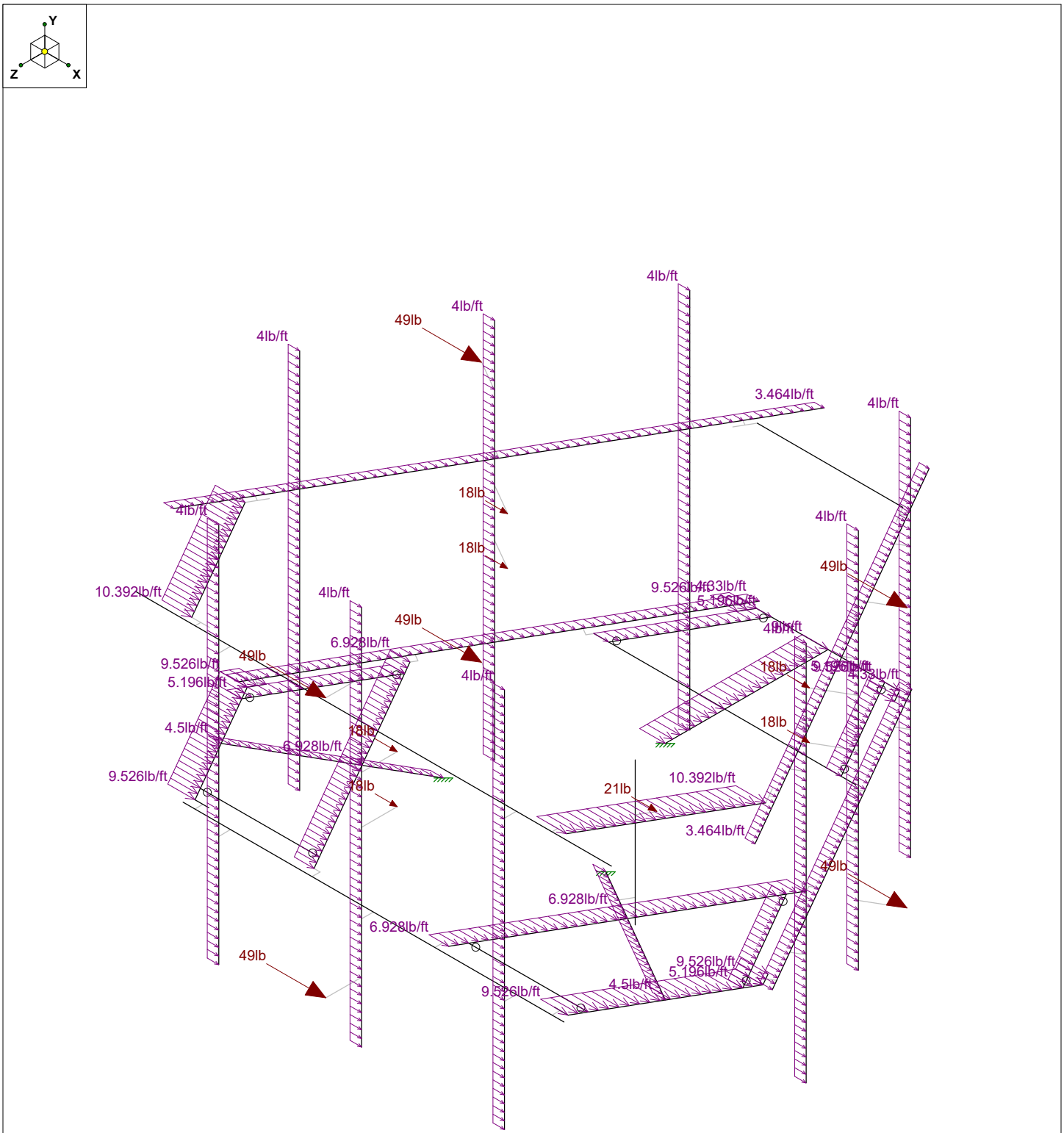
Loads: BLC 2, WLX



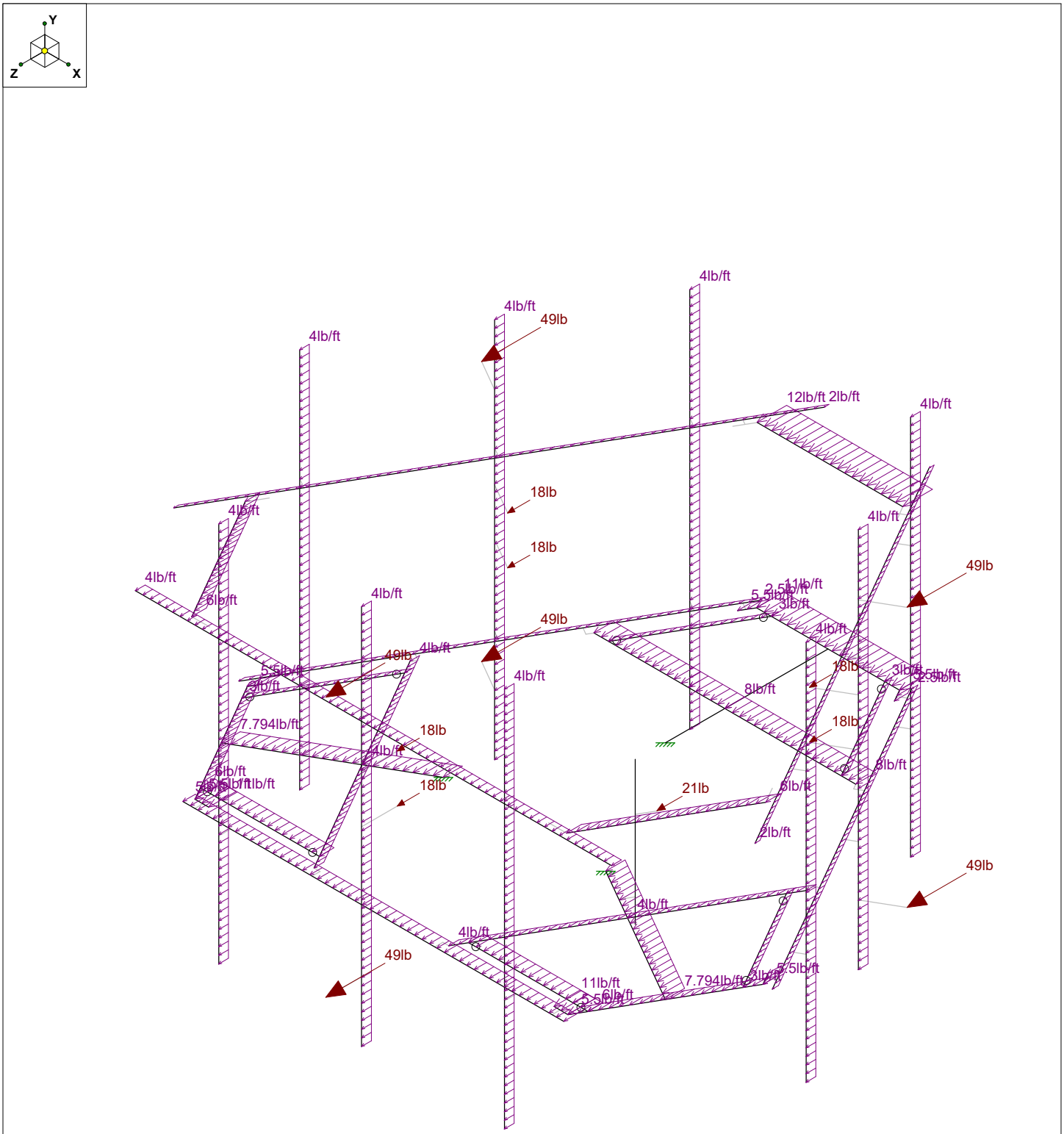
Loads: BLC 3, WLZ



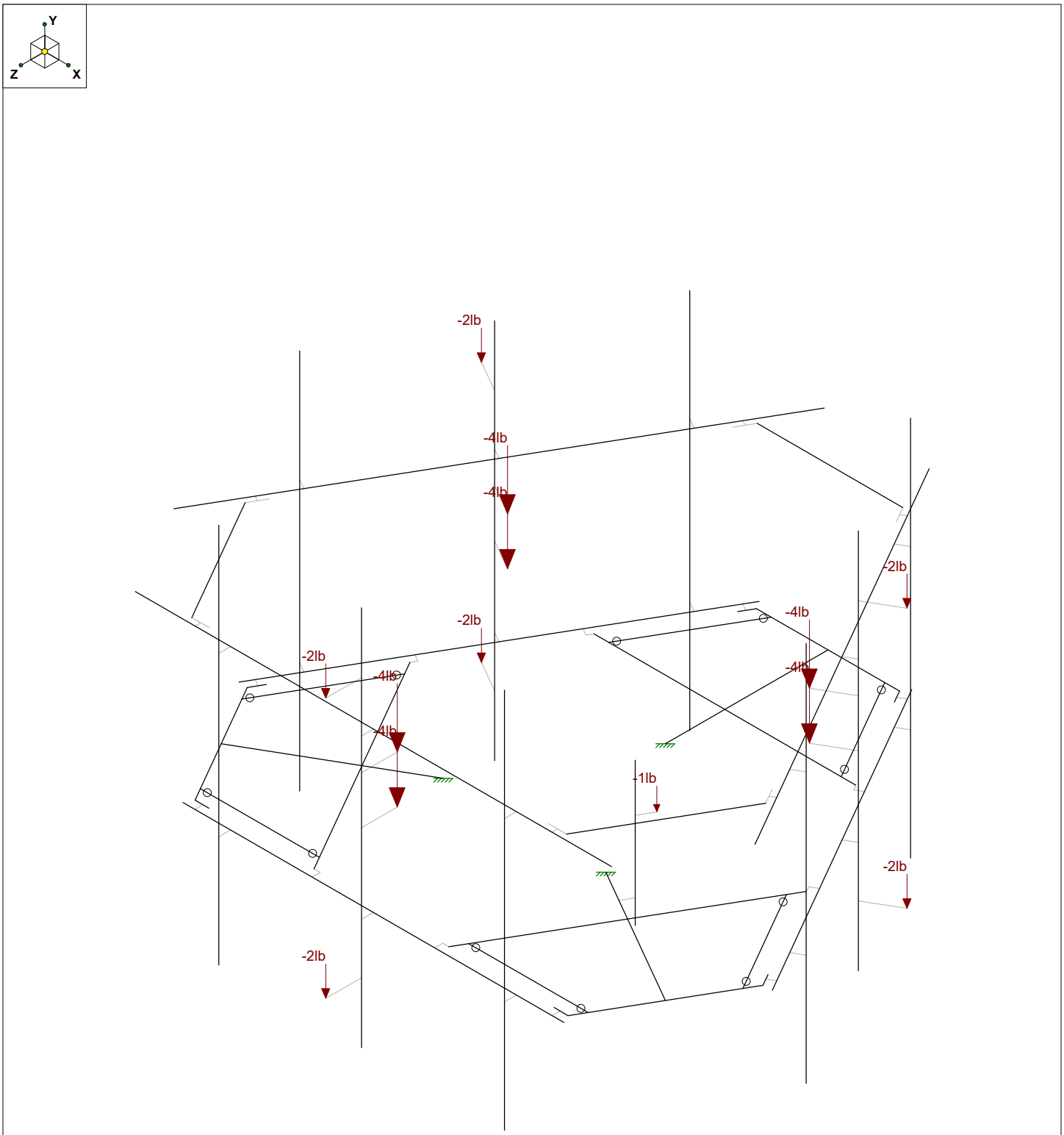
Loads: BLC 4, DL (ICE)



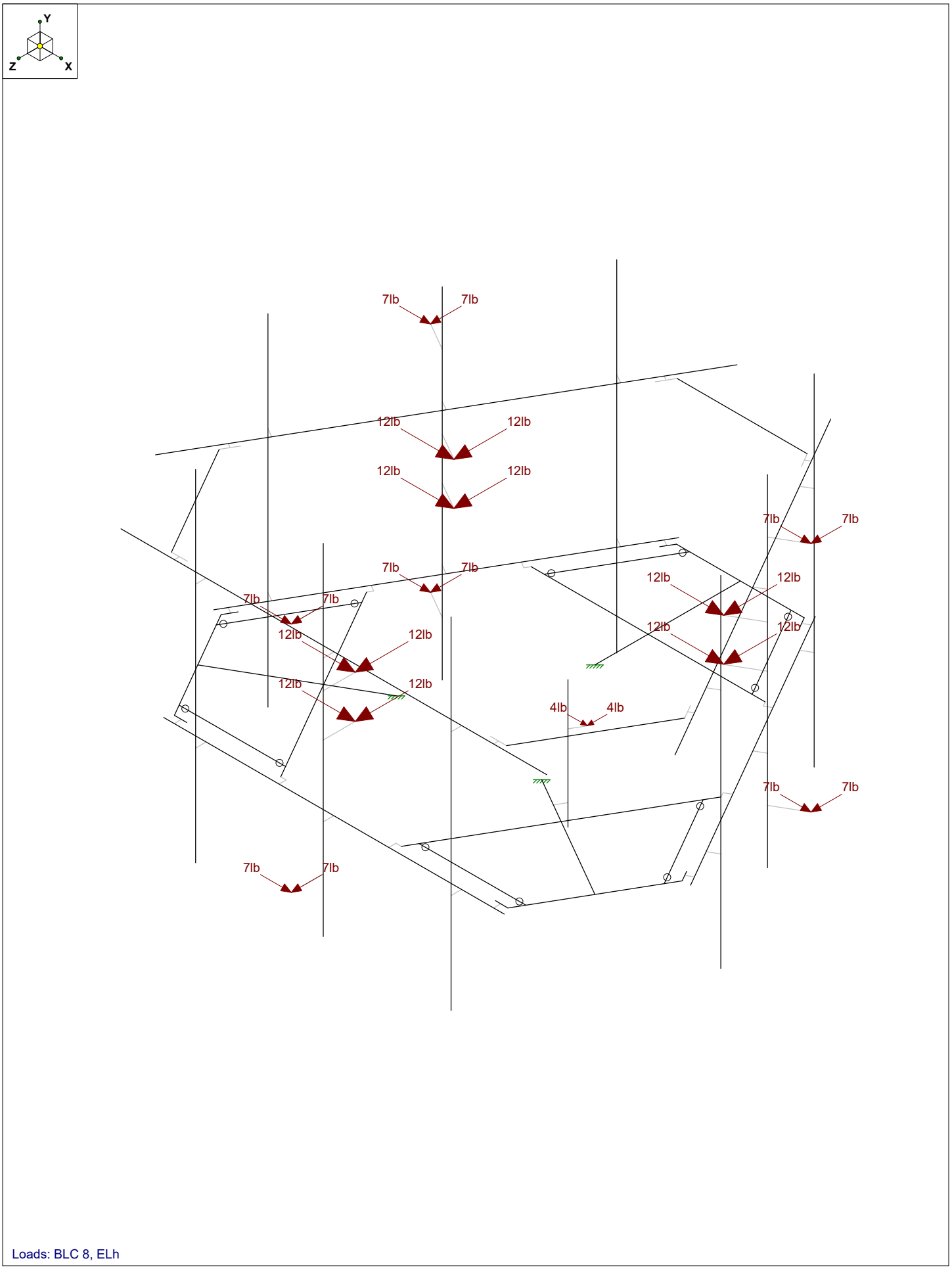
Loads: BLC 5, WLX (ICE)



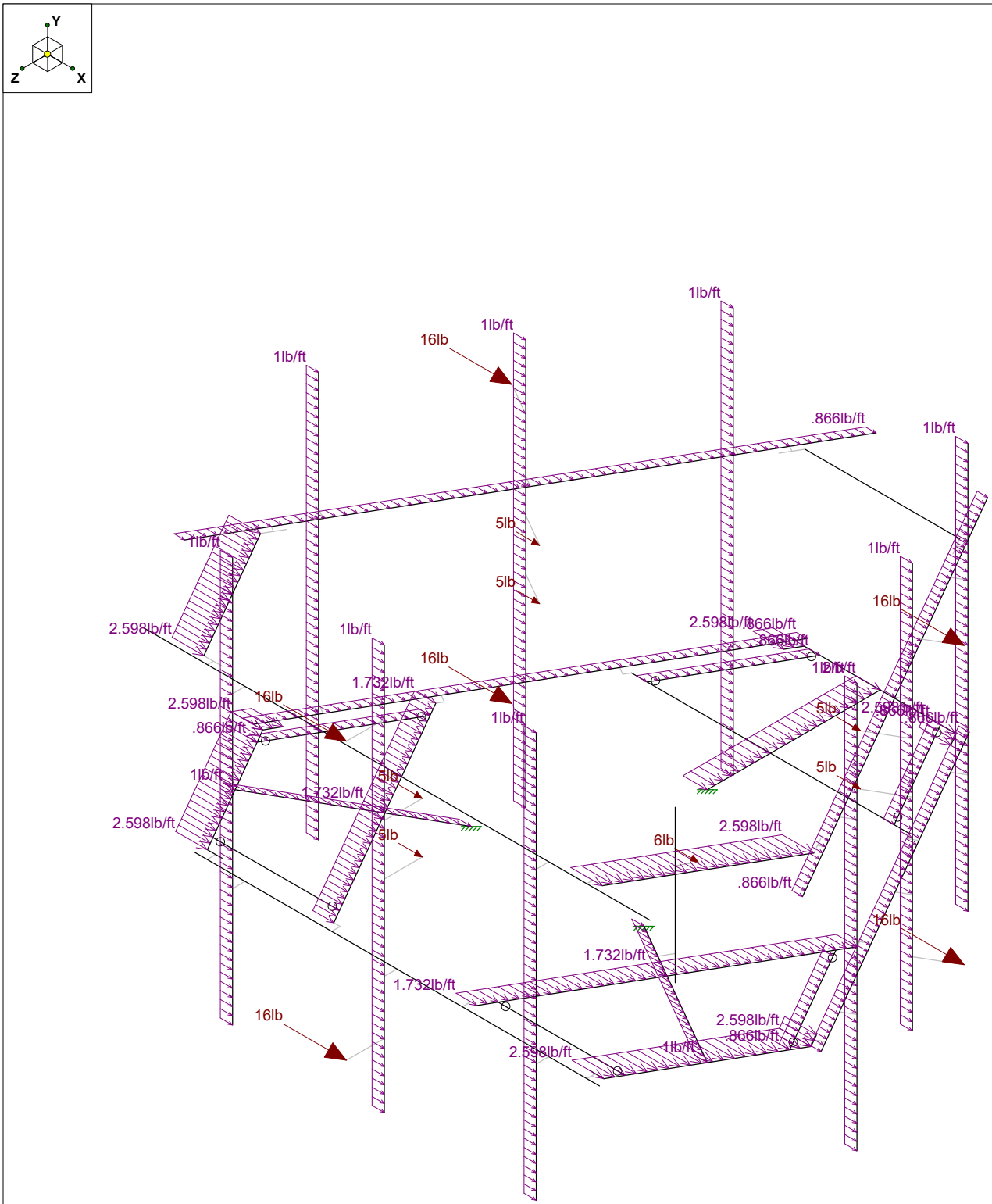
Loads: BLC 6, WLZ (ICE)



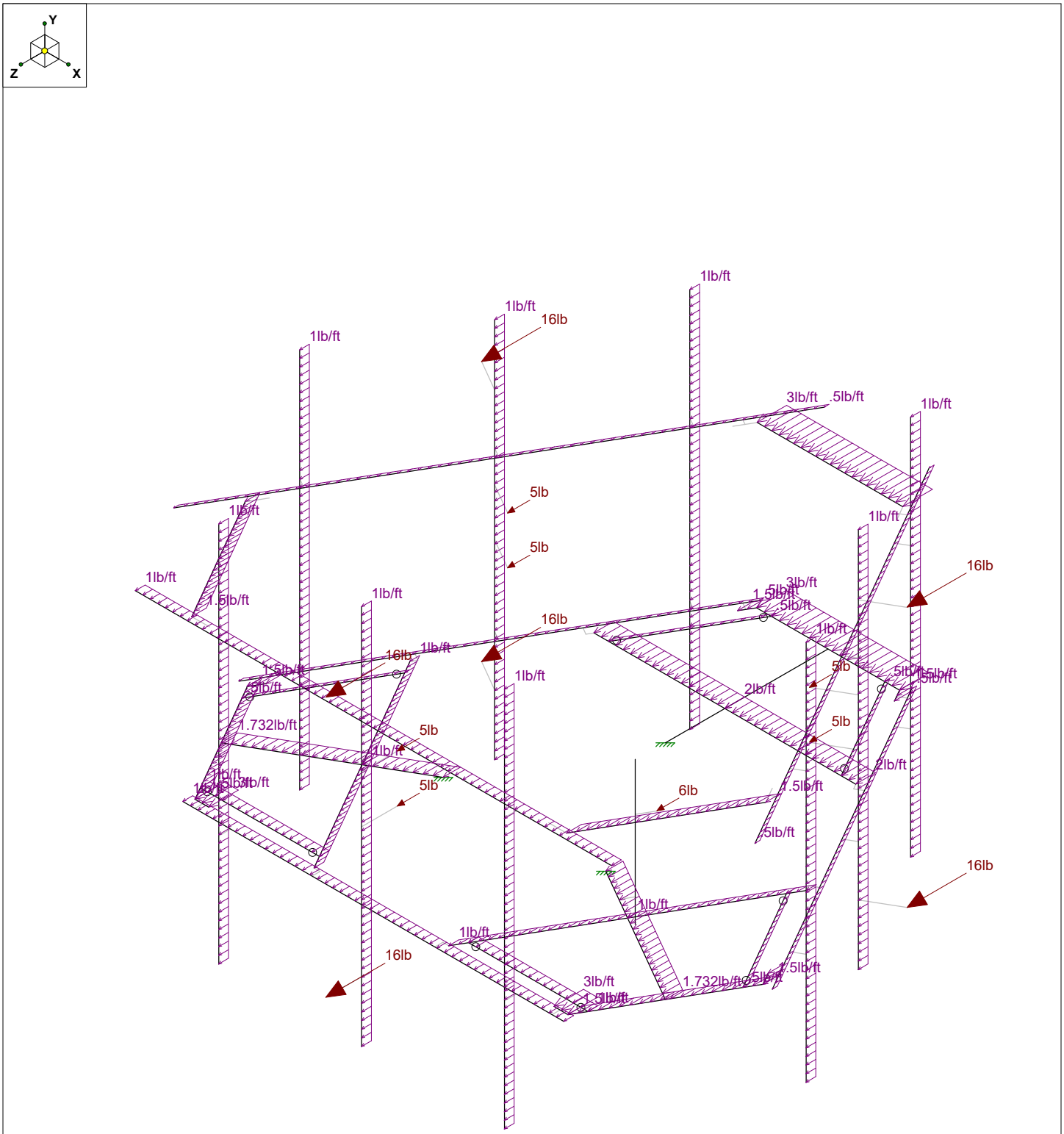
Loads: BLC 7, ELv



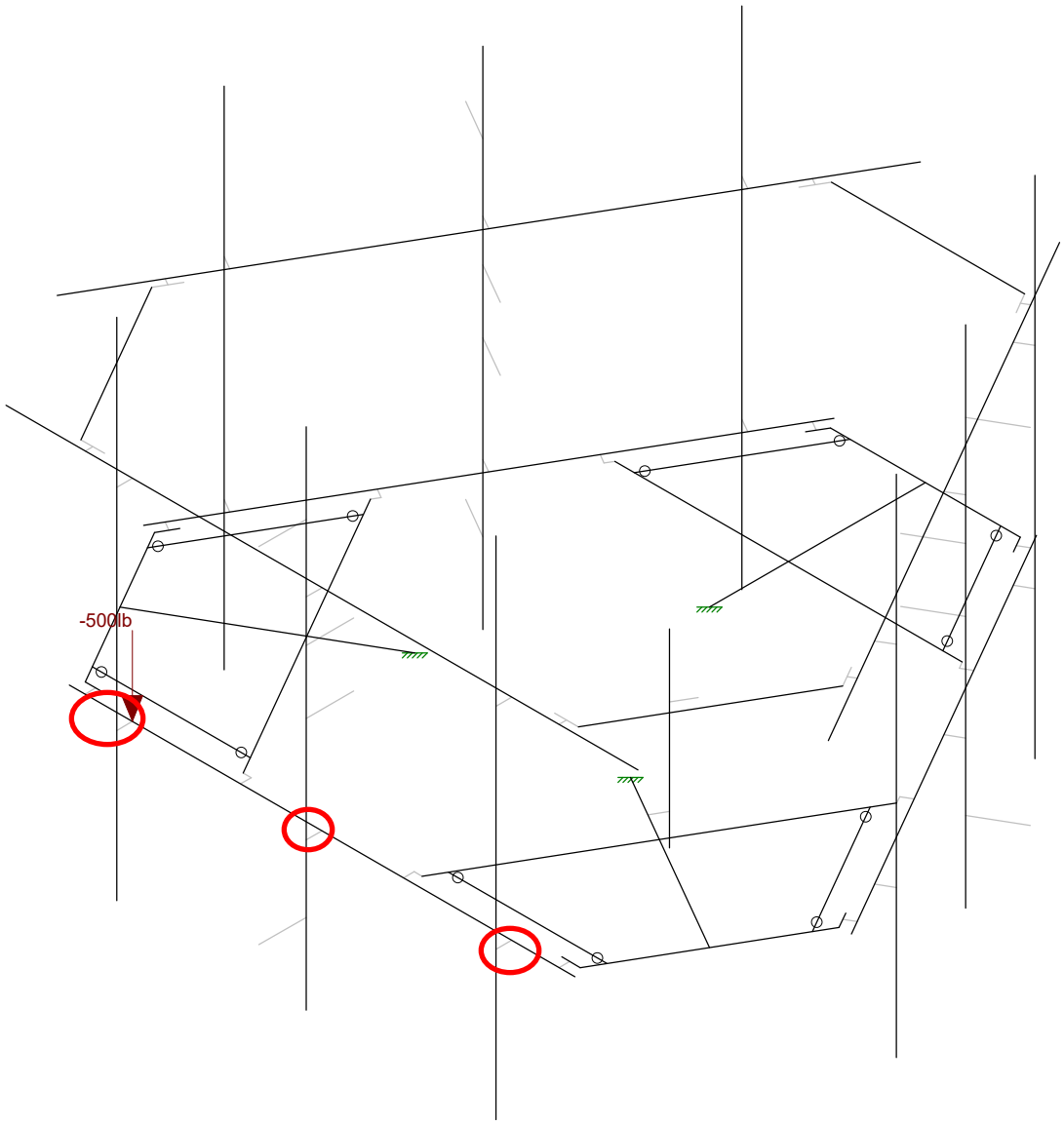
Loads: BLC 8, ELh



Loads: BLC 9, WLX (MAINT)

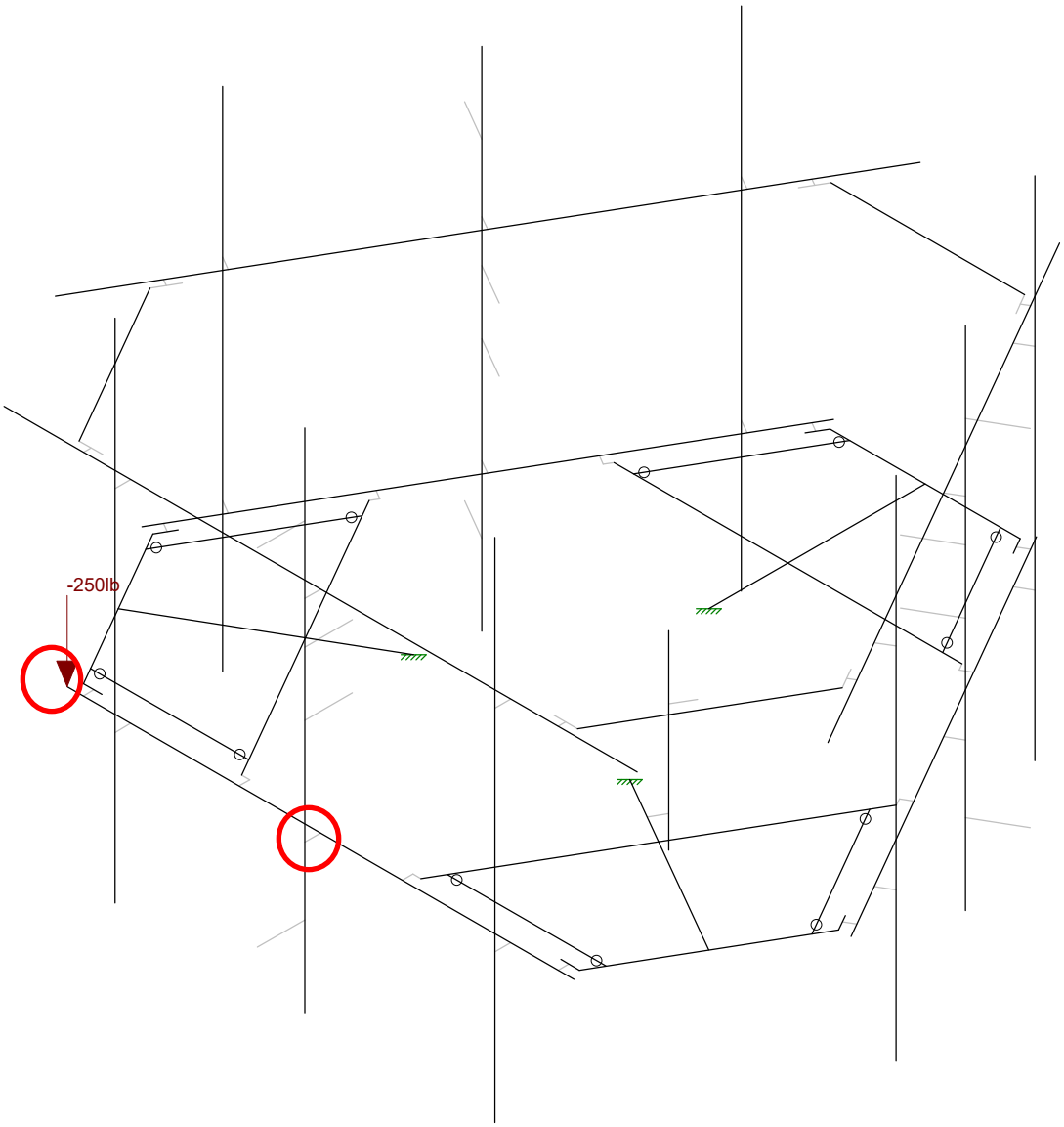


Loads: BLC 10, WLZ (MAINT)



500 lbs man load considered, typ of 3

Loads: BLC 11, Lm1

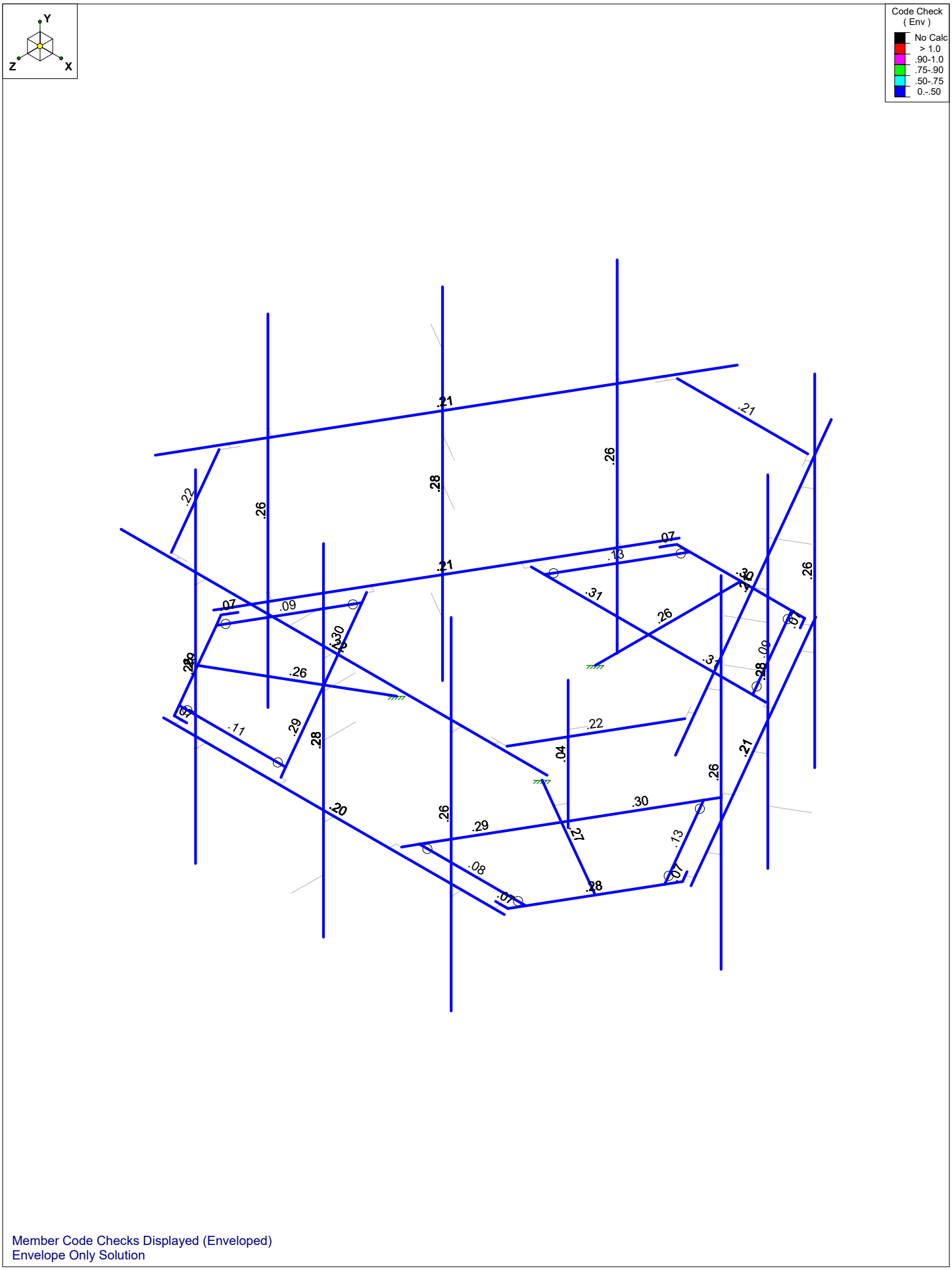


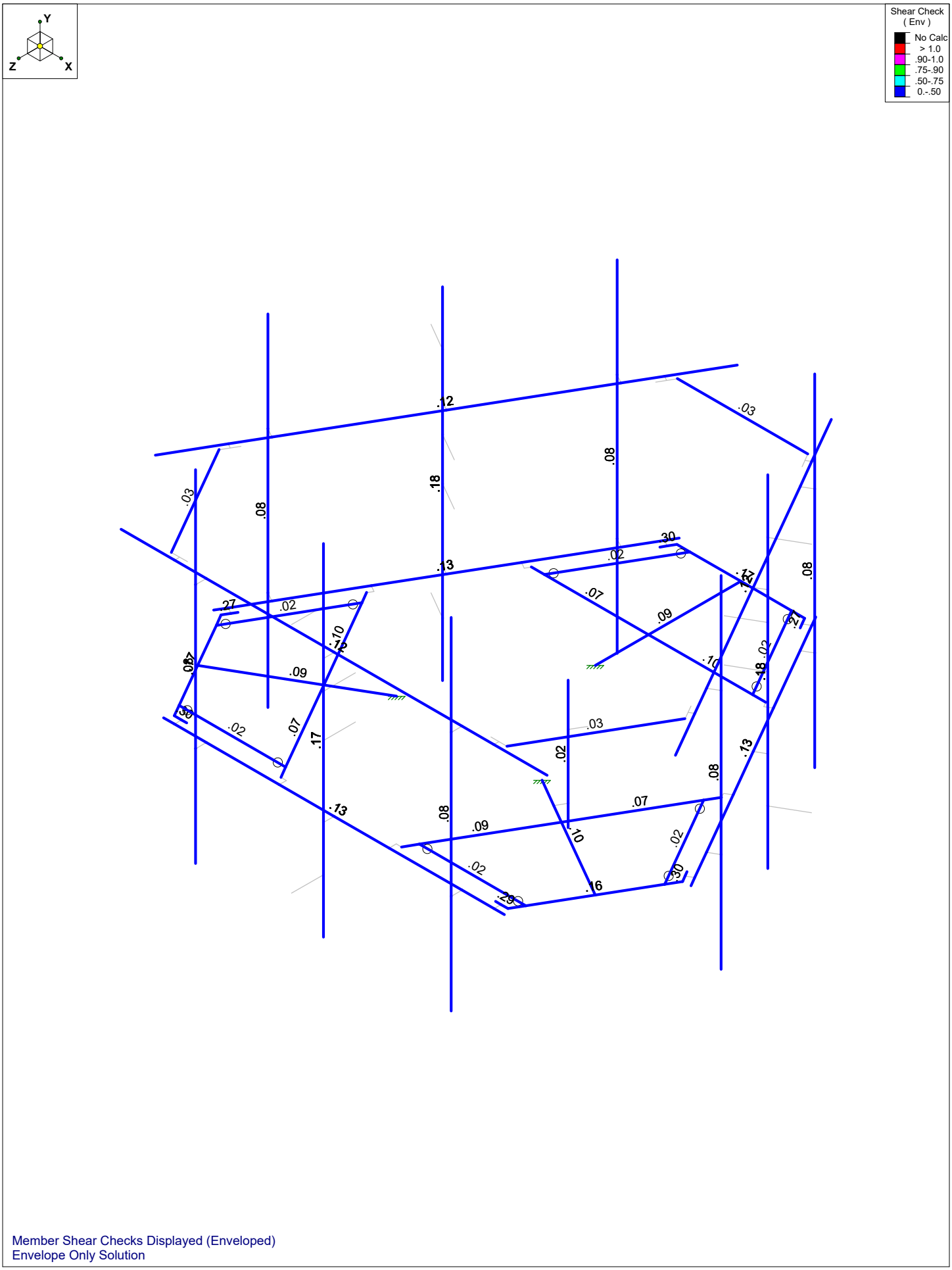
250 lbs vertical load considered, typ of 2

Loads: BLC 14, Lv1

APPENDIX C

SOFTWARE ANALYSIS OUTPUT


Y
Z
X
Code Check
(Env)
No Calc
> 1.0
.90-1.0
.75-.90
.50-.75
0.-.50
Member Code Checks Displayed (Enveloped)
Envelope Only Solution



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design...	A [in2]	Iyy [in...	Izz [in...	J [in4]
1	Standoff End Plate 6.5"	PL6.5x0.375	Beam	RECT	A36 Gr.36	Typical	2.438	.029	8.582	.11
2	Standoff End Plate 6"	Plate 6x.37	Beam	RECT	A36 Gr.36	Typical	2.22	.025	6.66	.097
3	Grating Support Angle	L2x2x4	Beam	Single Angle	A36 Gr.36	Typical	.944	.346	.346	.021
4	Face Horizontal	Pipe3.5x0.165	Beam	Pipe	A53 Gr.B	Typical	1.729	2.409	2.409	4.819
5	Mount Pipe	PIPE_2.5	Column	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
6	Standoff Channel	C3.38x2.06x0.25	Beam	Channel	A36 Gr.36	Typical	1.75	.715	3.026	.034
7	Standoff	HSS4X4X6	Beam	SquareTube	A500 Gr.B R...	Typical	4.78	10.3	10.3	17.5
8	Rail Connector	L6.6x4.46x0.25	Beam	Single Angle	A36 Gr.36	Typical	2.703	4.759	12.473	.055
9	Railing	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gravity	Joint	Point	Distrib...	Area(Me...	Surface...
1	DL	DL		-1.05		13			3	
2	WLX	WLX				13		42		
3	WLZ	WLZ				13		42		
4	DL (ICE)	None				13		42	3	
5	WLX (ICE)	None				13		42		
6	WLZ (ICE)	None				13		42		
7	ELv	None		-.048		13				
8	ELh	None	.16		.16	26				
9	WLX (MAINT)	None				13		42		
10	WLZ (MAINT)	None				13		42		
11	Lm1	None				1				
12	Lm2	None				1				
13	Lm3	None				1				
14	Lv1	None				1				
15	Lv2	None				1				
16	BLC 1 Transient Area Loads	None						18		
17	BLC 4 Transient Area Loads	None						18		

Load Combinations

	Description	S...	PDe...	SRSS	B...	Fa...	BLC	Fact...	B...	Factor	B...	Fa...	B...	F...	B...	Fa...	Fa...	Fa...
1	*LRFD																	
2	1.4D	Yes	Y		1	1.4												
3	1.2D+(WLX+WLZ) - 0 Deg	Yes	Y		1	1.2	2	1										
4	1.2D+(WLX+WLZ) - 30 Deg	Yes	Y		1	1.2	2	.866	3	.5								
5	1.2D+(WLX+WLZ) - 60 Deg	Yes	Y		1	1.2	2	.5	3	.866								
6	1.2D+(WLX+WLZ) - 90 Deg	Yes	Y		1	1.2	2		3	1								
7	1.2D+(WLX+WLZ) - 120 Deg	Yes	Y		1	1.2	2	-.5	3	.866								
8	1.2D+(WLX+WLZ) - 150 Deg	Yes	Y		1	1.2	2	-.866	3	.5								
9	1.2D+(WLX+WLZ) - 180 Deg	Yes	Y		1	1.2	2	-1	3									

Load Combinations (Continued)

	Description	S...	PDe...	SRSS	B...	Fa...	BLC	Fact...	B...	Factor	B...	Fa...	B...	F...	B...	Fa...	Fa...
10	1.2D+(WLX+WLZ) - 210 Deg	Yes	Y		1	1.2	2	-.866	3	-.5							
11	1.2D+(WLX+WLZ) - 240 Deg	Yes	Y		1	1.2	2	-.5	3	-.866							
12	1.2D+(WLX+WLZ) - 270 Deg	Yes	Y		1	1.2	2		3	-1							
13	1.2D+(WLX+WLZ) - 300 Deg	Yes	Y		1	1.2	2	.5	3	-.866							
14	1.2D+(WLX+WLZ) - 330 Deg	Yes	Y		1	1.2	2	.866	3	-.5							
15	**Wind Load with Ice**																
16	1.2D+1.0Di+1.0(WLXi+WLZi) - 0 Deg	Yes	Y		1	1.2	4	1	5	1	6						
17	1.2D+1.0Di+1.0(WLXi+WLZi) - 30 Deg	Yes	Y		1	1.2	4	1	5	.866	6	.5					
18	1.2D+1.0Di+1.0(WLXi+WLZi) - 60 Deg	Yes	Y		1	1.2	4	1	5	.5	6	.866					
19	1.2D+1.0Di+1.0(WLXi+WLZi) - 90 Deg	Yes	Y		1	1.2	4	1	5		6	1					
20	1.2D+1.0Di+1.0(WLXi+WLZi) - 120 Deg	Yes	Y		1	1.2	4	1	5	-.5	6	.866					
21	1.2D+1.0Di+1.0(WLXi+WLZi) - 150 Deg	Yes	Y		1	1.2	4	1	5	-.866	6	.5					
22	1.2D+1.0Di+1.0(WLXi+WLZi) - 180 Deg	Yes	Y		1	1.2	4	1	5	-1	6						
23	1.2D+1.0Di+1.0(WLXi+WLZi) - 210 Deg	Yes	Y		1	1.2	4	1	5	-.866	6	-.5					
24	1.2D+1.0Di+1.0(WLXi+WLZi) - 240 Deg	Yes	Y		1	1.2	4	1	5	-.5	6	-.866					
25	1.2D+1.0Di+1.0(WLXi+WLZi) - 270 Deg	Yes	Y		1	1.2	4	1	5		6	-1					
26	1.2D+1.0Di+1.0(WLXi+WLZi) - 300 Deg	Yes	Y		1	1.2	4	1	5	.5	6	-.866					
27	1.2D+1.0Di+1.0(WLXi+WLZi) - 330 Deg	Yes	Y		1	1.2	4	1	5	.866	6	-.5					
28	**Seismic Load**																
29	1.2D+ELv+ELh	Yes	Y		1	1.2	7	1	8	1							
30	**Maintenance Load (With Service Load)**...																
31	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 0...	Yes	Y		1	1.2	11	1.5	9	1	10						
32	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	11	1.5	9	.87	10	.5					
33	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 6...	Yes	Y		1	1.2	11	1.5	9	.5	10	.87					
34	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 9...	Yes	Y		1	1.2	11	1.5	9		10	1					
35	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	11	1.5	9	-.5	10	.87					
36	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	11	1.5	9	-.87	10	.5					
37	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	11	1.5	9	-1	10						
38	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	11	1.5	9	-.87	10	-.5					
39	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	11	1.5	9	-.5	10	-.87					
40	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	11	1.5	9		10	-1					
41	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	11	1.5	9	.5	10	-.87					
42	1.2D+1.5Lm1+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	11	1.5	9	.87	10	-.5					
43	**Maintenance Load (With Service Load)**...																
44	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 0...	Yes	Y		1	1.2	12	1.5	9	1	10						
45	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	12	1.5	9	.87	10	.5					
46	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 6...	Yes	Y		1	1.2	12	1.5	9	.5	10	.87					
47	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 9...	Yes	Y		1	1.2	12	1.5	9		10	1					
48	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	12	1.5	9	-.5	10	.87					
49	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	12	1.5	9	-.87	10	.5					
50	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	12	1.5	9	-1	10						
51	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	12	1.5	9	-.87	10	-.5					
52	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	12	1.5	9	-.5	10	-.87					
53	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	12	1.5	9		10	-1					
54	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	12	1.5	9	.5	10	-.87					
55	1.2D+1.5Lm2+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	12	1.5	9	.87	10	-.5					
56	**Maintenance Load (With Service Load)**...																
57	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 0...	Yes	Y		1	1.2	13	1.5	9	1	10						
58	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	13	1.5	9	.87	10	.5					
59	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 6...	Yes	Y		1	1.2	13	1.5	9	.5	10	.87					
60	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 9...	Yes	Y		1	1.2	13	1.5	9		10	1					
61	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	13	1.5	9	-.5	10	.87					
62	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	13	1.5	9	-.87	10	.5					
63	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 1...	Yes	Y		1	1.2	13	1.5	9	-1	10						
64	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	13	1.5	9	-.87	10	-.5					
65	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	13	1.5	9	-.5	10	-.87					
66	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 2...	Yes	Y		1	1.2	13	1.5	9		10	-1					

Load Combinations (Continued)

	Description	S...	PDe...	SRSS	B...	Fa...	BLC	Fact...	B...	Factor	B...	Fa...	B...	F...	B...	Fa...	Fa...
67	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	13	1.5	9	.5	10	-.87					
68	1.2D+1.5Lm3+1.0(WLX+WLZ, Service) - 3...	Yes	Y		1	1.2	13	1.5	9	.87	10	-.5					
69	***Man Vertical Load***		Y														
70	1.2D+1.5Lv1	Yes	Y		1	1.2	14	1.5									
71	1.2D+1.5Lv2	Yes	Y		1	1.2	15	1.5									

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N10	max	1352.097	8	1913.012	4	2056.366	13	.951	9	2.361	7	4.464	4
2		min	-1347.415	14	-160.522	10	-2051.883	7	-2.923	57	-2.355	13	-1.39	10
3	N53	max	1239.784	10	1867.486	8	1985.468	11	.961	3	2.299	11	1.31	14
4		min	-1247.773	4	-209.969	14	-1986.682	5	-2.923	37	-2.293	5	-4.305	8
5	N70	max	2169.066	9	1895.796	12	626.551	12	5.066	12	2.109	3	.916	9
6		min	-2165.836	3	-236.88	6	-640.083	6	-1.606	6	-2.103	9	-.915	3
7	Totals:	max	4330.639	9	4214.371	24	4494.958	12						
8		min	-4330.639	3	2533.615	5	-4494.958	6						

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

	Member	Shape	Code Ch...	Loc[in]	LC	Shear C...	Loc[...	Dir	LC	phi*Pnc [lb]	phi*Pnt ...	phi*Mn y-y [k...	phi*M.....	Eqn
1	M23	C3.38x2.06x0.25	.308	0	12	.075	29.5...	z	13	47760.074	56700	2.203	5.752 ...	H1-1b
2	M22	C3.38x2.06x0.25	.307	33	12	.101	3.438	z	5	47760.074	56700	2.203	5.752 ...	H1-1b
3	M7	C3.38x2.06x0.25	.304	0	4	.074	29.5...	z	5	47760.074	56700	2.203	5.752 ...	H1-1b
4	M36	C3.38x2.06x0.25	.303	33	8	.100	3.438	z	13	47760.074	56700	2.203	5.752 ...	H1-1b
5	M19	PL6.5x0.375	.298	18	11	.169	36	y	5	4979.135	78975	.617	9.011 ...	H1-1b
6	M37	C3.38x2.06x0.25	.292	0	8	.067	29.5...	z	9	47760.074	56700	2.203	5.752 ...	H1-1b
7	M8	C3.38x2.06x0.25	.292	33	4	.092	3.438	z	9	47760.074	56700	2.203	5.752 ...	H1-1b
8	M33	PL6.5x0.375	.292	18	7	.168	36	y	13	4979.135	78975	.617	9.045 ...	H1-1b
9	M4	PL6.5x0.375	.284	18	5	.155	0	y	9	4979.135	78975	.617	9.02 ...	H1-1b
10	M82	PIPE_2.5	.279	68	5	.175	36		11	30038.461	50715	3.596	3.596 ...	H1-1b
11	M95	PIPE_2.5	.279	68	13	.175	36		7	30038.461	50715	3.596	3.596 ...	H1-1b
12	M69	PIPE_2.5	.277	68	3	.173	36		3	30038.461	50715	3.596	3.596 ...	H1-1b
13	M6	HSS4X4X6	.269	41	5	.096	31.6...	z	13	187775.062	197892	22.046	22.046 ...	H1-1b
14	M101	PIPE_2.5	.263	68	7	.082	68		5	30038.461	50715	3.596	3.596 ...	H1-1b
15	M88	PIPE_2.5	.263	68	11	.079	68		9	30038.461	50715	3.596	3.596 ...	H1-1b
16	M98	PIPE_2.5	.263	68	13	.079	68		3	30038.461	50715	3.596	3.596 ...	H1-1b
17	M85	PIPE_2.5	.263	68	5	.082	68		7	30038.461	50715	3.596	3.596 ...	H1-1b
18	M35	HSS4X4X6	.263	41	7	.095	41	z	5	187775.062	197892	22.046	22.046 ...	H1-1b
19	M72	PIPE_2.5	.262	68	9	.083	68		11	30038.461	50715	3.596	3.596 ...	H1-1b
20	M21	HSS4X4X6	.261	41	11	.090	41	z	9	187775.062	197892	22.046	22.046 ...	H1-1b
21	M75	PIPE_2.5	.260	68	3	.082	68		13	30038.461	50715	3.596	3.596 ...	H1-1b
22	M62	L6.6x4.46x0.25	.225	36.724	9	.033	36.7...	y	7	51620.642	87561	2.465	7.125 ...	H2-1
23	M61	L6.6x4.46x0.25	.223	0	3	.034	0	y	11	51620.642	87561	2.465	7.125 ...	H2-1
24	M46	PIPE_2.5	.217	25	9	.122	25		8	22373.407	50715	3.596	3.596 ...	H1-1b
25	M47	PIPE_2.5	.215	25	5	.123	95		12	22373.407	50715	3.596	3.596 ...	H1-1b
26	M48	PIPE_2.5	.215	95	7	.124	25		12	22373.407	50715	3.596	3.596 ...	H1-1b
27	M63	L6.6x4.46x0.25	.213	36.724	5	.031	0	y	3	51620.642	87561	2.465	7.125 ...	H2-1
28	M45	Pipe3.5x0.165	.209	64	13	.131	33		13	38821.879	54463.5	4.822	4.822 ...	H1-1b
29	M16	Pipe3.5x0.165	.208	64	11	.131	33		11	38821.879	54463.5	4.822	4.822 ...	H1-1b
30	M1	Pipe3.5x0.165	.196	64	9	.127	63		3	38821.879	54463.5	4.822	4.822 ...	H1-1b
31	M29	L2x2x4	.129	0	7	.017	0	y	9	22280.388	30585.6	.691	1.577 ...	H2-1
32	M15	L2x2x4	.126	0	11	.018	30.0...	z	57	22280.388	30585.6	.691	1.577 ...	H2-1
33	M43	L2x2x4	.114	0	3	.018	30.0...	y	6	22280.388	30585.6	.691	1.577 ...	H2-1
34	M30	L2x2x4	.088	0	11	.023	0	z	4	22280.388	30585.6	.691	1.577 ...	H2-1
35	M44	L2x2x4	.086	0	7	.023	30.0...	y	12	22280.388	30585.6	.691	1.577 ...	H2-1

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

	Member	Shape	Code Ch..	Loc[in]	LC	Shear C...	Loc[...	Dir	LC	phi*Pnc [lb]	phi*Pnt ...	phi*Mn y-y [k..	phi*M.....	Eqn
36	M14	L2x2x4	.078	0	3	.022	0	z	8	22280.388	30585.6	.691	1.577 ...	H2-1
37	M5	Plate 6x.37	.072	1.969	12	.300	0	y	5	67974.739	71928	.554	8.991 ...	H1-1b
38	M34	Plate 6x.37	.071	1.969	12	.269	0	y	7	67974.739	71928	.554	8.991 ...	H1-1b
39	M18	Plate 6x.37	.069	1.531	8	.301	3.5	y	13	67974.739	71928	.554	8.991 ...	H1-1b
40	M20	Plate 6x.37	.069	1.969	4	.269	0	y	11	67974.739	71928	.554	8.991 ...	H1-1b
41	M32	Plate 6x.37	.066	1.531	4	.298	3.5	y	9	67974.739	71928	.554	8.991 ...	H1-1b
42	M3	Plate 6x.37	.065	1.531	8	.287	3.5	y	57	67974.739	71928	.554	8.991 ...	H1-1b
43	M65	PIPE_2.5	.041	6	13	.016	6		4	47114.007	50715	3.596	3.596 ...	H1-1b

The maximum member stress does not exceed 31% of its capacity; therefore, the proposed mount will have sufficient capacity to support the proposed load configuration upon installation.

APPENDIX D

ADDITIONAL CALCULATIONS

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

Job No. 10710.NJJER01120B
Calculated By: AMP Date : 12/2/22
Checked By: IM Date : 12/2/22

Connection Details		
Bolt Details		
Bolt Quantity =	4	
Bolt Diameter =	0.625	in
Vertical Spacing =	7	in
Horizontal Spacing =	7	in
Bolt Grade =	A325	
Bolt F_u, if "Other" =	N/A	ksi

Loading Details		
Node N70, Env		
Shear, X =	2.169	k
Shear, Y =	1.896	k
Tension, Z =	0.64	k
Mx =	5.066	k-ft
My =	2.109	k-ft
Torsion, Mz =	0.916	k-ft

1 - Tensile Capacity

$$R_{nt} = F_{nt}A_b$$ AISC [Eqn. J3-1]

Φ =	0.75	
F_{nt} =	90	ksi
A_b =	0.307	in^2
$ΦR_{nt}$ =	20.72	k
T_{max} =	6.31	k

AISC [Table J3.2]

ΦRnt > Tmax

30.4% **OK**

2 - Shear Capacity

$$R_{nv} = F_{nv}A_b$$ AISC [Eqn. J3-1]

Φ =	0.75	
F_{nv} =	54	ksi
A_b =	0.307	in^2
$ΦR_{nv}$ =	12.43	k
V_{max} =	1.28	k

AISC [Table J3.2]

ΦRnv > Vmax

10.3% **OK**

3 - Combined Tension and Shear Capacity

$$R'_{nt} = F'_{nt}A_b$$ AISC [Eqn. J3-2]

$$F'_{nt} = 1.3F_{nt} - \frac{F_{nt}}{\phi F_{nv}} f_{rv} \leq F_{nt}$$ AISC [Eqn. J3-3a]

Φ =	0.75	
F'_{nt} =	90	ksi
A_b =	0.307	in^2
$ΦR'_{nt}$ =	20.72	k
T_{max} =	6.31	k

ΦR'nt > Tmax

30.4% **OK**

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

Job No. 10710.NJJER01120B
Calculated By: AMP Date : 12/2/22
Checked By: IM Date : 12/2/22

Connection Details		
Weld Details		
Weld Type	Fillet	
# of Sides	2	
Electrodes	70	XX
Size of Weld =	0.25	in
HSS Height =	4.00	in
HSS Width =	4.00	in
HSS Thickness =	0.38	in
Plate Details		
Height/Width =	9.00	in
Thickness =	0.625	in
F_y =	50	ksi

4 - Weld Capacity

$$F_{nw} = 0.6F_{EXX}$$ AISC [Table J2.5]

Φ =	0.75	
ΦF_{nw} =	63.00	ksi
$f_{V,max}$ =	2.422	ksi
$f_{b,max}$ =	18.39	ksi

Min(ΦFnw,ΦFnbm) > √(fv,max+fm,max)

29.4% **OK**

5 - Plate Capacity

Φ =	0.9	
ΦF_{byy} =	45.00	ksi
f_b =	18.32	ksi

ΦFbyy > Fb

40.7% **OK**