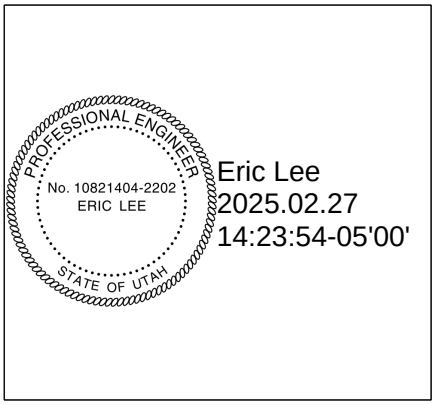
CALCULATIONS FOR:

POLIGON REK 40X64
STANDING SEAM OVER STAINED TONGUE AND GROOVE
2021 INTERNATIONAL BUILDING CODE



PREPARED UNDER THE CONTROL AND SUPERVISION OF THE DESIGN PROFESSIONAL ABOVE. THE SEAL APPLIES ONLY TO BUILDING COMPONENTS DETAILED WITHIN THESE CALCULATIONS AND SUPPLIED BY PORTER CORP AS WELL AS THE FOUNDATION DESIGN, IF APPLICABLE.

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DESIGN CRITERIA

GENERAL

Building Code:	See Cover Sheet	Roof Slope (°):	18.43		*4:12 Pitch*
Design Code:	ASCE 7-16				
Risk Category:	II	Equivalent Roof Height:	15.00	ft	

DEAD LOAD

Weight of Roofing System	6.0	psf	
Frame Dead Load	Frame Self-Weight		*(See RISA Analysis Report)*

LIVE LOAD

Roof Live Load, L_r	20.0	psf	*ASCE 7 Table 4-1*

SNOW LOAD

Ground Snow Load, p_g	31.0	psf	
Importance Factor, I (Snow Loads)	1.00		*ASCE 7 Table 1.5-2*
Slope Factor, C_s	1.0		*ASCE 7 Figure 7.4-1*
Thermal Factor, C_t	1.2		*ASCE 7 Table 7.3-2*
Exposure Factor, C_e	1.0		*ASCE 7 Table 7.3-1*
Flat Roof Snow Load, p_f	26.0	psf	*ASCE 7 Section 7.3*
Leeward Unbalanced Snow Load	26.0	psf	*ASCE 7 Section 7.6.1*
Drift Surcharge Load, p_d	0.0	psf	*ASCE 7 Section 7.7*
Width of Snow Drift, w	0.0	ft	*ASCE 7 Section 7.7*
Sliding Snow Load	0.0	psf	*ASCE 7 Section 7.9*

WIND LOAD

Basic Wind Speed, V	V_{ult}	105	mph	V_{asd}	81	mph	*ASCE 7 Section 26.5*
Exposure Category		C		V_T		mph	*ASCE 7 Section 26.7*
Ground Elevation Factor, Ke		1.00					*ASCE 7 Table 26.9-1*
Gust Effect Factor, G		0.85					*ASCE 7 Section 26.11.1*
Velocity Pressure Exposure Coefficient, K_z		0.85					*ASCE 7 Table 26.10-1*
Wind Directionality Factor, K_d		0.85		K_{zT}	0.80		*ASCE 7 Table 26.6-1*
Topographic Factor, K_{zt}		1.00					*ASCE 7 Section 26.8.2*
Velocity Pressure, q_z		20.39	psf	q_{zT}	0.00	psf	*ASCE 7 Section 26.10.2*

Main Wind-Force Resisting System *ASCE 7 Section 27.3*

Open Building, Clear Wind Flow (Cn from ASCE 7 Fig. 27.3-4 - 27.3-7)

	Roof	
Load Case	A	B
γ = 0		
Windward Cp =	1.10	0.01
p (psf):	19.07	0.15
γ = 180		
Leeward Cp=	-0.17	-0.96
p (psf):	-2.96	-16.68
γ = 90		
Sideward Cp=	-0.80	0.80
p (psf):	-13.87	13.87

Component and Cladding Elements *ASCE 7 Section 30.7.2*

Open Building, Clear Wind Flow (Cn from ASCE 7 Fig. 30.7-1 - 30.7-3)

	Wind Direction	*Toward Roof*	*Away From Roof*
Zone 3	Cn:	2.29	-2.11
	p (psf):	39.72	-36.55
Zone 2	Cn:	1.77	-1.63
	p (psf):	30.66	-28.28
Zone 1	Cn:	1.15	-1.05
	p (psf):	19.86	-18.27

SEISMIC LOAD

Analysis Procedure	Equivalent Lateral Force Procedure		*ASCE 7 Section 12.8*
Seismic Site Class	D		*ASCE 7 Section 11.4.2*
Basic Seismic Force Resisting System	Steel Ordinary Cantilever Column Systems		*ASCE 7 Table 12.2-1*
Short Spectral Response Parameter, S_s	1.39		
1-Sec Spectral Response Parameter, S_1	0.52		
Seismic Design Category	D		*ASCE 7 Section 11.6*
Importance Factor, I	1.00		*ASCE 7 Table 11.5-1*
Response Modification Coefficient, R	1.25		*ASCE 7 Table 12.2-1*
Redundancy Factor, ρ	1.30		*ASCE 7 Table 12.2-1*
Overstrength Factor, Ω_o	1.25		*ASCE 7 Table 12.2-1*
Design Short Spectral Response Parameter, S_{DS}	0.93		*ASCE 7 Section 11.4.4*
1-Sec Design Spectral Response Parameter, S_{D1}	0.92		*ASCE 7 Section 11.4.4*
Seismic Response Coefficient, C_s	0.74		*ASCE 7 Section 12.8.1.1*
Effective Seismic Weight, W	6.00	psf	*ASCE 7 Section 12.7.2*
Seismic Base Shear, V	4.46	psf	*ASCE 7 Section 12.8.1*
Seismic Load, E	5.79	psf	*ASCE 7 Section 12.4*
Seismic Load with Overstrength Factor, E_m	5.57	psf	*ASCE 7 Section 12.4*

STRUCTURAL ENGINEERING NOTES

GENERAL NOTES

Loads applied to the structure may be greater than required for the project location.

Actual structure dimensions may be smaller than shown in this document.

The engineering seal for the structure designed in these calculations is only valid if Porter Corp fabricates the steel components. Fabricating the steel components elsewhere voids the engineering provided by Porter Corp.

Porter Corp is responsible only for the structural design of the Steel Structure (and foundation design if applicaple) it sells to the Builder. Porter Corp or their engineer is not the Design Professional or Engineer of Record for the Construction Project. Porter Corp is not responsible for the design of any components or materials not sold by it or their interface and connection with the Steel Structure.

STRUCTURAL ANALYSIS NOTES

RISA-3D structural analysis software was used to model the 3-D space frame.

To reduce the amount of computer printout, the analysis results only show each member's controlling load case.

Unless noted otherwise in the ‘RISA Analysis Report’, the roof deck was not utilized in the structural analysis to provide lateral support to the members.

From the analysis, all member deflections and structural drift are within allowable limits.

STRUCTURAL DESIGN NOTES

End plates were designed by applying beam end forced to the edges of the plate and calculating the resulting prying moment at the edge of the bolt holes. In determining the prying moment it was assumed that the area of the plate between bolts was fixed.

Light gage members were designed in accordance with the latest edition of the AISC specifications and the AISI Cold-Formed Steel Design Manual.

STRUCTURAL CONNECTION NOTES

Bolt threads were assumed to not be excluded from the connections.

LOAD COMBINATIONS

Key

Abbreviation	Description
DL	Dead Load
Lr	Roof Live Load
S	Snow Load
Su	Unbalanced Snow Load
Ssliding	Sliding Snow
Sdrift	Snow Drift
Wx	Wind Load (X-Direction)
Wz	Wind Load (Z-Direction)
Wx (Min.)	16 psf Minimum Wind Load (X-Direction)
Wz (Min.)	16 psf Minimum Wind Load (Z-Direction)
Ex	Seismic Load (X-Direction)
Ez	Seismic Load (Z-Direction)
Emx	Seismic Load (X-Direction) with Overstrength Factor
Emz	Seismic Load (Z-Direction) with Overstrength Factor
Ev	Vertical Seismic Load Effect
LC	Load Case

Service (Unfactored)

Number	Description
1	SERVICE D
2	SERVICE Lr
3	SERVICE S
4	SERVICE Su
5	SERVICE Ssliding
6	SERVICE Sdrift
7	SERVICE Wx (LC A)
8	SERVICE Wx (LC B)
9	SERVICE Wz (LC A)
10	SERVICE Wz (LC B)
11	SERVICE Ex
12	SERVICE Ez
13	SERVICE Ev

Allowable Stress Design (Factored)

Number	Description
17	D
18	D + Lr
19	D + S
20	D + Su
21	D+Ssliding
22	D+Sdrift
23	D + 0.6Wx (LC A)
24	D + 0.6Wx (LC B)
25	D + 0.6Wz (LC A)
26	D + 0.6Wz (LC B)
27	D + (0.6Wx (Min.))
28	D + (0.6Wz (Min.))
29	D+0.6(0.75Wx(LC A)+0.75Wz(LC A))
30	D+0.6(0.75Wx(LC B)+0.75Wz(LC B))
31	D+0.6(0.75Wx(Min.)+0.75Wz(Min.))
32	D + 0.75(0.6Wx (LC A)) + 0.75Lr
33	D + 0.75(0.6Wx (LC B)) + 0.75Lr
34	D + 0.75(0.6Wz (LC A)) + 0.75Lr
35	D + 0.75(0.6Wz (LC B)) + 0.75Lr
36	D + 0.75(0.6Wx (Min.)) + 0.75Lr
37	D + 0.75(0.6Wz (Min.)) + 0.75Lr
38	D+0.75(0.6(0.75Wx(LC A)+0.75Wz(LC A))) + 0.75Lr
39	D+0.75(0.6(0.75Wx(LC B)+0.75Wz(LC B)) + 0.75Lr
40	D+ 0.75(0.6(0.75Wx(Min.)+0.75Wz(Min.))) + 0.75Lr
41	D + 0.75(0.6Wx (LC A)) + 0.75S
42	D + 0.75(0.6Wx (LC B)) + 0.75S
43	D + 0.75(0.6Wz (LC A)) + 0.75S
44	D + 0.75(0.6Wz (LC B)) + 0.75S
45	D + 0.75(0.6Wx (Min.)) + 0.75S
46	D + 0.75(0.6Wz (Min.)) + 0.75S
47	D+0.75(0.6(0.75Wx(LC A)+0.75Wz(LC A))) + 0.75S
48	D+0.75(0.6(0.75Wx(LC B)+0.75Wz(LC B)) + 0.75S
49	D+ 0.75(0.6(0.75Wx(Min.)+0.75Wz(Min.))) + 0.75S
50	0.6D + 0.6Wx (LC A)
51	0.6D + 0.6Wx (LC B)
52	0.6D + 0.6Wz (LC A)
53	0.6D + 0.6Wz (LC B)
54	0.6D + (0.6Wx (Min.))
55	0.6D + (0.6Wz (Min.))
56	0.6D+0.6(0.75Wx(LC A)+0.75Wz(LC A))
57	0.6D+0.6(0.75Wx(LC B)+0.75Wz(LC B))
58	0.6D+0.6(0.75Wx(Min.)+0.75Wz(Min.))
59	1.0D+0.7Ev+0.7Ehx
60	1.0D+0.525Ev+0.525Ehx+0.75S
61	0.6D-0.7Ev+0.7Ehx
62	1.0D+0.7Ev+0.7Ehz
63	1.0D+0.525Ev+0.525Ehz+0.75S
64	0.6D-0.7Ev+0.7Ehz
65	1.0D+0.7Ev+0.7Ehx+0.21Ehz
66	1.0D+0.525Ev+0.525Ehx+0.1575Ehz+0.75S
67	0.6D-0.7Ev+0.7Ehx+0.21Ehz
68	1.0D+0.7Ev+0.7Ehz+0.21Ehx
69	1.0D+0.525Ev+0.525Ehz+0.1575Ehx+0.75S
70	0.6D-0.7Ev+0.7Ehz+0.21Ehx

Notes:

1. Load combinations are effective in all states that have adopted IBC as a base code.
2. See "RISA Analysis Report" for the load combinations that are not listed above.

LOAD COMBINATIONS

Strength Design (Factored)

Number	Description
92	1.4D
93	1.2D + 0.5Lr
94	1.2D + 0.5S
95	1.2D + 1.6Lr + 0.5Wx (LC A)
96	1.2D + 1.6Lr + 0.5Wx (LC B)
97	1.2D + 1.6Lr + 0.5Wz (LC A)
98	1.2D + 1.6Lr + 0.5Wz (LC B)
99	1.2D + 1.6Lr + 0.5Wx (Min.)
100	1.2D + 1.6Lr + 0.5Wz (Min.)
101	1.2D + 1.6Lr + 0.5(0.75Wx (LC A)+0.75Wz (LC A))
102	1.2D + 1.6Lr + 0.5(0.75Wx (LC B)+0.75Wz (LC B))
103	1.2D + 1.6Lr + 0.5(0.75Wx (Min.)+0.75Wz (Min.))
104	1.2D + 1.6S + 0.5Wx (LC A)
105	1.2D + 1.6S + 0.5Wx (LC B)
106	1.2D + 1.6S + 0.5Wz (LC A)
107	1.2D + 1.6S + 0.5Wz (LC B)
108	1.2D + 1.6S + 0.5Wx (Min.)
109	1.2D + 1.6S + 0.5Wz (Min.)
110	1.2D + 1.6S + 0.5(0.75Wx (LC A)+0.75Wz (LC A))
111	1.2D + 1.6S + 0.5(0.75Wx (LC B)+0.75Wz (LC B))
112	1.2D + 1.6S + 0.5(0.75Wx (Min.)+0.75Wz (Min.))
113	1.2D + 1.6Su + 0.5Wx (LC A)
114	1.2D + 1.6Su + 0.5Wx (LC B)
115	1.2D + 1.6Su + 0.5Wz (LC A)
116	1.2D + 1.6Su + 0.5Wz (LC B)
117	1.2D + 1.6Su + 0.5Wx (Min.)
118	1.2D + 1.6Su + 0.5Wz (Min.)
119	1.2D + 1.6Su + 0.5(0.75Wx (LC A)+0.75Wz (LC A))
120	1.2D + 1.6Su + 0.5(0.75Wx (LC B)+0.75Wz (LC B))
121	1.2D + 1.6Su + 0.5(0.75Wx (Min.)+0.75Wz (Min.))
122	1.2D + 1.6Ssliding + 0.5Wx (LC A)
123	1.2D + 1.6Ssliding + 0.5Wx (LC B)
124	1.2D + 1.6Ssliding + 0.5Wz (LC A)
125	1.2D + 1.6Ssliding + 0.5Wz (LC B)
126	1.2D + 1.6Ssliding + 0.5Wx (Min.)
127	1.2D + 1.6Ssliding + 0.5Wz (Min.)
128	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A)+0.75Wz (LC A))
129	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B)+0.75Wz (LC B))
130	1.2D + 1.6Ssliding + 0.5(0.75Wx (Min.)+0.75Wz (Min.))
131	1.2D + 1.6Sdrift + 0.5Wx (LC A)
132	1.2D + 1.6Sdrift + 0.5Wx (LC B)
133	1.2D + 1.6Sdrift + 0.5Wz (LC A)
134	1.2D + 1.6Sdrift + 0.5Wz (LC B)
135	1.2D + 1.6Sdrift + 0.5Wx (Min.)
136	1.2D + 1.6Sdrift + 0.5Wz (Min.)
137	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A)+0.75Wz (LC A))
138	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B)+0.75Wz (LC B))
139	1.2D + 1.6Sdrift + 0.5(0.75Wx (Min.)+0.75Wz (Min.))
140	1.2D + 1.0Wx (LC A) + 0.5Lr
141	1.2D + 1.0Wx (LC B) + 0.5Lr
142	1.2D + 1.0Wz (LC A) + 0.5Lr
143	1.2D + 1.0Wz (LC B) + 0.5Lr
144	1.2D + 1.0Wx (Min.) + 0.5Lr
145	1.2D + 1.0Wz (Min.) + 0.5Lr
146	1.2D + 1.0(0.75Wx (LC A)+0.75Wz (LC A)) + 0.5Lr
147	1.2D + 1.0(0.75Wx (LC B)+0.75Wz (LC B)) + 0.5Lr
148	1.2D + 1.0(0.75Wx (Min.)+0.75Wz (Min.)) + 0.5Lr
149	1.2D + 1.0Wx (LC A) + 0.5S
150	1.2D + 1.0Wx (LC B) + 0.5S
151	1.2D + 1.0Wz (LC A) + 0.5S
152	1.2D + 1.0Wz (LC B) + 0.5S
153	1.2D + 1.0Wx (Min.) + 0.5S
154	1.2D + 1.0Wz (Min.) + 0.5S
155	1.2D + 1.0(0.75Wx (LC A)+0.75Wz (LC A)) + 0.5S
156	1.2D + 1.0(0.75Wx (LC B)+0.75Wz (LC B)) + 0.5S
157	1.2D + 1.0(0.75Wx (Min.)+0.75Wz (Min.)) + 0.5S
158	0.9D + 1.0Wx (LC A)
159	0.9D + 1.0Wx (LC B)
160	0.9D + 1.0Wz (LC A)
161	0.9D + 1.0Wz (LC B)
162	0.9D + 1.0Wx (Min.)
163	0.9D + 1.0Wz (Min.)
164	0.9D + 1.0(0.75Wx (LC A)+0.75Wz (LC A))
165	0.9D + 1.0(0.75Wx (LC B)+0.75Wz (LC B))
166	0.9D + 1.0(0.75Wx (Min.)+0.75Wz (Min.))
167	1.2D+Ev+Ehx+0.2S
168	0.9D-Ev+Ehx
169	1.2D+Ev+Ehz+0.2S
170	0.9D-Ev+Ehz
171	1.2D+Ev+Ehx+0.3Ehz+0.2S
172	0.9D-Ev+Ehx+0.3Ehz
173	1.2D+Ev+Ehz+0.3Ehx+0.2S
174	0.9D-Ev+Ehz+0.3Ehx

Notes:

1. Load combinations are effective in all states that have adopted IBC as a base code.
2. See "RISA Analysis Report" for the load combinations that are not listed above.

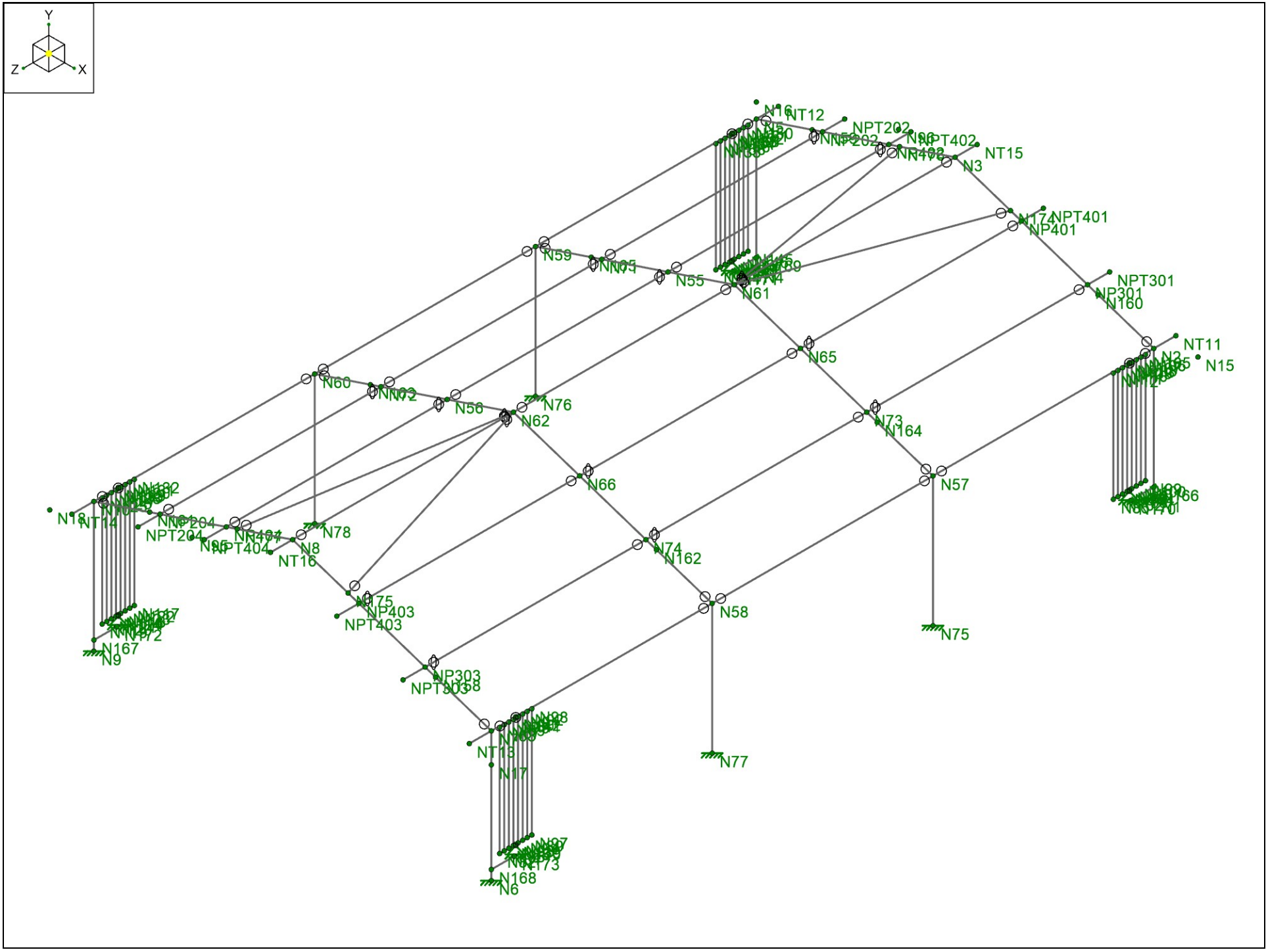
MATERIALS

Column	HSS14x10x3/8
Truss	HSS20x8x3/8
Tension	HSS6x6x3/16
Ridge	HSS8x4x3/16
Purlin	HSS8x6x3/16
Purlin Tail	HSS8x6x3/16
Tension Tail	HSS6x6x3/16
Ridge Tail	HSS8x4x3/16
Vert Ornamentation	HSS4x2x1/8
Brace	HSS5x5x3/8
Compression Tube	HSS16x12x3/8

HSS Sections:	ASTM A500 Gr. C
Pipe Sections:	ASTM A53 Gr. B
RMT Sections:	ASTM A519
Channel & Angle Sections:	ASTM A36
Connection Plates:	ASTM A36
Connections Bolts	ASTM A325
Welding Process:	Gas Metal Arc Welding
Welding Electrode:	E70xx

RISA MODEL VIEWS

Joint Labels
Member Labels
Member Shapes
Member Lengths
Member Local Axis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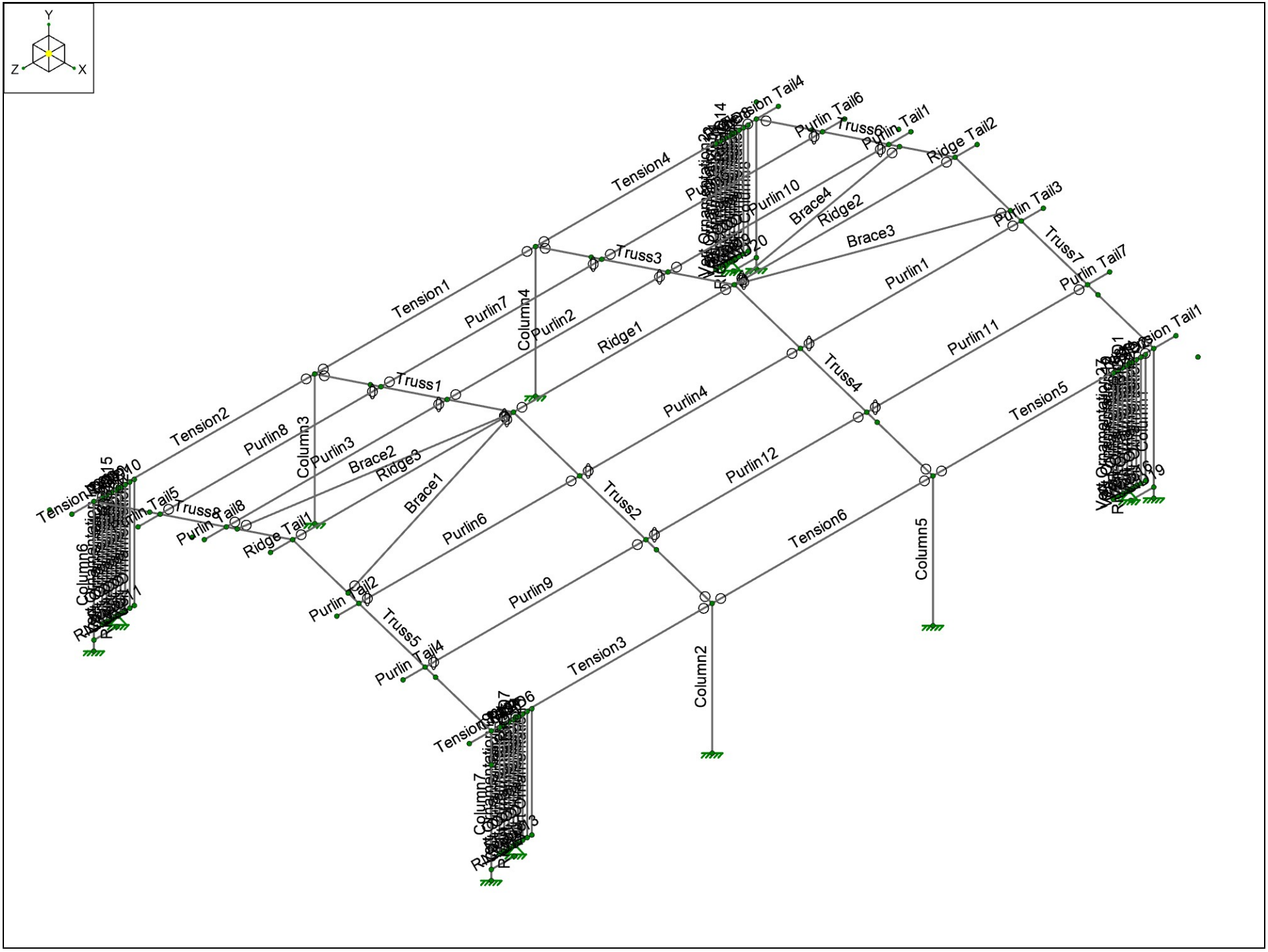
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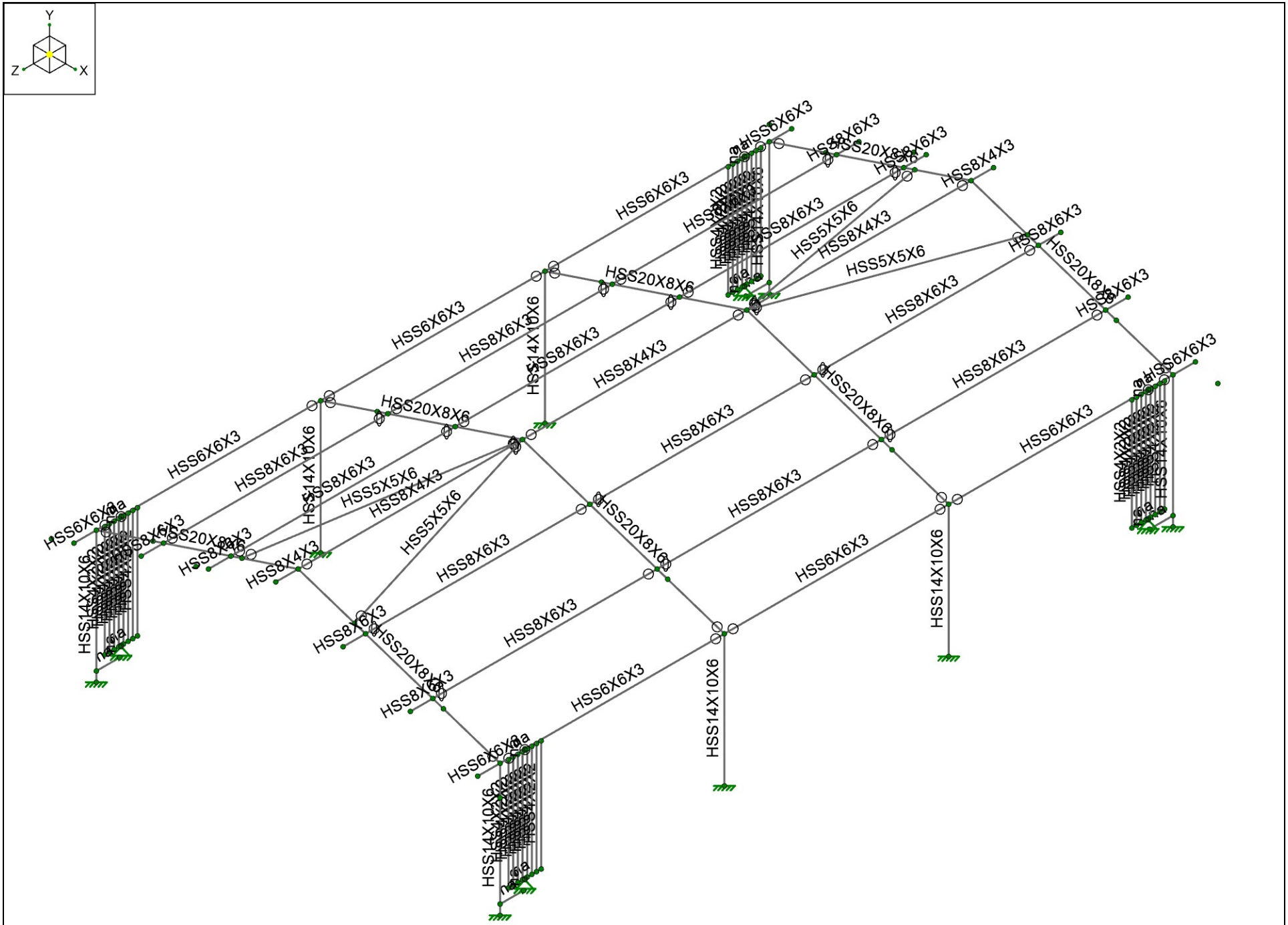
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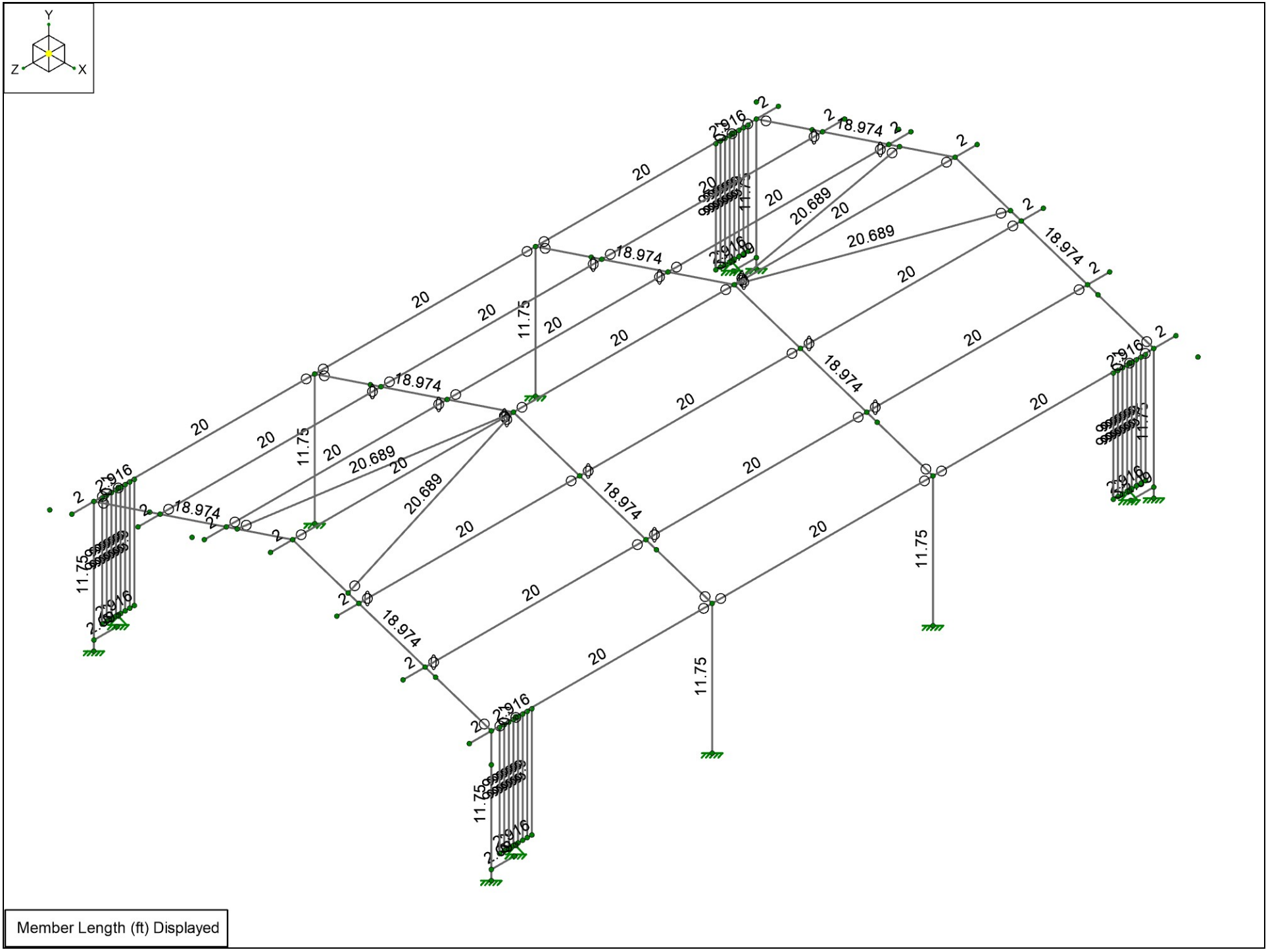
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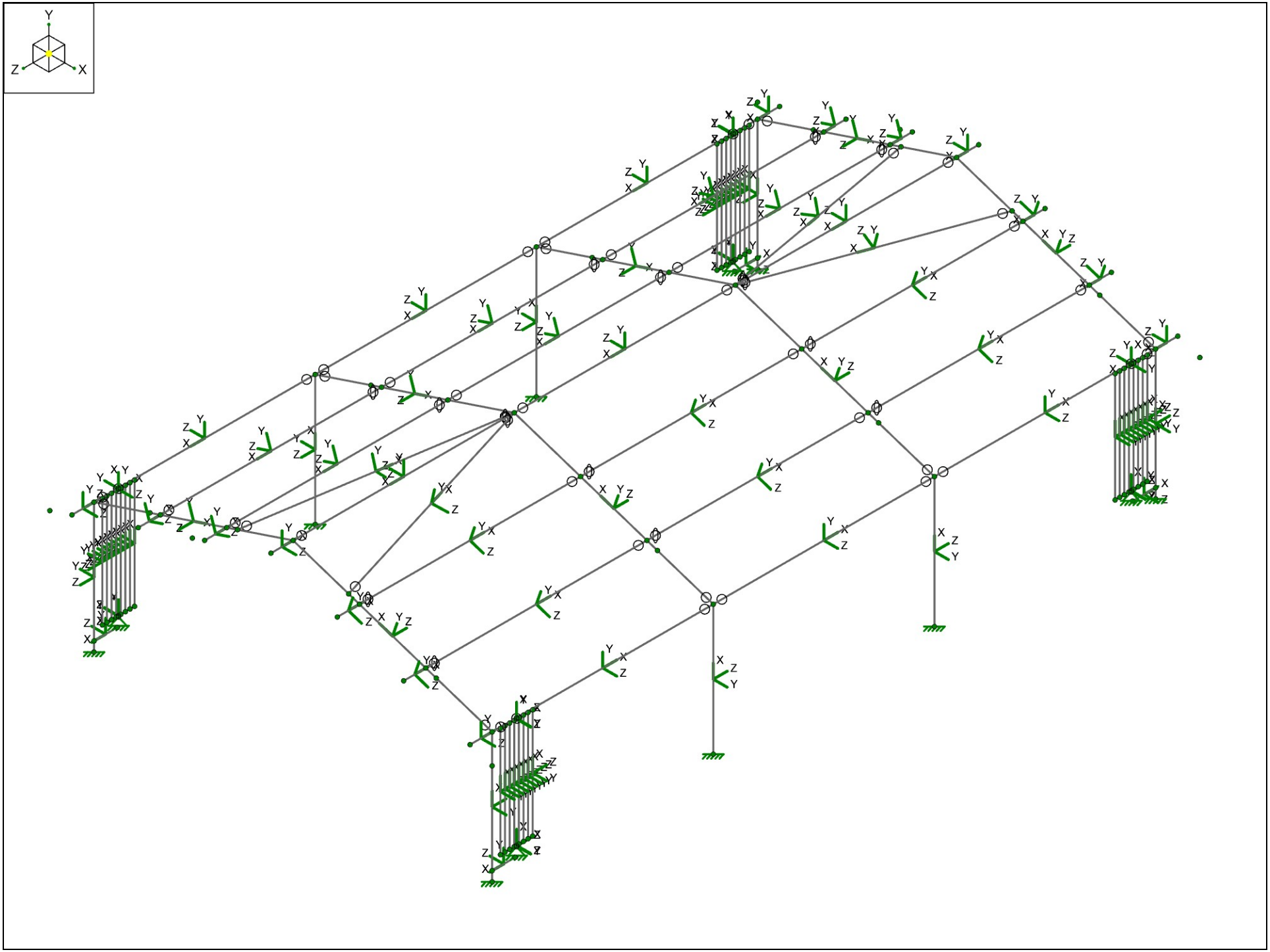
Y
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X

FOUNDATION DESIGN

The foundation design contained herein is site specific, and is based on Geotechnical Engineering Report, Sugar House Park Pavilions - Salt Lake City, UT, by Terracon. Dated December 27, 2024. Report No. 61245209. Proper care must be taken to ensure any and all recommendations of the above mentioned report for site preparation, soil performance, and foundation design are met. If conditions are present that do not allow for these recommendations to be met, the geotechnical engineer must be contacted.

Detail Report: F1

Input Data

Length (ft):	9.5	**eX (in):**	0	**Net Allowable Bearing (psf):**	1400 (net)
Width (ft):	9.5	**eZ (in):**	0	**Design Code:**	ACI 318-19
Thickness (in):	30	**pX (in):**	22	**Minimum Steel:**	.0018
Height (in):	0	**pZ (in):**	26	**Maximum Steel:**	.0075
Rot. Angle (deg):	0				

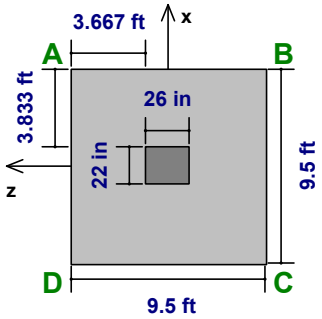
Material Properties

Material:	Conc4500NW	**Therm. Coef ($1e^{5o}F^{-1}$):**	0.6	**Tension Bar Fy (ksi):**	60
E (ksi):	3824	**Density (lb/ft^3):**	145	**Shear Bar (ksi):**	60
G (ksi):	1663	**f'c (ksi):**	4.5		
Nu:	0.15	**λ:**	1		

Design Properties

Footing Top Bar Cover (in):	3	**Overturning / Sliding SF:**	1.5	**Φ for Flexure:**	0.9
Footing Bottom Bar Cover (in):	3	**Coefficient of Friction:**	0	**Φ for Shear:**	0.75
Pedestal Longitudinal Bar Cover (in):	3	**Passive Resistance of Soil (k):**	16.03	**Φ for Bearing:**	0.65

Footing Dimensions

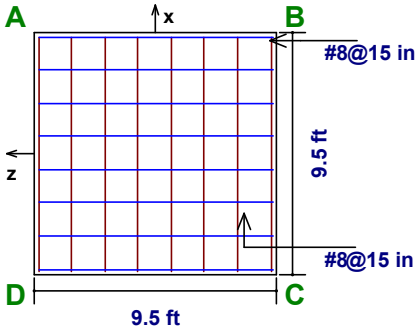


Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-in)	Mz (k-in)	Overburden (psf)
DL	5.83		1.5	-212.5	2.6	0
SL	10.29	-0.01	2.85	-400.44	7.64	
RLL	7.92	-0.01	2.19	-306.98	5.81	
ELX	0.72	-0.08	5.42	-716.1	-10.09	
ELY	1.08		0.28	-39.36	0.48	
ELZ	2.34	5.13	1.21	-165.77	660.72	
WL+X	0.58		1.3	-180.2	-1.6	
WL+Z	-3.06	0.62	-0.7	98.41	71.35	
WL-X	-2.98	-0.02	0.13	-17.91	-3.43	
WL-Z	3.29		0.82	-115.53	2.76	
OL3	9.64	-0.01	2.34	-328.91	6.23	

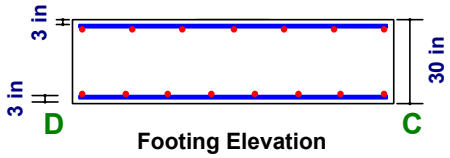
Design Checks	Gov. LC	Required	Available	Unity Check	Result
Soil Bearing	53	1330.015 psf	1762.5 psf	0.755	PASS
Footing Flexure Design	88	276.781 k-in	8674.923 k-in	0.072	PASS
Footing Shear Check (Bottom Bars)	88	12.675 k	153.251 k	0.083	PASS
Concrete Bearing Check (Vertical Loads Only)	91	26.202 k	2844.27 k	0.009	PASS
Overturning Check (Service)	51	855.117 k-in	1408.43 k-in	1.647	PASS
Sliding Check (Service)	50	16.03 k	16.03 k	2.35	PASS

Details

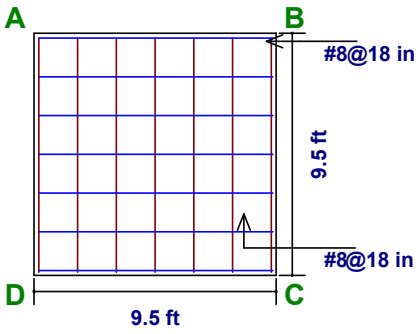


x Dir. Steel: 6.28 in^2 (8 #8)
z Dir. Steel: 6.28 in^2 (8 #8)

Bottom Rebar Plan

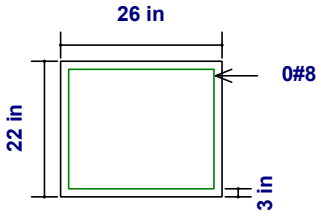


Footing Elevation

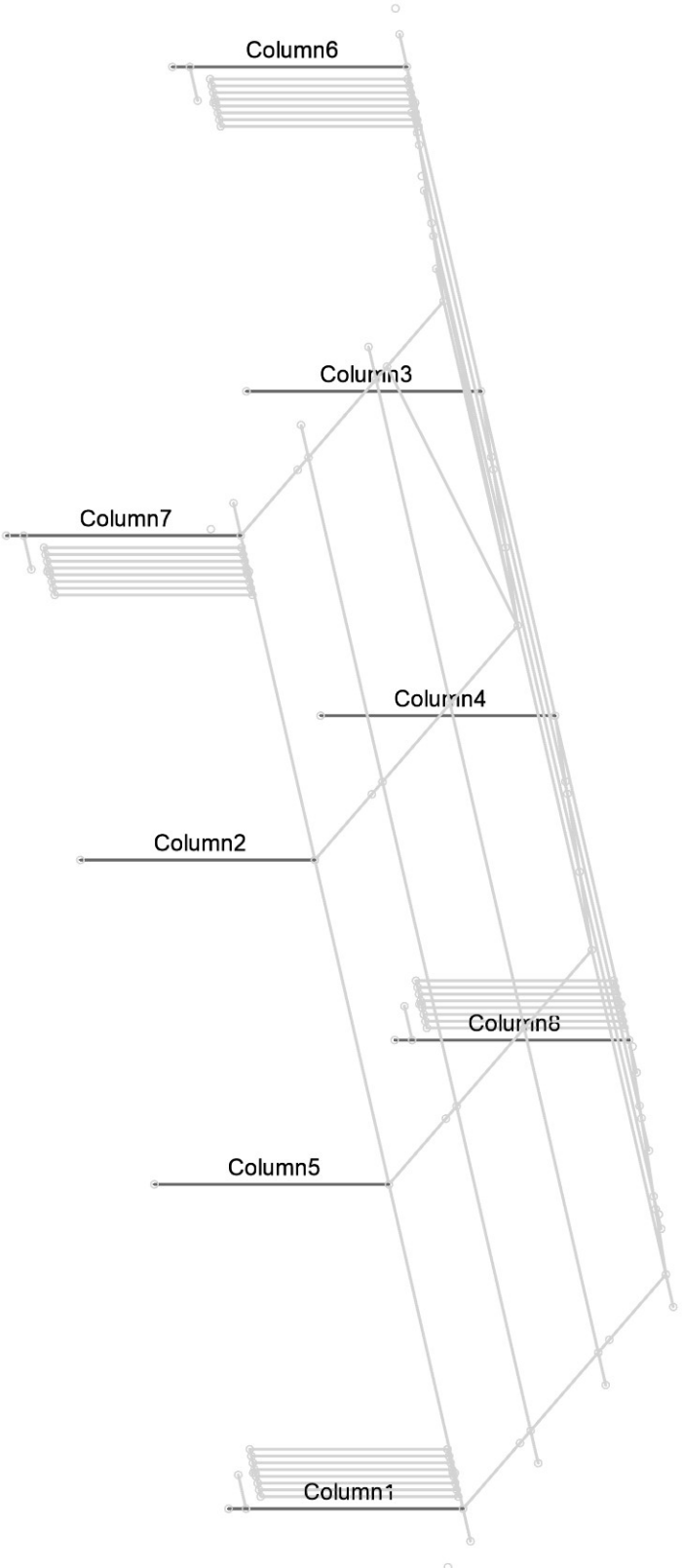


x Dir. Steel: 5.5 in^2 (7 #8)
z Dir. Steel: 5.5 in^2 (7 #8)

Top Rebar Plan



Pedestal Rebar Plan


Z
Y
X
Column6
Column3
Column7
Column4
Column2
Column8
Column5
Column1

SERVICE LOAD COLUMN BASE REACTION SUMMARY

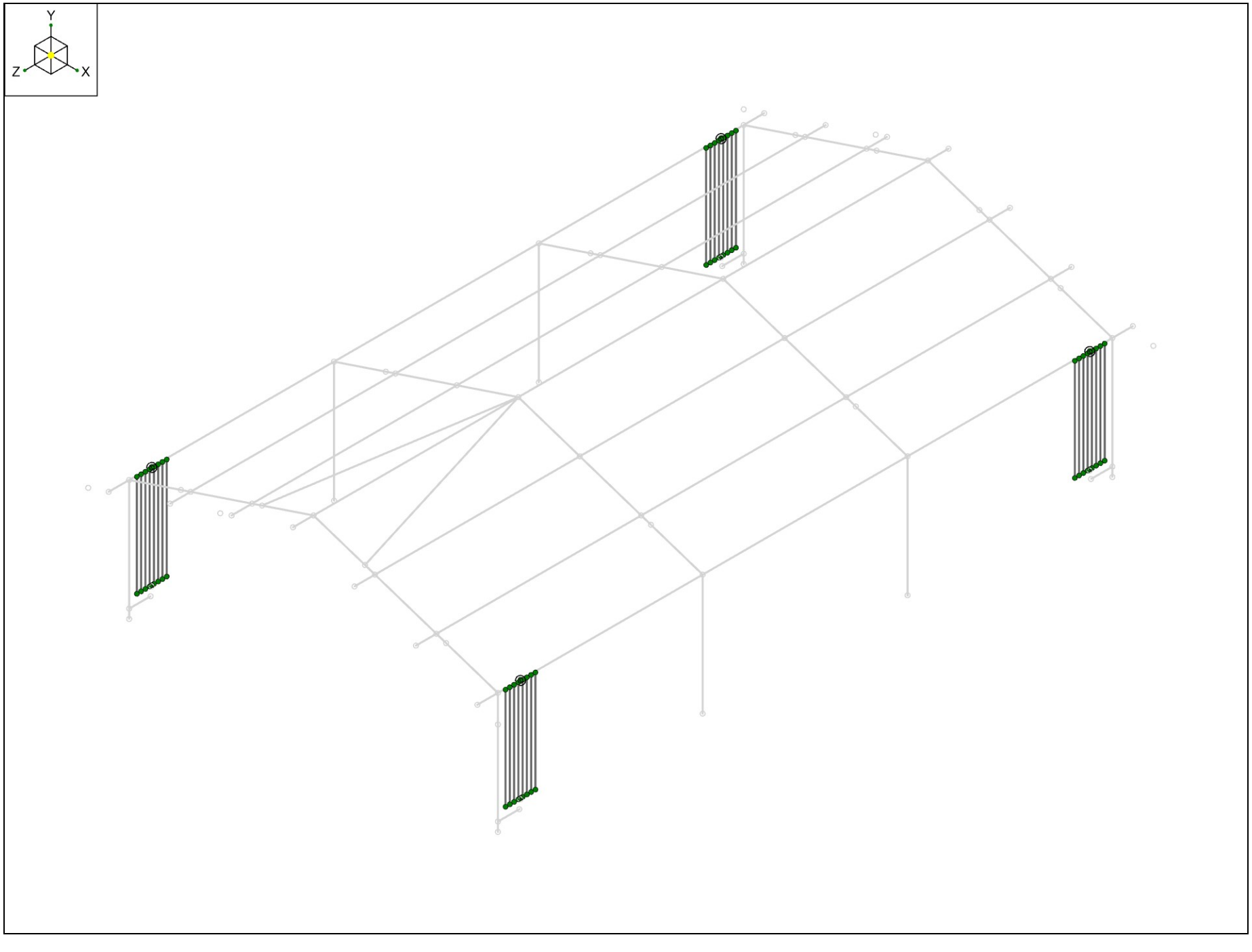
Refer to RISA model views for column local axis
Wind values are based on Vasd and should be factored accordingly for LRFD analysis
Negative axial values represent uplift

Service Loads (Unfactored)

LC	Member Label	Sec	Axial [k]	y Shear [k]	z Shear [k]	Torque [k-in]	y-y Moment [k-in]	z-z Moment [k-in]	LC Description
1	Column1	1	4.192	-1.004	0.029	-1.470	1.522	-142.707	SERVICE D
1	Column2	1	5.826	-1.512	0.003	-1.009	2.635	-212.511	SERVICE D
1	Column3	1	5.826	-1.512	-0.003	1.009	-2.635	-212.511	SERVICE D
1	Column4	1	5.637	-1.411	0.003	0.837	-2.913	-198.457	SERVICE D
1	Column5	1	5.637	-1.411	-0.003	-0.837	2.913	-198.457	SERVICE D
1	Column6	1	4.470	-1.130	0.029	0.350	-4.064	-160.431	SERVICE D
1	Column7	1	4.470	-1.130	-0.029	-0.350	4.064	-160.430	SERVICE D
1	Column8	1	4.192	-1.004	-0.029	1.470	-1.522	-142.707	SERVICE D
2	Column1	1	4.978	-1.306	0.060	-3.154	3.479	-186.329	SERVICE Lr
2	Column2	1	7.924	-2.186	0.006	-2.217	5.812	-306.982	SERVICE Lr
2	Column3	1	7.924	-2.186	-0.006	2.217	-5.813	-306.983	SERVICE Lr
2	Column4	1	8.022	-2.224	0.006	1.836	-6.422	-312.225	SERVICE Lr
2	Column5	1	8.022	-2.224	-0.006	-1.836	6.422	-312.225	SERVICE Lr
2	Column6	1	5.076	-1.349	0.061	0.841	-8.837	-192.368	SERVICE Lr
2	Column7	1	5.076	-1.349	-0.061	-0.841	8.837	-192.367	SERVICE Lr
2	Column8	1	4.978	-1.306	-0.060	3.154	-3.479	-186.328	SERVICE Lr
3	Column1	1	6.250	-1.700	0.078	-4.116	4.596	-242.846	SERVICE S
3	Column2	1	10.289	-2.851	0.007	-2.897	7.636	-400.439	SERVICE S
3	Column3	1	10.289	-2.851	-0.007	2.897	-7.637	-400.439	SERVICE S
3	Column4	1	10.416	-2.902	0.009	2.400	-8.431	-407.279	SERVICE S
3	Column5	1	10.416	-2.902	-0.009	-2.400	8.430	-407.279	SERVICE S
3	Column6	1	6.377	-1.756	0.080	1.104	-11.573	-250.719	SERVICE S
3	Column7	1	6.377	-1.756	-0.080	-1.104	11.573	-250.718	SERVICE S
3	Column8	1	6.250	-1.700	-0.078	4.116	-4.597	-242.844	SERVICE S
4	Column1	1	3.436	-1.395	0.035	-2.963	4.984	-198.806	SERVICE Su
4	Column2	1	5.669	-2.333	0.006	-2.377	6.239	-327.616	SERVICE Su
4	Column3	1	9.638	-2.342	-0.006	2.377	-6.229	-328.907	SERVICE Su
4	Column4	1	9.788	-2.382	0.007	1.966	-6.906	-334.310	SERVICE Su
4	Column5	1	5.728	-2.372	-0.007	-1.970	6.835	-332.908	SERVICE Su
4	Column6	1	6.024	-1.441	0.077	0.677	-9.957	-205.697	SERVICE Su
4	Column7	1	3.495	-1.440	-0.037	-1.320	8.181	-205.081	SERVICE Su
4	Column8	1	5.874	-1.396	-0.075	3.604	-3.263	-199.325	SERVICE Su
5	Column1	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	Column2	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	Column3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	Column4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	Column5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	Column6	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	Column7	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	Column8	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
6	Column1	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	Column2	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	Column3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	Column4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	Column5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	Column6	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	Column7	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	Column8	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
7	Column1	1	1.953	0.242	0.008	-1.340	2.927	34.481	SERVICE Wx (LC A)
7	Column2	1	3.238	0.329	-0.020	-0.413	4.118	46.420	SERVICE Wx (LC A)
7	Column3	1	0.583	-1.281	-0.023	0.565	1.579	-180.217	SERVICE Wx (LC A)
7	Column4	1	0.610	-1.367	-0.021	0.496	1.503	-191.745	SERVICE Wx (LC A)
7	Column5	1	3.254	0.398	-0.024	-0.318	4.323	55.803	SERVICE Wx (LC A)
7	Column6	1	0.393	-0.902	-0.020	0.452	1.402	-127.747	SERVICE Wx (LC A)
7	Column7	1	1.969	0.310	-0.051	0.593	5.487	43.861	SERVICE Wx (LC A)
7	Column8	1	0.366	-0.815	-0.024	0.567	1.616	-115.790	SERVICE Wx (LC A)
8	Column1	1	-0.584	0.698	-0.022	0.679	1.065	99.003	SERVICE Wx (LC B)
8	Column2	1	-0.948	1.101	-0.018	0.556	0.877	154.887	SERVICE Wx (LC B)
8	Column3	1	-2.975	-0.126	-0.015	-0.443	3.428	-17.905	SERVICE Wx (LC B)
8	Column4	1	-2.994	-0.177	-0.018	-0.348	3.621	-24.751	SERVICE Wx (LC B)
8	Column5	1	-0.975	1.168	-0.016	0.482	0.782	163.948	SERVICE Wx (LC B)
8	Column6	1	-1.815	-0.160	-0.043	0.473	4.678	-22.451	SERVICE Wx (LC B)
8	Column7	1	-0.611	0.766	-0.011	0.323	0.538	108.459	SERVICE Wx (LC B)
8	Column8	1	-1.797	-0.110	0.010	-1.273	2.359	-15.651	SERVICE Wx (LC B)
9	Column1	1	-1.997	0.493	-0.600	0.857	70.750	69.852	SERVICE Wz (LC A)
9	Column2	1	-3.060	0.697	-0.618	1.570	71.346	98.413	SERVICE Wz (LC A)
9	Column3	1	-3.060	0.697	0.618	-1.570	-71.347	98.414	SERVICE Wz (LC A)
9	Column4	1	-3.328	0.832	0.581	-0.351	-69.787	116.586	SERVICE Wz (LC A)
9	Column5	1	-3.328	0.832	-0.581	0.351	69.786	116.586	SERVICE Wz (LC A)
9	Column6	1	-2.265	0.628	0.599	-0.925	-70.470	88.482	SERVICE Wz (LC A)
9	Column7	1	-2.265	0.628	-0.599	0.925	70.469	88.483	SERVICE Wz (LC A)
9	Column8	1	-1.997	0.493	0.600	-0.857	-70.751	69.852	SERVICE Wz (LC A)
10	Column1	1	1.997	-0.492	0.023	-1.651	1.685	-70.081	SERVICE Wz (LC B)
10	Column2	1	3.292	-0.823	-0.002	-0.839	2.755	-115.532	SERVICE Wz (LC B)
10	Column3	1	3.292	-0.823	0.002	0.839	-2.755	-115.532	SERVICE Wz (LC B)

Service Loads (Unfactored)

LC	Member Label	Sec	Axial [k]	y Shear [k]	z Shear [k]	Torque [k-in]	y-y Moment [k-in]	z-z Moment [k-in]	LC Description
10	Column4	1	3.328	-0.835	0.007	0.706	-2.986	-117.263	SERVICE Wz (LC B)
10	Column5	1	3.328	-0.835	-0.007	-0.706	2.986	-117.263	SERVICE Wz (LC B)
10	Column6	1	2.033	-0.508	0.032	-0.128	-4.090	-72.180	SERVICE Wz (LC B)
10	Column7	1	2.033	-0.508	-0.032	0.128	4.090	-72.180	SERVICE Wz (LC B)
10	Column8	1	1.997	-0.492	-0.023	1.651	-1.686	-70.080	SERVICE Wz (LC B)
11	Column1	1	-0.528	4.212	-0.078	-0.794	10.199	548.704	SERVICE Ex
11	Column2	1	-0.722	5.417	-0.077	0.267	10.070	715.961	SERVICE Ex
11	Column3	1	0.722	-5.418	-0.077	0.268	10.090	-716.098	SERVICE Ex
11	Column4	1	0.733	-5.465	-0.079	0.311	10.218	-721.850	SERVICE Ex
11	Column5	1	-0.733	5.464	-0.079	0.310	10.198	721.711	SERVICE Ex
11	Column6	1	0.668	-4.708	-0.075	1.269	9.931	-618.354	SERVICE Ex
11	Column7	1	-0.668	4.712	-0.075	1.268	9.912	618.287	SERVICE Ex
11	Column8	1	0.528	-4.209	-0.078	-0.794	10.218	-548.751	SERVICE Ex
12	Column1	1	0.000	0.000	-4.665	-10.421	642.094	0.003	SERVICE Ez
12	Column2	1	2.340	-1.214	-5.125	5.009	660.713	-165.774	SERVICE Ez
12	Column3	1	2.340	-1.214	5.125	-5.010	-660.723	-165.769	SERVICE Ez
12	Column4	1	0.003	0.012	4.797	5.953	-647.341	-0.054	SERVICE Ez
12	Column5	1	0.003	0.012	-4.797	-5.954	647.330	-0.054	SERVICE Ez
12	Column6	1	-2.343	1.213	5.233	-8.325	-663.832	167.141	SERVICE Ez
12	Column7	1	-2.343	1.213	-5.233	8.324	663.822	167.146	SERVICE Ez
12	Column8	1	0.000	0.000	4.665	10.420	-642.105	0.003	SERVICE Ez
13	Column1	1	0.779	-0.187	0.005	-0.272	0.274	-26.466	SERVICE Ev
13	Column2	1	1.083	-0.280	0.001	-0.186	0.481	-39.358	SERVICE Ev
13	Column3	1	1.083	-0.280	-0.001	0.186	-0.481	-39.358	SERVICE Ev
13	Column4	1	1.048	-0.261	0.000	0.154	-0.532	-36.761	SERVICE Ev
13	Column5	1	1.048	-0.261	0.000	-0.154	0.532	-36.761	SERVICE Ev
13	Column6	1	0.831	-0.210	0.005	0.064	-0.747	-29.749	SERVICE Ev
13	Column7	1	0.831	-0.210	-0.005	-0.064	0.747	-29.748	SERVICE Ev
13	Column8	1	0.779	-0.187	-0.005	0.272	-0.274	-26.466	SERVICE Ev


Y
Z
X

SERVICE LOAD COLUMN BASE REACTION SUMMARY

Refer to RISA model views for column local axis
Wind values are based on Vasd and should be factored accordingly for LRFD analysis
Negative axial values represent uplift

Service Loads (Unfactored)

LC	Member Label	Sec	Axial [k]	y Shear [k]	z Shear [k]	Torque [k-in]	y-y Moment [k-in]	z-z Moment [k-in]	LC Description
1	RIGID3	1	0.377	0.000	0.000	0.000	0.000	0.000	SERVICE D
1	RIGID4	1	0.377	0.000	0.000	0.000	0.000	0.000	SERVICE D
1	RIGID5	1	0.377	0.000	0.000	0.000	0.000	0.000	SERVICE D
1	RIGID12	1	0.377	0.000	0.000	0.000	0.000	0.000	SERVICE D
2	RIGID3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Lr
2	RIGID4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Lr
2	RIGID5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Lr
2	RIGID12	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Lr
3	RIGID3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
3	RIGID4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
3	RIGID5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
3	RIGID12	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
4	RIGID3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Su
4	RIGID4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Su
4	RIGID5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Su
4	RIGID12	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Su
5	RIGID3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	RIGID4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	RIGID5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
5	RIGID12	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Ssliding
6	RIGID3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	RIGID4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	RIGID5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
6	RIGID12	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Sdrift
7	RIGID3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Wx (LC A)
7	RIGID4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Wx (LC A)
7	RIGID5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Wx (LC A)
7	RIGID12	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Wx (LC A)
8	RIGID3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Wx (LC B)
8	RIGID4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Wx (LC B)
8	RIGID5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Wx (LC B)
8	RIGID12	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Wx (LC B)
9	RIGID3	1	0.000	0.000	-0.151	0.000	0.000	0.000	SERVICE Wz (LC A)
9	RIGID4	1	0.000	0.000	0.151	0.000	0.000	0.000	SERVICE Wz (LC A)
9	RIGID5	1	0.000	0.000	-0.151	0.000	0.000	0.000	SERVICE Wz (LC A)
9	RIGID12	1	0.000	0.000	0.151	0.000	0.000	0.000	SERVICE Wz (LC A)
10	RIGID3	1	0.000	0.000	-0.001	0.000	0.000	0.000	SERVICE Wz (LC B)
10	RIGID4	1	0.000	0.000	0.001	0.000	0.000	0.000	SERVICE Wz (LC B)
10	RIGID5	1	0.000	0.000	-0.001	0.000	0.000	0.000	SERVICE Wz (LC B)
10	RIGID12	1	0.000	0.000	0.001	0.000	0.000	0.000	SERVICE Wz (LC B)
11	RIGID3	1	0.000	0.182	0.000	0.000	0.000	0.000	SERVICE Ex
11	RIGID4	1	0.000	-0.182	0.000	0.000	0.000	0.000	SERVICE Ex
11	RIGID5	1	0.000	0.182	0.000	0.000	0.000	0.000	SERVICE Ex
11	RIGID12	1	0.000	-0.182	0.000	0.000	0.000	0.000	SERVICE Ex
12	RIGID3	1	0.000	0.000	-0.182	0.000	0.000	0.000	SERVICE Ez
12	RIGID4	1	0.000	0.000	0.182	0.000	0.000	0.000	SERVICE Ez
12	RIGID5	1	0.000	0.000	-0.182	0.000	0.000	0.000	SERVICE Ez
12	RIGID12	1	0.000	0.000	0.182	0.000	0.000	0.000	SERVICE Ez
13	RIGID3	1	0.070	0.000	0.000	0.000	0.000	0.000	SERVICE Ev
13	RIGID4	1	0.070	0.000	0.000	0.000	0.000	0.000	SERVICE Ev
13	RIGID5	1	0.070	0.000	0.000	0.000	0.000	0.000	SERVICE Ev
13	RIGID12	1	0.070	0.000	0.000	0.000	0.000	0.000	SERVICE Ev

CONNECTION DESIGN

Company:		Page:	1
Address:		Specifier:	chreva
Phone I Fax:	|	E-Mail:	
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Specifier's comments:

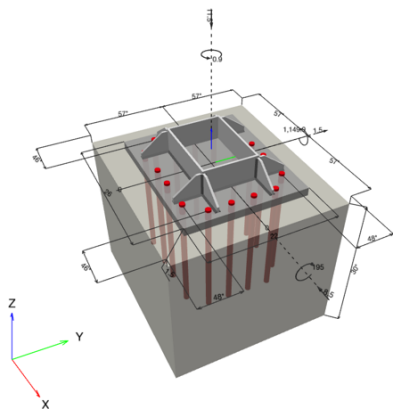
1 Anchor Design

1.1 Input data

Anchor type and diameter:	**Heavy Hex Head ASTM F 1554 GR. 55 1**
Item number:	not available
Specification text:	∅ 1 in Heavy Hex Head ASTM F 1554 GR. 55 with 20 in nominal embedment depth per Technical data , cast in place installation per MPII
Effective embedment depth:	h_{ef} = 20.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-19 / CIP
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 1.500 in.
Anchor plate[CBFEM] :	l_x x l_y x t = 26.000 in. x 22.000 in. x 1.500 in.;
Profile:	Rectangular HSS (AISC), HSS14X10X.375; (L x W x T) = 14.000 in. x 10.000 in. x 0.375 in.
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 30.000 in.
Reinforcement:	tension: not present, shear: not present; edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.10.5.3 (d)) Shear load: yes (17.10.6.3 (c))

[CBFEM] - The anchor calculation is based on a component-based Finite Element Method (CBFEM)

Geometry [in.] & Loading [kip, in.kip]



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1.1.1 Load combination and design results

Case	Description	Forces [kip] / Moments [in.kip]	Seismic	Max. Util. Anchor [%]
1	1.2D+Ev+Ehz+0.3Ehx+0.2S	N = -12.700; V_x = -5.600; V_y = 5.200; M_x = -671.900000; M_y = -762.600000; M_z = -2.800000;	yes	47
2	1.2D+Ev+Ehz+0.3Ehx+0.2S	N = -10.100; V_x = -4.200; V_y = 4.800; M_x = -658.800000; M_y = -576.000000; M_z = 8.100000;	yes	42
3	0.9D-Ev+Ehz+0.3Ehx	N = -6.700; V_x = -3.900; V_y = 5.100; M_x = -662.600000; M_y = -534.800000; M_z = -4.100000;	yes	42
4	1.2D+Ev+Ehx+0.3Ehz+0.2S	N = -11.500; V_x = -8.500; V_y = 1.500; M_x = -195.000000; M_y = -1,149.900000; M_z = 0.900000;	yes	57
5	1.2D+Ev+Ehz+0.2S	N = -12.500; V_x = -3.900; V_y = -5.200; M_x = 676.200000; M_y = -545.800000; M_z = 3.000000;	yes	41
6	1.2D+Ev+Ehx+0.3Ehz+0.2S	N = -10.600; V_x = -8.100; V_y = 1.400; M_x = -191.300000; M_y = -1,086.300000; M_z = 3.900000;	yes	52
7	1.2D+Ev+Ehz+0.3Ehx+0.2S	N = -7.200; V_x = -3.000; V_y = 4.600; M_x = -650.300000; M_y = -412.600000; M_z = 13.500000;	yes	39
8	0.9D-Ev+Ehz+0.3Ehx	N = -4.200; V_x = -2.600; V_y = 4.800; M_x = -649.200000; M_y = -359.100000; M_z = 6.800000;	yes	39
9	0.9D-Ev+Ehx+0.3Ehz	N = -5.600; V_x = -6.900; V_y = 1.500; M_x = -190.000000; M_y = -920.900000; M_z = -0.400000;	yes	45
10	0.9D-Ev+Ehz	N = -6.500; V_x = -2.300; V_y = -5.200; M_x = 666.800000; M_y = -319.200000; M_z = 4.300000;	yes	40
11	1.2D+Ev+Ehx+0.2S	N = -10.800; V_x = -8.100; V_y = -0.100; M_x = 5.200000; M_y = -1,098.600000; M_z = 2.300000;	yes	51
12	1.2D+Ev+Ehx+0.2S	N = -10.600; V_x = -8.100; V_y = -0.100; M_x = 4.800000; M_y = -1,086.400000; M_z = 2.000000;	yes	51
13	0.9D-Ev+Ehx+0.3Ehz	N = -4.800; V_x = -6.500; V_y = 1.400; M_x = -186.000000; M_y = -866.300000; M_z = 2.800000;	yes	43
14	0.9D-Ev+Ehx	N = -4.900; V_x = -6.500; V_y = -0.100; M_x = 8.300000; M_y = -870.500000; M_z = 1.000000;	yes	42
15	0.9D-Ev+Ehx	N = -4.800; V_x = -6.500; V_y = -0.100; M_x = 8.300000; M_y = -866.300000; M_z = 0.900000;	yes	42
16	1.2D+Ev+Ehx+0.2S	N = -8.100; V_x = -6.600; V_y = 0.000; M_x = 2.200000; M_y = -896.600000; M_z = 2.000000;	yes	42
17	1.2D+Ev+Ehx+0.3Ehz+0.2S	N = -7.400; V_x = -6.300; V_y = 1.500; M_x = -198.700000; M_y = -845.200000; M_z = -0.400000;	yes	41

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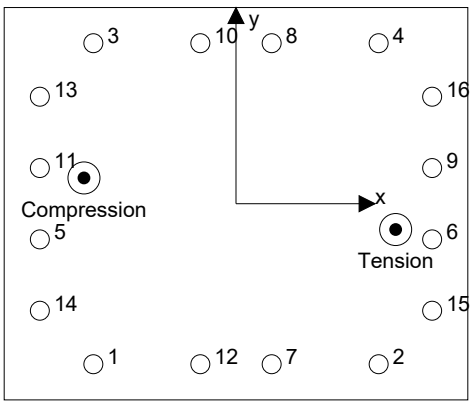
Case	Description	Forces [kip] / Moments [in.kip]	Seismic	Max. Util. Anchor [%]
18	1.2D+Ev+Ehx+0.3Ehz+0.2S	N = -7.600; V_x = -5.900; V_y = 1.300; M_x = -186.900000; M_y = -799.600000; M_z = 5.400000;	yes	39
19	0.9D-Ev+Ehx	N = -3.900; V_x = -5.500; V_y = -0.100; M_x = 7.200000; M_y = -735.000000; M_z = 1.500000;	yes	36
20	1.2D+Ev+Ehx+0.2S	N = -7.600; V_x = -5.900; V_y = -0.100; M_x = 7.500000; M_y = -799.600000; M_z = 2.100000;	yes	38

1.2 Load case/Resulting anchor forces

Controlling load case: 4 1.2D+Ev+Ehx+0.3Ehz+0.2S



Anchor reactions [kip]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	-0.001	0.470	-0.469	0.023
2	10.586	0.588	-0.548	0.213
3	-0.001	0.549	-0.516	0.188
4	6.530	0.518	-0.518	0.006
5	-0.001	0.527	-0.523	0.062
6	10.823	0.607	-0.596	0.112
7	6.599	0.483	-0.467	0.121
8	2.268	0.470	-0.464	0.077
9	9.505	0.583	-0.579	0.060
10	-0.001	0.476	-0.463	0.109
11	-0.002	0.549	-0.542	0.083
12	0.000	0.455	-0.447	0.088
13	-0.002	0.606	-0.586	0.155
14	-0.001	0.536	-0.535	0.015
15	10.107	0.664	-0.643	0.166
16	7.672	0.604	-0.604	0.021

Resulting tension force in (x/y)=(8.954/-1.447): 64.080 [kip]
Resulting compression force in (x/y)=(-8.526/1.446): 76.104 [kip]

Anchor forces are calculated based on a component-based Finite Element Method (CBFEM)

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1.3 Tension load

	Load N_{ua} [kip]	Capacity ϕ N_n [kip]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	10.823	34.087	32	OK
Pullout Strength*	10.823	28.369	39	OK
Concrete Breakout Failure**	64.089	114.395	57	OK
Concrete Side-Face Blowout, direction **	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (anchors in tension)

1.3.1 Steel Strength

$N_{sa} = A_{se,N} f_{uta}$ ACI 318-19 Eq. (17.6.1.2)
$\phi N_{sa} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.61	75,000

Calculations

N_{sa} [kip]
45.450

Results

N_{sa} [kip]	ϕ_{steel}	ϕN_{sa} [kip]	N_{ua} [kip]
45.450	0.750	34.087	10.823

1.3.2 Pullout Strength

$N_{pN} = \psi_{c,p} N_p$ ACI 318-19 Eq. (17.6.3.1)
$N_p = 8 A_{brg} f'_c$ ACI 318-19 Eq. (17.6.3.2.2a)
$\phi N_{pN} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$\psi_{c,p}$	A_{brg} [in.^{2}]	λ_a	f'_c [psi]
1.000	1.50	1.000	4,500

Calculations

N_p [kip]
54.036

Results

N_{pn} [kip]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	ϕN_{pn} [kip]	N_{ua} [kip]
54.036	0.700	0.750	1.000	28.369	10.823

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1.3.3 Concrete Breakout Failure

$N_{cbg} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ec,N}\ \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b$ ACI 318-19 Eq. (17.6.2.1b)

$\phi\ N_{cbg} \geq N_{ua}$ ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9\ h_{ef}^2$ ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\ e'_N}{3\ h_{ef}}}\right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.3.1)

$\psi_{ed,N} = 0.7 + 0.3\left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = 16\ \lambda_a\ \sqrt{f'_c}\ h_{ef}^{5/3}$ ACI 318-19 Eq. (17.6.2.2.3)

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
20.000	0.954	1.447	46.000	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
-	16	1.000	4,500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [kip]
5,364.00	3,600.00	0.969	0.954	1.000	1.000	158.165

Results

N_{cbg} [kip]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi\ N_{cbg}$ [kip]	N_{ua} [kip]
217.894	0.700	0.750	1.000	114.395	64.089

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1.4 Shear load

	Load V_{ua} [kip]	Capacity ϕ V_n [kip]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	0.664	17.725	4	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	8.631	389.624	3	OK
Concrete edge failure in direction y+**	8.631	71.748	13	OK

* highest loaded anchor **anchor group (relevant anchors)

1.4.1 Steel Strength

$V_{sa} = 0.6\ A_{se,V}\ f_{uta}$ ACI 318-19 Eq. (17.7.1.2b)
$\phi\ V_{steel} \geq V_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
0.61	75,000

Calculations

V_{sa} [kip]
27.270

Results

V_{sa} [kip]	ϕ_{steel}	$\phi\ V_{sa,eq}$ [kip]	V_{ua} [kip]
27.270	0.650	17.725	0.664

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1.4.2 Pryout Strength

$V_{cpg} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right]$ ACI 318-19 Eq. (17.7.3.1b)

$\phi V_{cpg} \geq V_{ua}$ ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 e'_N}{3 h_{ef}}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.3.1)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = 16 \lambda_a \sqrt{f'_c} h_{ef}^{5/3}$ ACI 318-19 Eq. (17.6.2.2.3)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	20.000	0.018	0.103	46.000

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
1.000	-	16	1.000	4,500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [kip]
6,360.00	3,600.00	0.999	0.997	1.000	1.000	158.165

Results

V_{cpg} [kip]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	ϕV_{cpg} [kip]	V_{ua} [kip]
556.606	0.700	1.000	1.000	389.624	8.631

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1.4.3 Concrete edge failure in direction y+

$V_{cbg} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) \psi_{ec,V}\ \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}\ \psi_{parallel,V}\ V_b$ — ACI 318-19 Eq. (17.7.2.1b)

$\phi\ V_{cbg} \geq V_{ua}$ — ACI 318-19 Table 17.5.2

A_{Vc} see ACI 318-19, Section 17.7.2.1, Fig. R 17.7.2.1(b)*

$A_{Vc0} = 4.5\ c_{a1}^2$ — ACI 318-19 Eq. (17.7.2.1.3)

$\psi_{ec,V} = \left(\frac{1}{1 + \frac{e'_v}{1.5c_{a1}}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.7.2.3.1)

$\psi_{ed,V} = 0.7 + 0.3\left(\frac{c_{a2}}{1.5c_{a1}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.7.2.4.1b)

$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0$ — ACI 318-19 Eq. (17.7.2.6.1)

$V_b = 9\ \lambda_a\ \sqrt{f'_c}\ c_{a1}^{1.5}$ — ACI 318-19 Eq. (17.7.2.2.1b)

Variables

c_{a1} [in.]	c_{a2} [in.]	e_{cV} [in.]	$\psi_{c,V}$	h_a [in.]
32.667	49.000	0.049	1.000	30.000

l_e [in.]	λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$
8.000	1.000	1.000	4,500	1.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ec,V}$	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [kip]
3,420.00	4,802.00	0.999	1.000	1.278	112.721

Results

V_{cbg} [kip]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi\ V_{cbg}$ [kip]	V_{ua} [kip]
102.497	0.700	1.000	1.000	71.748	8.631

*Anchor row defined by: Anchor 3, 4, 8, 10; Case 3 controls

1.5 Combined tension and shear loads, per ACI 318-19 section 17.8

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.560	0.120	5/3	42	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

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1.6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates as per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- The equations presented in this report are based on imperial units. When inputs are displayed in metric units, the user should be aware that the equations remain in their imperial format.
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- Attention! In case of compressive anchor forces a buckling check as well as the proof of the local load transfer into and within the base material (incl. punching) has to be done separately.
- "An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-19, Chapter 17, Section 17.10.5.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Section 17.10.5.3 (b), Section 17.10.5.3 (c), or Section 17.10.5.3 (d). The connection design (shear) shall satisfy the provisions of Section 17.10.6.3 (a), Section 17.10.6.3 (b), or Section 17.10.6.3 (c)."
- Section 17.10.5.3 (b) / Section 17.10.6.3 (a) require the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Section 17.10.5.3 (c) / Section 17.10.6.3 (b) waive the ductility requirements and require the anchors to be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Section 17.10.5.3 (d) / Section 17.10.6.3 (c) waive the ductility requirements and require the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by ω_0.
- The anchor design methods in PROFIS Engineering require rigid anchor plates, as per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means that the anchor plate should be sufficiently rigid to prevent load re-distribution to the anchors due to elastic/plastic displacements. The user accepts that the anchor plate is considered close to rigid by engineering judgment."

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1.7 Installation data

Profile: Rectangular HSS (AISC), HSS14X10X.375; (L x W x T) = 14.000 in. x 10.000 in. x 0.375 in.

Hole diameter in the fixture: d_f = 1.062 in.

Plate thickness (input): 1.500 in.

Anchor type and diameter: Heavy Hex Head ASTM F 1554 GR. 55 1

Item number: not available

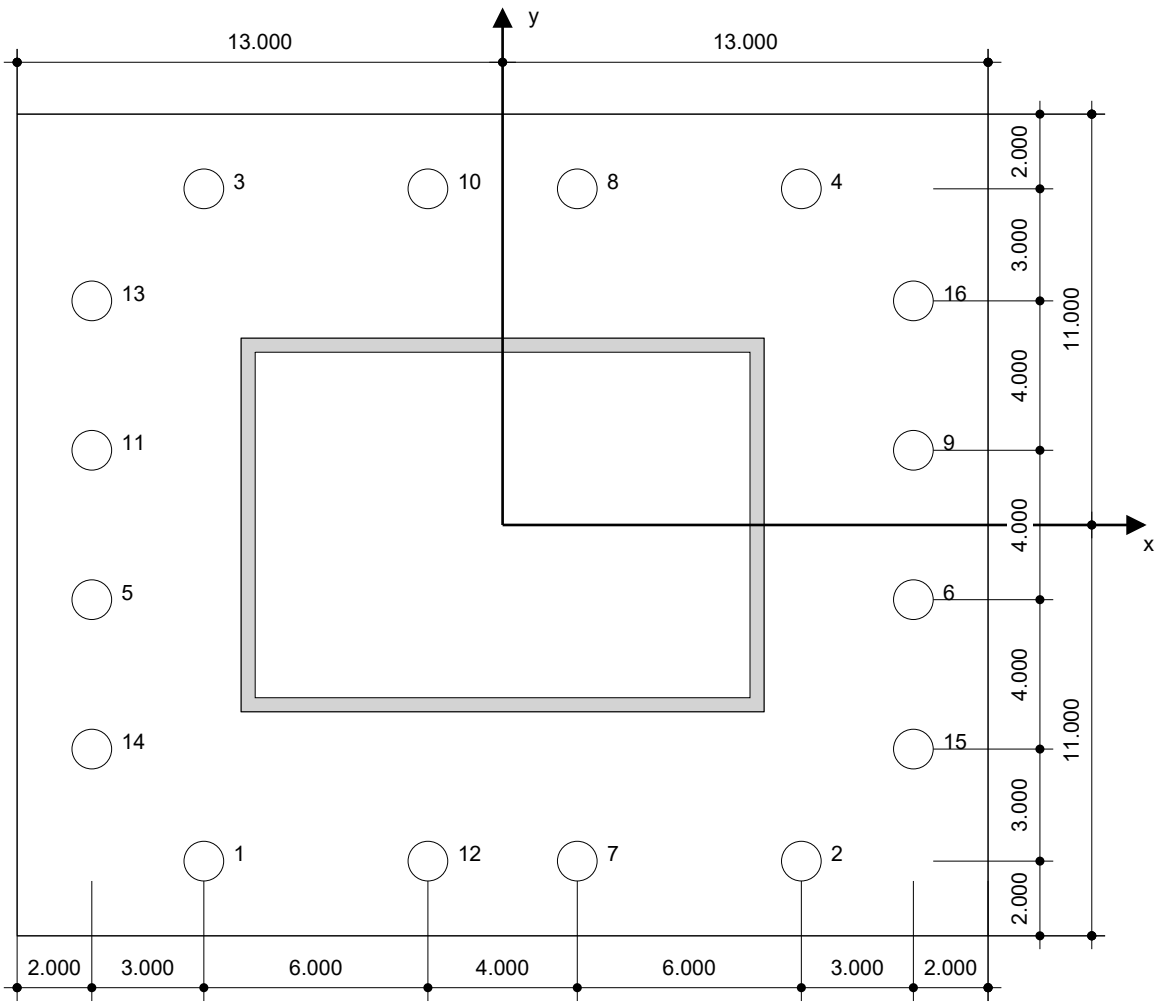
Maximum installation torque: -

Hole diameter in the base material: - in.

Hole depth in the base material: 20.000 in.

Minimum thickness of the base material: 21.172 in.

⌀ 1 in Heavy Hex Head ASTM F 1554 GR. 55 with 20 in nominal embedment depth per Technical data , cast in place installation per MPII



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Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-8.000	-9.000	49.000	65.000	48.000	66.000
2	8.000	-9.000	65.000	49.000	48.000	66.000
3	-8.000	9.000	49.000	65.000	66.000	48.000
4	8.000	9.000	65.000	49.000	66.000	48.000
5	-11.000	-2.000	46.000	68.000	55.000	59.000
6	11.000	-2.000	68.000	46.000	55.000	59.000
7	2.000	-9.000	59.000	55.000	48.000	66.000
8	2.000	9.000	59.000	55.000	66.000	48.000

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
9	11.000	2.000	68.000	46.000	59.000	55.000
10	-2.000	9.000	55.000	59.000	66.000	48.000
11	-11.000	2.000	46.000	68.000	59.000	55.000
12	-2.000	-9.000	55.000	59.000	48.000	66.000
13	-11.000	6.000	46.000	68.000	63.000	51.000
14	-11.000	-6.000	46.000	68.000	51.000	63.000
15	11.000	-6.000	68.000	46.000	51.000	63.000
16	11.000	6.000	68.000	46.000	63.000	51.000

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2 Anchor plate design

2.1 Input data

Anchor plate:	Shape: Rectangular l_x x l_y x t = 26.000 in x 22.000 in x 1.500 in Calculation: CBFEM Material: ASTM A36; F_y = 36,000 psi; ε_{lim} = 5.00%
Anchor type and size:	Heavy Hex Head ASTM F 1554 GR. 55 1, h_{ef} = 20.000 in
Anchor stiffness:	The anchor is modeled considering stiffness values determined from load displacement curves tested in an independent laboratory. Please note that no simple replacement of the anchor is possible as the anchor stiffness has a major impact on the load distribution results.
Design method:	AISC and LRFD-based design using component-based FEM
Seismic loads (cat. C, D, E or F):	Tension load: Yes (17.10.5.3 (d)) Shear load: Yes (17.10.6.3 (c))
Stand-off installation:	e_b = 0.000 in (No stand-off); t = 1.500 in
Profile:	HSS14X10X.375; (L x W x T x FT) = 14.000 in x 10.000 in x 0.375 in x - Material: ASTM A500 Gr.C Rect; F_y = 50,000 psi; ε_{lim} = 5.00% Eccentricity x: 0.000 in Eccentricity y: 0.000 in
Base material:	Cracked concrete; Custom; $f_{c,cyl}$ = 4,500 psi; h = 30.000 in; E = 3,823,676 psi; G = 1,662,468 psi; v = 0.15; D = 145.00 lb/ft³
Welds (profile to anchor plate):	Type of redistribution: Plastic Material: E70xx
Stiffeners:	Geometry: Chamfered; size = l_x x l_y x t = 4.000 in x 5.000 in x 0.375 in Material: ASTM A36; F_y = 36,000 psi; ε_{lim} = 5.00%
Welds (stiffeners to profile/anchor plate):	Type of redistribution: Plastic Material: E70xx
Mesh size:	Number of elements on edge: 8 Min. size of element: 0.394 in Max. size of element: 1.969 in

2.2 Summary

	Description	Profile		Stiffeners		Anchor plate			Welds [%]	Concrete [%]
		σ_{Ed} [psi]	ε_{Pl} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Hole bearing [%]		
1	**1.2D+Ev+Ehz+0.3Ehx+0.2S**	**26,123**	**0.00**	**34,706**	**0.07**	8,399	0.00	1	**76**	**7**
2	1.2D+Ev+Ehz+0.3Ehx+0.2S	22,827	0.00	33,582	0.04	7,437	0.00	1	76	6
3	0.9D-Ev+Ehz+0.3Ehx	22,409	0.00	33,529	0.04	7,391	0.00	1	76	6
4	**1.2D+Ev+Ehx+0.3Ehz+0.2S**	24,238	0.00	32,481	0.02	**8,464**	**0.00**	**1**	76	7
5	1.2D+Ev+Ehz+0.2S	22,345	0.00	33,455	0.04	7,311	0.00	1	75	6
6	1.2D+Ev+Ehx+0.3Ehz+0.2S	23,091	0.00	31,636	0.02	8,011	0.00	1	76	6
7	1.2D+Ev+Ehz+0.3Ehx+0.2S	20,021	0.00	32,706	0.02	7,048	0.00	1	66	5

8	0.9D-Ev+Ehz +0.3Ehx	19,333	0.00	32,358	0.02	7,138	0.00	1	63	5
9	0.9D-Ev+Ehx +0.3Ehz	20,410	0.00	29,806	0.01	6,993	0.00	1	72	6
10	0.9D-Ev+Ehz	18,973	0.00	32,037	0.02	7,198	0.00	1	61	5
11	1.2D+Ev+Ehx +0.2S	19,796	0.00	22,978	0.01	7,867	0.00	1	71	6
12	1.2D+Ev+Ehx +0.2S	19,575	0.00	22,751	0.00	7,778	0.00	1	70	6
13	0.9D-Ev+Ehx +0.3Ehz	19,409	0.00	28,725	0.00	6,617	0.00	1	68	5
14	0.9D-Ev+Ehx	16,145	0.00	22,706	0.00	6,370	0.00	1	58	5
15	0.9D-Ev+Ehx	16,074	0.00	22,612	0.00	6,341	0.00	1	57	5
16	1.2D+Ev+Ehx +0.2S	16,202	0.00	22,564	0.00	6,439	0.00	1	58	5
17	1.2D+Ev+Ehx +0.3Ehz+0.2 S	18,948	0.00	28,282	0.00	6,389	0.00	1	66	5
18	1.2D+Ev+Ehx +0.3Ehz+0.2 S	17,894	0.00	27,078	0.00	6,020	0.00	1	62	5
19	0.9D-Ev+Ehx	13,653	0.00	19,219	0.00	5,387	0.00	1	49	4
20	1.2D+Ev+Ehx +0.2S	14,510	0.00	20,266	0.00	5,728	0.00	1	52	5

2.3 Anchor plate classification

Results below are displayed for the decisive load combinations: 1.2D+Ev+Ehx+0.3Ehz+0.2S

Anchor tension forces	Equivalent rigid anchor plate (CBFEM)	Component-based Finite Element Method (CBFEM) anchor plate design
Anchor 1	-0.001 kip	-0.001 kip
Anchor 2	9.324 kip	10.586 kip
Anchor 3	-0.002 kip	-0.001 kip
Anchor 4	5.093 kip	6.530 kip
Anchor 5	-0.002 kip	-0.001 kip
Anchor 6	10.484 kip	10.823 kip
Anchor 7	3.715 kip	6.599 kip
Anchor 8	0.000 kip	2.268 kip
Anchor 9	9.543 kip	9.505 kip
Anchor 10	-0.001 kip	-0.001 kip
Anchor 11	-0.002 kip	-0.002 kip
Anchor 12	0.000 kip	0.000 kip
Anchor 13	-0.002 kip	-0.002 kip
Anchor 14	-0.001 kip	-0.001 kip
Anchor 15	11.424 kip	10.107 kip
Anchor 16	8.603 kip	7.672 kip

User accepted to consider the selected anchor plate as rigid by his/her engineering judgement. This means the anchor design guidelines can be applied.

2.4 Profile/Stiffeners/Plate

Profile and stiffeners are verified at the level of the steel to concrete connection. The connection design does not replace the steel design for critical cross sections, which should be performed outside of PROFIS Engineering.

2.4.1 Equivalent stress and plastic strain

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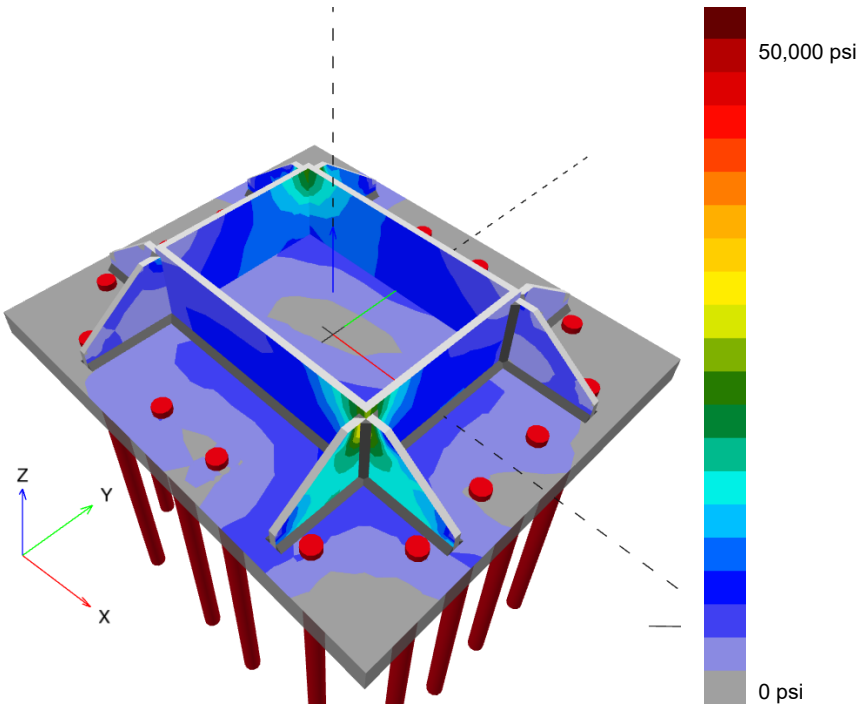
Part	Load combination	Material	f_y [psi]	ε_{lim} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Status
Plate	1.2D+Ev+Ehx+0.3 Ehz+0.2S	ASTM A36	36,000	5.00	8,464	0.00	OK
Profile	1.2D+Ev+Ehx+0.3 Ehz+0.2S	ASTM A500 Gr.C Rect	50,000	5.00	26,049	0.00	OK
Profile	1.2D+Ev+Ehx+0.3 Ehz+0.2S	ASTM A500 Gr.C Rect	50,000	5.00	26,123	0.00	OK
Profile	1.2D+Ev+Ehx+0.3 Ehz+0.2S	ASTM A500 Gr.C Rect	50,000	5.00	24,898	0.00	OK
Profile	1.2D+Ev+Ehx+0.3 Ehz+0.2S	ASTM A500 Gr.C Rect	50,000	5.00	24,363	0.00	OK
Stiffener	1.2D+Ev+Ehx+0.3 Ehz+0.2S	ASTM A36	36,000	5.00	34,706	0.07	OK

2.4.1.1 Equivalent stress

Results below are displayed for the decisive load combination: 1 - 1.2D+Ev+Ehz+0.3Ehx+0.2S



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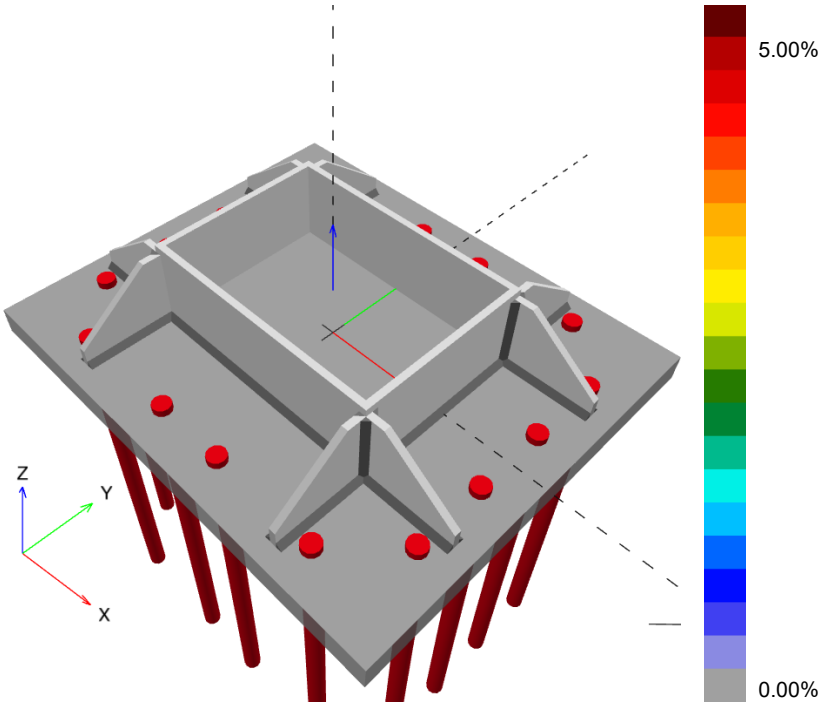
2.4.1.2 Plastic strain

Results below are displayed for the decisive load combination: 1 - 1.2D+Ev+Ehz+0.3Ehx+0.2S



2.4.2 Plate hole bearing resistance, AISC 360-16 Section J3

Decisive load combination: 4 - 1.2D+Ev+Ehx+0.3Ehz+0.2S

Equations

$R_n = \min(1.2\, l_c\, t\, F_u\, ,\ 2.4\, d\, t\, F_u)$ (AISC 360-16 J3-6a, c)

$\Phi R_n = 0.75\, R_n$

$V \leq \Phi R_n$

Variables

	l_c [in]	t [in]	F_u [psi]	d [in]	R_n [kip]
Anchor 1	4.938	1.500	58,000	1.000	208.800
Anchor 2	4.834	1.500	58,000	1.000	208.800
Anchor 3	19.186	1.500	58,000	1.000	208.800
Anchor 4	4.469	1.500	58,000	1.000	208.800
Anchor 5	23.635	1.500	58,000	1.000	208.800
Anchor 6	1.503	1.500	58,000	1.000	156.960
Anchor 7	7.425	1.500	58,000	1.000	208.800
Anchor 8	4.938	1.500	58,000	1.000	208.800
Anchor 9	1.480	1.500	58,000	1.000	154.469
Anchor 10	2.938	1.500	58,000	1.000	208.800

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	l_c [in]	t [in]	F_u [psi]	d [in]	R_n [kip]
Anchor 11	21.298	1.500	58,000	1.000	208.800
Anchor 12	2.938	1.500	58,000	1.000	208.800
Anchor 13	24.293	1.500	58,000	1.000	208.800
Anchor 14	20.938	1.500	58,000	1.000	208.800
Anchor 15	1.534	1.500	58,000	1.000	160.179
Anchor 16	1.470	1.500	58,000	1.000	153.467

Results

	V [kip]	ΦR_n [kip]	Utilization [%]	Status
Anchor 1	0.470	156.600	1	OK
Anchor 2	0.588	156.600	1	OK
Anchor 3	0.549	156.600	1	OK
Anchor 4	0.518	156.600	1	OK
Anchor 5	0.527	156.600	1	OK
Anchor 6	0.607	117.720	1	OK
Anchor 7	0.483	156.600	1	OK
Anchor 8	0.470	156.600	1	OK
Anchor 9	0.582	115.852	1	OK
Anchor 10	0.476	156.600	1	OK
Anchor 11	0.549	156.600	1	OK
Anchor 12	0.455	156.600	1	OK
Anchor 13	0.606	156.600	1	OK
Anchor 14	0.535	156.600	1	OK
Anchor 15	0.664	120.134	1	OK
Anchor 16	0.604	115.100	1	OK

2.5 Welds

Profiles are modeled without taking the corner radius into account. Special rules for welding (e.g. for cold-formed profiles ...) are not taken into account by the software.

2.5.1 Anchor plate to profile

Decisive load combination: 1 - 1.2D+Ev+Ehz+0.3Ehx+0.2S

Equations

$F_{nw} = 0.6\, F_{EXX}\, (1.0 + 0.5\sin^{1.5}\Theta)$

$\Phi R_n = \Phi\, F_{nw}\, A_w$

$\text{Utilization} = \dfrac{F_n}{\Phi\, R_n}$

Variables

Edge	X_u	T_h [in]	L_s [in]	L [in]	L_c [in]	F_{EXX} [psi]	Θ [°]	A_w [in²]
Member 1-tfl 1	E70xx	◢0.220	0.311	9.976	1.663	70,000	61.8	0.37
Member 1-bfl 1	E70xx	0.220◣	0.311	9.976	1.663	70,000	31.4	0.37
Member 1-w 1	E70xx	◢0.220	0.311	13.219	1.652	70,000	52.2	0.36
Member 1-w 2	E70xx	0.220◣	0.311	13.219	1.652	70,000	71.9	0.36

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Results

Edge	F_n [kip]	ΦR_n [kip]	Utilization [%]	Status
Member 1-tfl 1	5.805	16.288	36	OK
Member 1-bfl 1	4.820	13.688	36	OK
Member 1-w 1	4.587	15.469	30	OK
Member 1-w 2	6.474	16.755	39	OK

2.5.2 Stiffeners to profile/anchor plate

Decisive load combination: 1 - 1.2D+Ev+Ehz+0.3Ehx+0.2S

Equations

$F_{nw} = 0.6\, F_{EXX}\, (1.0 + 0.5\sin^{1.5}\Theta)$

$\Phi R_n = \Phi\, F_{nw}\, A_w$

$\text{Utilization} = \frac{F_n}{\Phi\, R_n}$

Variables

Edge	X_u	T_h [in]	L_s [in]	L [in]	L_c [in]	F_{EXX} [psi]	Θ [°]	A_w [in²]
Stiffenera	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	62.4	0.14
Stiffenera 1	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	47.1	0.14
Stiffenerb	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	71.2	0.14
Stiffenerb 1	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	55.3	0.14
Stiffenerc	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	55.8	0.14
Stiffenerc 1	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	48.1	0.14
Stiffenerd	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	66.4	0.14
Stiffenerd 1	E70xx	◢0.220◣	0.311	4.969	0.621	70,000	27.0	0.14
Stiffenere (Anchor plate)	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	31.1	0.14
Stiffenere (Anchor plate) 1	E70xx	◢0.220◣	0.311	4.969	0.621	70,000	20.5	0.14
Stiffenerf (Anchor plate)	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	46.2	0.14
Stiffenerf (Anchor plate) 1	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	64.7	0.14
Stiffenerg (Anchor plate)	E70xx	◢0.220◣	0.311	4.969	0.621	70,000	3.2	0.14
Stiffenerg (Anchor plate) 1	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	67.2	0.14
Stiffenerh (Anchor plate)	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	35.8	0.14
Stiffenerh (Anchor plate) 1	E70xx	◢0.220◣	0.311	4.984	0.623	70,000	35.0	0.14
Stiffenere (Member 1-bfl 1)	E70xx	◢0.220◣	0.311	3.988	0.665	70,000	36.5	0.15
Stiffenere (Member 1-bfl 1) 1	E70xx	◢0.220◣	0.311	3.988	0.665	70,000	43.3	0.15

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Edge	X_u	T_h [in]	L_s [in]	L [in]	L_c [in]	F_{EXX} [psi]	Θ [°]	A_w [in²]
Stiffenerf (Member 1-tfl 1)	E70xx	◢0.220◣	0.311	3.988	0.665	70,000	35.5	0.15
Stiffenerf (Member 1-tfl 1) 1	E70xx	◢0.220◣	0.311	3.988	0.665	70,000	88.4	0.15
Stiffenerg (Member 1-bfl 1)	E70xx	◢0.220◣	0.311	3.988	0.665	70,000	41.9	0.15
Stiffenerg (Member 1-bfl 1) 1	E70xx	◢0.220◣	0.311	3.988	0.665	70,000	61.5	0.15
Stiffenerh (Member 1-tfl 1)	E70xx	◢0.220◣	0.311	3.988	0.665	70,000	32.7	0.15
Stiffenerh (Member 1-tfl 1) 1	E70xx	◢0.220◣	0.311	3.988	0.665	70,000	42.5	0.15

Results

Edge	F_n [kip]	$ΦR_n$ [kip]	Utilization [%]	Status
Stiffenera	0.748	6.119	13	OK
Stiffenera 1	0.862	5.670	16	OK
Stiffenerb	2.378	6.306	38	OK
Stiffenerb 1	2.215	5.928	38	OK
Stiffenerc	1.985	5.942	34	OK
Stiffenerc 1	2.329	5.704	41	OK
Stiffenerd	0.640	6.212	11	OK
Stiffenerd 1	0.630	4.962	13	OK
Stiffenere (Anchor plate)	2.026	5.121	40	OK
Stiffenere (Anchor plate) 1	1.927	4.751	41	OK
Stiffenerf (Anchor plate)	0.572	5.642	11	OK
Stiffenerf (Anchor plate) 1	0.478	6.174	8	OK
Stiffenerg (Anchor plate)	0.948	4.333	22	OK
Stiffenerg (Anchor plate) 1	0.763	6.229	13	OK
Stiffenerh (Anchor plate)	1.814	5.283	35	OK
Stiffenerh (Anchor plate) 1	1.539	5.256	30	OK
Stiffenere (Member 1-bfl 1)	4.260	5.664	76	OK
Stiffenere (Member 1-bfl 1) 1	4.438	5.915	76	OK
Stiffenerf (Member 1-tfl 1)	0.633	5.626	12	OK
Stiffenerf (Member 1-tfl 1) 1	0.456	6.908	7	OK
Stiffenerg (Member 1-bfl 1)	1.127	5.865	20	OK
Stiffenerg (Member 1-bfl 1) 1	0.937	6.504	15	OK
Stiffenerh (Member 1-tfl 1)	4.141	5.522	75	OK
Stiffenerh (Member 1-tfl 1) 1	3.698	5.884	63	OK

2.6 Concrete

Decisive load combination: 1 - 1.2D+Ev+Ehz+0.3Ehx+0.2S

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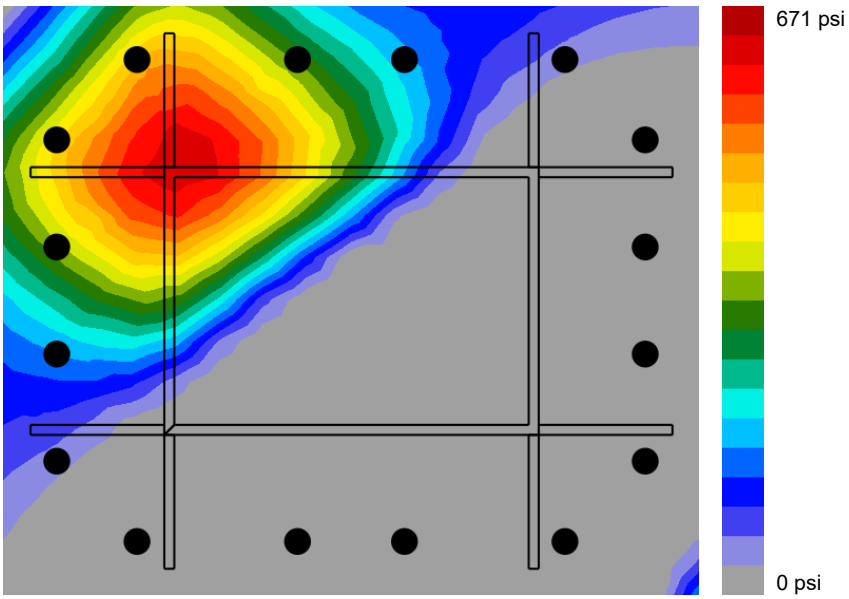
2.6.1 Compression in concrete under the anchor plate



2.6.2 Concrete block compressive strength resistance check, AISC 360-16 Section J8

Equations

$$F_p = \Phi f_{p,max}$$

$$f_{p,max} = 0.85 f_c' \sqrt{\left(\frac{A_2}{A_1}\right)} \le 1.7 f_c; \quad \sqrt{\left(\frac{A_2}{A_1}\right)} \le 2$$

$$\sigma = \frac{N}{A_1}$$

$$\text{Utilization} = \frac{\sigma}{F_p}$$

Variables

N [kip]	f_c' [psi]	Φ	A_1 [in²]	A_2 [in²]
68.409	4,500	0.65	217.32	10,111.42

Results

Load combination	F_p [psi]	σ [psi]	Utilization [%]	Status
1.2D+Ev+Ehz+0.3Ehx+0.2S	4,973	315	7	OK

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2.7 Symbol explanation

A_1	Loaded area of concrete
A_2	Supporting area
A_w	Effective area of weld critical element
d	Nominal diameter of the bolt
ε_{lim}	Limit plastic strain
ε_{Pl}	Plastic strain from CBFEM results
f_c	Concrete compressive strength
f_c'	Concrete compressive strength
F_{EXX}	Electrode classification number, i.e. minimum specified tensile strength
F_u	Specified minimum tensile strength of the connected material
F_n	Force in weld critical element
F_{nw}	Nominal stress of the weld material
F_p	Concrete block design bearing strength
$f_{p,max}$	Concrete block design bearing strength maximum
f_y	Yield strength
l_c	Clear distance, in the direction of the force, between the edge of the hole and the edge of the adjacent hole or edge of the material
L	Length of weld
L_c	Length of weld critical element
L_s	Leg size of weld
N	Resulting compression force
σ	Average stress in concrete
σ_{Ed}	Equivalent stress
Φ	Resistance factor
ΦR_n	Factored resistance
R_n	Resistance
t	Thickness of the anchor plate
Θ	Angle of loading measured from the weld longitudinal axis
T_h	Throat thickness of weld
V	Resultant of shear forces Vy, Vz in bolt.
X_u	Filler metal tensile strength

2.8 Warnings

- By using the CBFEM calculation functionality of PROFIS Engineering you may act outside the applicable design codes and your specified anchor plate may not behave rigid. Please, validate the results with a professional designer and/or structural engineer to ensure suitability and adequacy for your specific jurisdiction and project requirements.
- The anchor is modeled considering stiffness values determined from load displacement curves tested in an independent laboratory. Please note that no simple replacement of the anchor is possible as the anchor stiffness has a major impact on the load distribution results.

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3 Summary of results

Design of the anchor plate, anchors, welds and other elements are based on CBFEM (component based finite element method) and AISC.

	Load combination	Max. utilization	Status
Anchors	1.2D+Ev+Ehx+0.3Ehz+0.2S	57%	OK
Anchor plate	1.2D+Ev+Ehx+0.3Ehz+0.2S	24%	OK
Welds	1.2D+Ev+Ehz+0.3Ehx+0.2S	76%	OK
Stiffeners	1.2D+Ev+Ehz+0.3Ehx+0.2S	97%	OK
Concrete	1.2D+Ev+Ehz+0.3Ehx+0.2S	7%	OK
Profile	1.2D+Ev+Ehz+0.3Ehx+0.2S	53%	OK

Fastening meets the design criteria!

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Design:	_HILTI	Date:	2/3/2025
Fastening point:			

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STRENGTH DESIGN COLUMN BASE REACTIONS

Strength Design Reactions (Factored)

							strong axis	
		N	Vx	Vy	Mz	Mx	My	Column*
LC	Load Combination Description	[k]	[k]	[k]	[in-kip]	[in-kip]	[in-kip]	
92	1.4D	-8.2	-2.1	0.0	-1.4	3.7	-298.0	Column2
93	1.2D + 0.5Lr	-11.0	-2.9	0.0	-2.3	6.2	-409.8	Column2
94	1.2D + 0.5S	-12.1	-3.3	0.0	-2.7	7.1	-456.7	Column2
95	1.2D + 1.6Lr + 0.5Wx (LC A)	-20.1	-6.5	0.0	4.5	-13.2	-907.4	Column4
96	1.2D + 1.6Lr + 0.5Wx (LC B)	-17.2	-5.5	0.0	4.4	-9.9	-767.0	Column3
97	1.2D + 1.6Lr + 0.5Wz (LC A)	-17.1	-4.8	-0.5	-3.5	74.1	-668.7	Column2
98	1.2D + 1.6Lr + 0.5Wz (LC B)	-22.4	-6.1	0.0	-5.6	15.7	-852.9	Column2
99	1.2D + 1.6Lr + 0.5Wx (Min.)	-19.7	-5.8	0.0	4.9	-11.2	-817.6	Column3
100	1.2D + 1.6Lr + 0.5Wz (Min.)	-19.8	-5.5	-0.4	-4.3	66.2	-765.5	Column2
101	1.2D + 1.6Lr + 0.5(0.75Wx (LC A)+0.75Wz (LC A))	-18.1	-5.7	0.4	4.2	-58.3	-804.0	Column3
102	1.2D + 1.6Lr + 0.5(0.75Wx (LC B)+0.75Wz (LC B))	-19.9	-6.0	0.0	5.1	-12.6	-838.8	Column3
103	1.2D + 1.6Lr + 0.5(0.75Wx (Min.)+0.75Wz (Min.))	-19.8	-5.8	0.3	4.5	-51.5	-810.7	Column3
104	1.2D + 1.6S + 0.5Wx (LC A)	-23.9	-7.6	0.0	5.4	-16.6	-1062.9	Column4
105	1.2D + 1.6S + 0.5Wx (LC B)	-20.9	-6.5	0.0	4.6	-14.5	-918.8	Column4
106	1.2D + 1.6S + 0.5Wz (LC A)	-20.9	-5.8	-0.5	-4.6	77.5	-820.6	Column2
107	1.2D + 1.6S + 0.5Wz (LC B)	-26.2	-7.2	0.0	-6.7	18.9	-1006.0	Column2
108	1.2D + 1.6S + 0.5Wx (Min.)	-23.5	-6.9	0.0	5.0	-15.9	-970.4	Column4
109	1.2D + 1.6S + 0.5Wz (Min.)	-23.6	-6.5	-0.4	-5.4	69.7	-918.0	Column2
110	1.2D + 1.6S + 0.5(0.75Wx (LC A)+0.75Wz (LC A))	-21.9	-6.8	0.4	5.3	-61.7	-956.4	Column3
111	1.2D + 1.6S + 0.5(0.75Wx (LC B)+0.75Wz (LC B))	-23.7	-7.1	0.0	5.2	-17.4	-990.7	Column4
112	1.2D + 1.6S + 0.5(0.75Wx (Min.)+0.75Wz (Min.))	-23.6	-6.9	0.3	5.6	-54.9	-963.4	Column3
113	1.2D + 1.6Su + 0.5Wx (LC A)	-22.9	-6.7	0.0	4.7	-13.9	-945.0	Column4
114	1.2D + 1.6Su + 0.5Wx (LC B)	-19.9	-5.7	0.0	4.7	-10.6	-803.7	Column3
115	1.2D + 1.6Su + 0.5Wz (LC A)	-13.5	-5.0	-0.5	-3.8	74.5	-701.2	Column2
116	1.2D + 1.6Su + 0.5Wz (LC B)	-18.8	-6.3	0.0	-5.8	16.4	-885.0	Column2
117	1.2D + 1.6Su + 0.5Wx (Min.)	-22.5	-6.1	0.0	5.1	-11.8	-854.5	Column3
118	1.2D + 1.6Su + 0.5Wz (Min.)	-16.2	-5.7	-0.4	-4.6	66.8	-797.8	Column2
119	1.2D + 1.6Su + 0.5(0.75Wx (LC A)+0.75Wz (LC A))	-20.9	-6.0	0.4	4.5	-59.1	-840.7	Column3
120	1.2D + 1.6Su + 0.5(0.75Wx (LC B)+0.75Wz (LC B))	-22.6	-6.2	0.0	5.4	-13.3	-875.8	Column3
121	1.2D + 1.6Su + 0.5(0.75Wx (Min.)+0.75Wz (Min.))	-22.6	-6.0	0.3	4.7	-52.3	-847.5	Column3
122	1.2D + 1.6Ssliding + 0.5Wx (LC A)	-7.5	-2.9	0.0	1.7	-1.9	-406.3	Column3
123	1.2D + 1.6Ssliding + 0.5Wx (LC B)	-4.5	-1.9	0.0	0.8	-0.2	-269.7	Column3
124	1.2D + 1.6Ssliding + 0.5Wz (LC A)	-4.4	-1.2	-0.5	0.1	63.2	-172.4	Column2
125	1.2D + 1.6Ssliding + 0.5Wz (LC B)	-9.7	-2.5	0.0	-1.9	5.6	-352.6	Column2
126	1.2D + 1.6Ssliding + 0.5Wx (Min.)	-7.1	-2.3	0.0	1.2	-1.3	-318.5	Column3
127	1.2D + 1.6Ssliding + 0.5Wz (Min.)	-7.2	-1.9	-0.4	-0.7	55.3	-267.0	Column2
128	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A)+0.75Wz (LC A))	-5.4	-2.2	0.4	0.6	-47.7	-305.7	Column3
129	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B)+0.75Wz (LC B))	-7.2	-2.4	0.0	1.5	-2.7	-339.6	Column3
130	1.2D + 1.6Ssliding + 0.5(0.75Wx (Min.)+0.75Wz (Min.))	-7.2	-2.2	0.3	0.8	-40.9	-311.5	Column3
131	1.2D + 1.6Sdrift + 0.5Wx (LC A)	-7.5	-2.9	0.0	1.7	-1.9	-406.3	Column3
132	1.2D + 1.6Sdrift + 0.5Wx (LC B)	-4.5	-1.9	0.0	0.8	-0.2	-269.7	Column3
133	1.2D + 1.6Sdrift + 0.5Wz (LC A)	-4.4	-1.2	-0.5	0.1	63.2	-172.4	Column2
134	1.2D + 1.6Sdrift + 0.5Wz (LC B)	-9.7	-2.5	0.0	-1.9	5.6	-352.6	Column2
135	1.2D + 1.6Sdrift + 0.5Wx (Min.)	-7.1	-2.3	0.0	1.2	-1.3	-318.5	Column3
136	1.2D + 1.6Sdrift + 0.5Wz (Min.)	-7.2	-1.9	-0.4	-0.7	55.3	-267.0	Column2
137	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A)+0.75Wz (LC A))	-5.4	-2.2	0.4	0.6	-47.7	-305.7	Column3
138	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B)+0.75Wz (LC B))	-7.2	-2.4	0.0	1.5	-2.7	-339.6	Column3
139	1.2D + 1.6Sdrift + 0.5(0.75Wx (Min.)+0.75Wz (Min.))	-7.2	-2.2	0.3	0.8	-40.9	-311.5	Column3
140	1.2D + 1.0Wx (LC A) + 0.5Lr	-16.4	-2.4	0.0	-3.0	13.4	-333.4	Column2
141	1.2D + 1.0Wx (LC B) + 0.5Lr	-6.0	-3.1	0.0	1.6	-0.2	-438.4	Column3
142	1.2D + 1.0Wz (LC A) + 0.5Lr	-5.9	-1.7	-1.0	0.3	126.4	-243.1	Column2
143	1.2D + 1.0Wz (LC B) + 0.5Lr	-16.4	-4.3	0.0	-3.8	11.1	-606.5	Column2
144	1.2D + 1.0Wx (Min.) + 0.5Lr	-10.9	-3.8	0.0	2.0	-3.0	-535.1	Column4
145	1.2D + 1.0Wz (Min.) + 0.5Lr	-11.3	-3.1	-0.9	-1.3	111.1	-433.6	Column2
146	1.2D + 1.0(0.75Wx (LC A)+0.75Wz (LC A)) + 0.5Lr	-7.9	-3.6	0.7	1.1	-94.6	-511.8	Column3
147	1.2D + 1.0(0.75Wx (LC B)+0.75Wz (LC B)) + 0.5Lr	-11.3	-4.1	0.0	2.8	-5.3	-578.1	Column3
148	1.2D + 1.0(0.75Wx (Min.)+0.75Wz (Min.)) + 0.5Lr	-11.1	-2.2	-0.7	-1.4	87.5	-315.3	Column2
149	1.2D + 1.0Wx (LC A) + 0.5S	-13.0	-5.5	0.0	3.1	-5.4	-766.8	Column4
150	1.2D + 1.0Wx (LC B) + 0.5S	-7.5	-1.0	-0.1	-0.4	11.6	-136.3	Column7
151	1.2D + 1.0Wz (LC A) + 0.5S	-7.0	-2.1	1.0	0.0	-127.5	-289.7	Column3
152	1.2D + 1.0Wz (LC B) + 0.5S	-17.5	-4.6	0.0	3.4	-13.2	-642.9	Column4
153	1.2D + 1.0Wx (Min.) + 0.5S	-12.1	-4.2	0.0	2.3	-4.0	-583.0	Column4
154	1.2D + 1.0Wz (Min.) + 0.5S	-8.2	-2.1	1.0	-0.5	-116.4	-294.7	Column6
155	1.2D + 1.0(0.75Wx (LC A)+0.75Wz (LC A)) + 0.5S	-9.0	-4.0	0.7	1.4	-95.7	-558.7	Column3
156	1.2D + 1.0(0.75Wx (LC B)+0.75Wz (LC B)) + 0.5S	-12.5	-4.4	0.0	3.2	-6.2	-625.2	Column3
157	1.2D + 1.0(0.75Wx (Min.)+0.75Wz (Min.)) + 0.5S	-12.5	-4.1	0.6	1.9	-83.1	-570.1	Column3
158	0.9D + 1.0Wx (LC A)	-4.7	-2.5	0.0	1.1	-1.3	-358.2	Column6

Strength Design Reactions (Factored)

							strong axis	
		N	**Vx**	**Vy**	**Mz**	**Mx**	**My**	**Column***
159	0.9D + 1.0Wx (LC B)	-3.7	0.5	0.0	0.0	3.8	68.2	Column2
160	0.9D + 1.0Wz (LC A)	-0.2	0.0	1.0	-1.2	-121.6	3.9	Column6
161	0.9D + 1.0Wz (LC B)	-10.7	-2.7	0.0	-2.3	7.1	-385.9	Column2
162	0.9D + 1.0Wx (Min.)	-5.2	-2.3	0.0	0.8	1.1	-317.3	Column4
163	0.9D + 1.0Wz (Min.)	-5.6	-1.5	-0.9	0.1	106.4	-214.5	Column2
164	0.9D + 1.0(0.75Wx (LC A)+0.75Wz (LC A))	-2.2	-2.1	0.7	-0.3	-90.2	-293.0	Column3
165	0.9D + 1.0(0.75Wx (LC B)+0.75Wz (LC B))	-5.6	-2.6	0.0	1.4	-1.5	-358.5	Column3
166	0.9D + 1.0(0.75Wx (Min.)+0.75Wz (Min.))	-5.6	-2.2	0.6	0.2	-77.6	-303.5	Column3
167	1.2D+Ev+Ehx+0.2S	-10.8	-8.1	-0.1	2.3	5.2	-1098.6	Column3
168	0.9D-Ev+Ehx	-4.9	-6.5	-0.1	1.0	8.3	-870.5	Column3
169	1.2D+Ev+Ehz+0.2S	-12.5	-3.9	-5.2	3.0	676.2	-545.8	Column2
170	0.9D-Ev+Ehz	-6.5	-2.3	-5.2	4.3	666.8	-319.2	Column2
171	1.2D+Ev+Ehx+0.3Ehz+0.2S	-11.5	-8.5	1.5	0.9	-195.0	-1149.9	Column3
172	0.9D-Ev+Ehx+0.3Ehz	-5.6	-6.9	1.5	-0.4	-190.0	-920.9	Column3
173	1.2D+Ev+Ehz+0.3Ehx+0.2S	-12.7	-5.6	5.2	-2.8	-671.9	-762.6	Column3
174	0.9D-Ev+Ehz+0.3Ehx	-6.7	-3.9	5.1	-4.1	-662.6	-534.8	Column3

*Columns identified are determined from expected peak anchor stress for the given load combination

TENSION MEMBER TO COLUMN

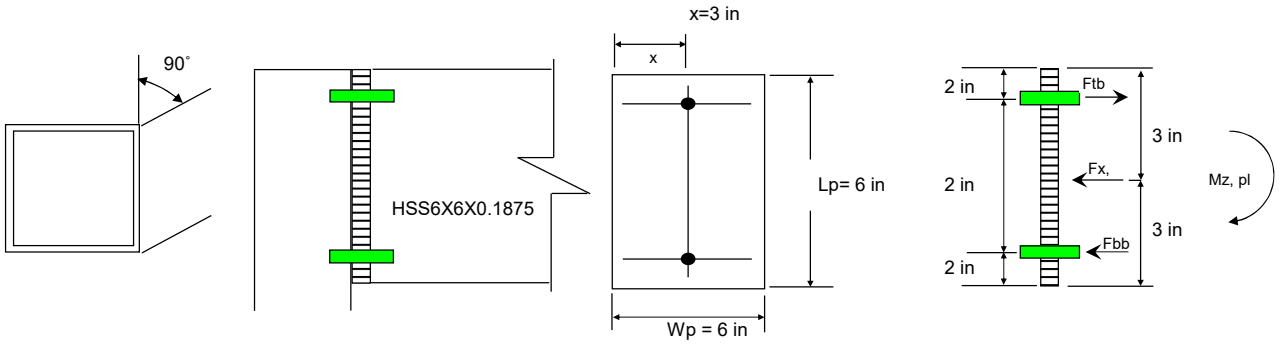
2 BOLTS - PRETENSIONED JOINT

Bolt Check: (2) 0.625" Diameter, A325 Bolts				Allowable		Actual	Load Combination / Member	
1	Shear	AISC (J3-1)	R_N/Ω	8.3 kip		2.2 kip	69 / Tension2	**OK**
2	Tension	AISC (J3-1)	R_N/Ω	13.8 kip		0.5 kip	68 / Tension6	**OK**
3	Bearing	AISC (J3-6b,d)	R_N/Ω	20.4 kip		2.2 kip	69 / Tension2	**OK**

End Plate Check: 0.375" Thick				Allowable		Actual	Load Combination / Member	
4	Shear Yielding	AISC (J4-3)	R_N/Ω	32.4 kip		1.9 kip	41 / Tension5	**OK**
5	Shear Rupture	AISC (J4-4)	R_N/Ω	30.2 kip		1.9 kip	41 / Tension5	**OK**
6	Weld Check *w = 0.1875"*	AISC (J2-3)	R_N/Ω	2.8 kip/in		0.1 kip/in	63 / Tension3	**OK**
7	Plate Thickness (t_P)		$\sqrt{\frac{4M_{PL}}{22W_P}}$	0.11 in		0.38 in	68 / Tension6	**OK**

Design Forces / Moments

Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	69	Tension2	-0.2	1.5	-0.1	4.0	0.0	0.0
2	68	Tension6	-1.0	0.5	0.1	1.4	0.0	0.0
3	69	Tension2	-0.2	1.5	-0.1	4.0	0.0	0.0
4	41	Tension5	-0.1	1.9	0.1	1.8	0.0	0.0
5	41	Tension5	-0.1	1.9	0.1	1.8	0.0	0.0
6	63	Tension3	-0.8	1.5	0.0	-3.8	0.0	0.0
7	68	Tension6	-1.0	0.5	0.1	1.4	0.0	0.0



Plan View | Connection Elevation | End Plate Elevation | End Plate Section

Member Height (in):	6	Number of Bolts:	2
Member Width (in):	6	Bolt Diameter (in):	0.625
Member Thickness (in):	0.188	End Plate Thickness (in):	0.375
End Plate Weld Size (in):	0.188	Flange Plate Thickness (in):	NONE

TRUSS TO COLUMN

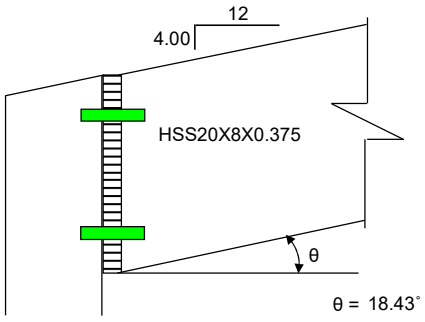
4 BOLTS - PRETENSIONED JOINT

Bolt Check: (4) 1" Diameter, A325 Bolts				Allowable		Actual		Load Combination / Member	
1	Shear		AISC (J3-1)	R_N/Ω	21.2 kip	3.2 kip		19 / Truss1	**OK**
2	Tension		AISC (J3-1)	R_N/Ω	35.3 kip	0.9 kip		70 / Truss7	**OK**
3	Bearing		AISC (J3-6b,d)	R_N/Ω	43.5 kip	3.2 kip		19 / Truss1	**OK**

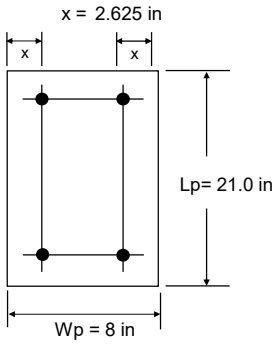
End Plate Check: 0.5" Thick				Allowable		Actual		Load Combination / Member	
4	Shear Yielding		AISC (J4-3)	R_N/Ω	151.8 kip	12.0 kip		19 / Truss1	**OK**
5	Shear Rupture		AISC (J4-4)	R_N/Ω	164.9 kip	12.0 kip		19 / Truss1	**OK**
6	Weld Check	*w = 0.25"*	AISC (J2-3)	R_N/Ω	3.7 kip/in	0.2 kip/in		19 / Truss1	**OK**
7	Plate Thickness (t_P)			$\sqrt{\frac{4M_{PL}}{22W_P}}$	0.21 in	0.50 in		67 / Truss5	**OK**

Design Forces / Moments

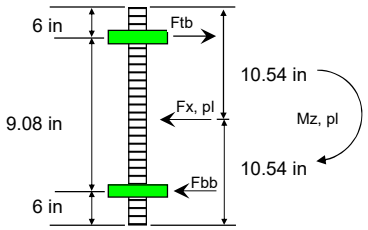
Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	19	Truss1	7.9	10.0	0.0	12.5	0.0	0.0
2	70	Truss7	0.3	1.3	-2.7	-25.2	0.0	0.0
3	19	Truss1	7.9	10.0	0.0	12.5	0.0	0.0
4	19	Truss1	7.9	10.0	0.0	12.5	0.0	0.0
5	19	Truss1	7.9	10.0	0.0	12.5	0.0	0.0
6	19	Truss1	7.9	10.0	0.0	12.5	0.0	0.0
7	67	Truss5	-1.8	1.2	-0.7	5.6	0.0	0.0



Connection Elevation



End Plate Elevation



End Plate Section

Member Height (in):	20	Number of Bolts:	4
Member Width (in):	8	Bolt Diameter (in):	1.000
Member Thickness (in):	0.375	End Plate Thickness (in):	0.500
End Plate Weld Size (in):	0.250	Flange Plate Thickness (in):	0.500
	UNIQUE WELD SIZE		

TRUSS TO COMPRESSION MEMBER

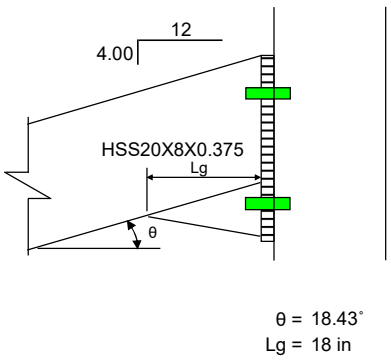
4 BOLTS - PRETENSIONED JOINT

Bolt Check: (4) 1" Diameter, A325 Bolts				Allowable		Actual	Load Combination / Member	
1	Shear		AISC (J3-1)	R_N/Ω	21.2 kip	1.9 kip	70 / Truss5	**OK**
2	Tension		AISC (J3-1)	R_N/Ω	35.3 kip	21.2 kip	19 / Truss1	**OK**
3	Bearing		AISC (J3-6b,d)	R_N/Ω	74.8 kip	1.9 kip	70 / Truss5	**OK**

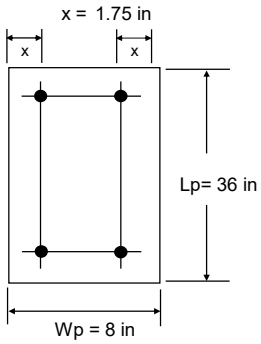
End Plate Check: 1" Thick				Allowable		Actual	Load Combination / Member	
4	Shear Yielding		AISC (J4-3)	R_N/Ω	115.2 kip	7.7 kip	70 / Truss5	**OK**
5	Shear Rupture		AISC (J4-4)	R_N/Ω	102.2 kip	7.7 kip	70 / Truss5	**OK**
6	Weld Check	*w = 0.25"*	AISC (J2-3)	R_N/Ω	3.7 kip/in	1.9 kip/in	19 / Truss1	**OK**
7	Plate Thickness (t_P)			$\sqrt{\frac{4M_{PL}}{22W_P}}$	0.79 in	1.00 in	69 / Truss2	**OK**

Design Forces / Moments

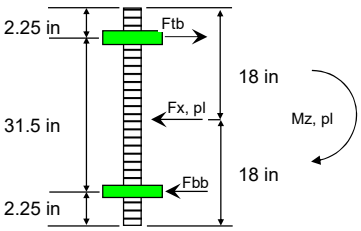
Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	70	Truss5	4.3	-1.5	7.7	16.9	49.3	147.8
2	19	Truss1	4.9	1.0	0.6	12.5	37.4	-1240.3
3	70	Truss5	4.3	-1.5	7.7	16.9	49.3	147.8
4	70	Truss5	4.3	-1.5	7.7	16.9	49.3	147.8
5	70	Truss5	4.3	-1.5	7.7	16.9	49.3	147.8
6	19	Truss1	4.9	1.0	0.6	12.5	37.4	-1240.3
7	69	Truss2	5.1	1.7	3.5	-2.0	-6.8	-1304.5



Connection Elevation



End Plate Elevation



End Plate Section

Member Height (in):	20	Number of Bolts:	4
Member Width (in):	8	Bolt Diameter (in):	1.000
Member Thickness (in):	0.375	End Plate Thickness (in):	1.000
End Plate Weld Size (in):	0.250	Flange Plate Thickness (in):	0.625

UNIQUE WELD SIZE

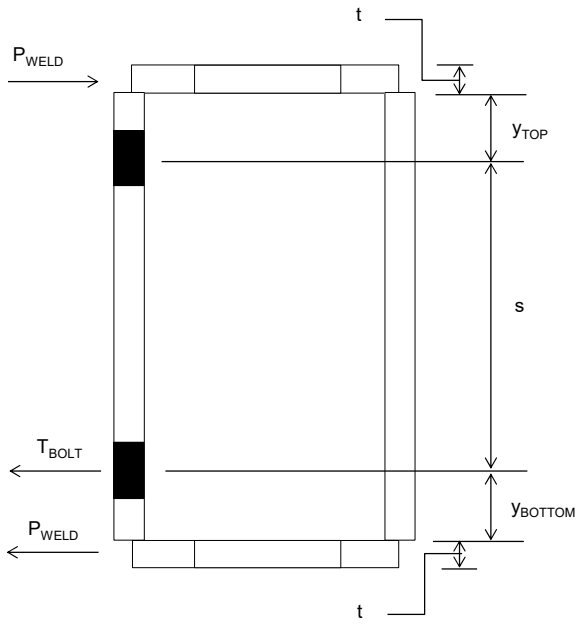
CONTINUITY PLATE CHECK

TRUSS TO COMPRESSION MEMBER - 4 BOLTS

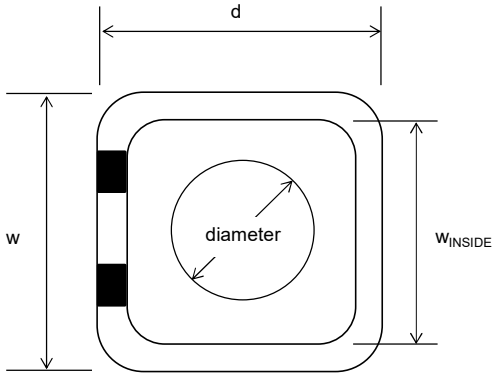
Weld Check: 5/16" weld		Design Equation	Allowable	Actual	
1	Weld Capacity	AISC (J2-3)	4.64 kip/in	3.03 kip/in	**OK**

Continuity Plate Check: 0.625" Thick		Design Equation	Allowable	Actual	
2	Flexural Yielding	AISC (F11-1)	84.21 k-in	21.20 k-in	**OK**

Controlling Design Forces / Moments							
LC	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
19	Truss1	4.9	1.0	0.6	12.5	37.4	-1240.3



Compression Tube Section



Compression Tube Plan

4 Bolt Connection

P_{WELD}:	84.8 kips	Tube Width (w):	12.0 in	Diameter:	6.000 in
T_{BOLT}:	21.2 kips	Tube Depth (d):	16.0 in	Weld Size:	0.313 in
y_{TOP}:	1.8 in	Tube Thickness:	0.375 in	Plate Thickness (t):	0.625 in
y_{BOTTOM}:	1.8 in	Bolt Spread (s):	32.5 in		
		w_{INSIDE}:	11.3 in		

RIDGE BEAM TO COMPRESSION TUBE

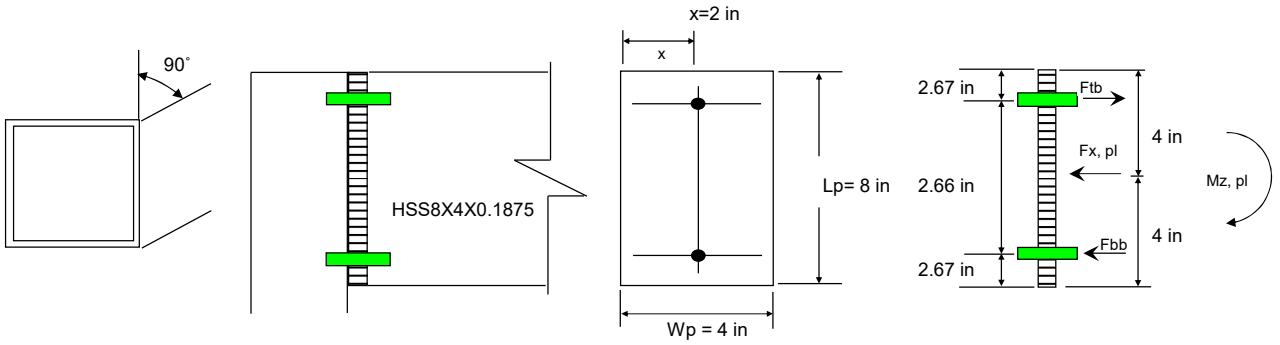
2 BOLTS - PRETENSIONED JOINT

Bolt Check: (2) 0.75" Diameter, A325 Bolts				Allowable		Actual		Load Combination / Member	
1	Shear		AISC (J3-1)	R_N/Ω	11.9 kip	2.1 kip		19 / Ridge1	**OK**
2	Tension		AISC (J3-1)	R_N/Ω	19.9 kip	6.2 kip		64 / Ridge1	**OK**
3	Bearing		AISC (J3-6b,d)	R_N/Ω	32.6 kip	2.1 kip		19 / Ridge1	**OK**

End Plate Check: 0.75" Thick				Allowable		Actual		Load Combination / Member	
4	Shear Yielding		AISC (J4-3)	R_N/Ω	57.6 kip	2.1 kip		19 / Ridge1	**OK**
5	Shear Rupture		AISC (J4-4)	R_N/Ω	55.5 kip	2.1 kip		19 / Ridge1	**OK**
6	Weld Check	*w = 0.1875"*	AISC (J2-3)	R_N/Ω	2.8 kip/in	0.5 kip/in		70 / Ridge1	**OK**
7	Plate Thickness (t_P)			$\sqrt{\frac{4M_{PL}}{22W_P}}$	0.49 in	0.75 in		64 / Ridge1	**OK**

Design Forces / Moments

Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	19	Ridge1	1.0	-2.1	0.0	0.0	0.0	0.0
2	64	Ridge1	-12.3	-0.2	0.0	0.0	0.0	0.0
3	19	Ridge1	1.0	-2.1	0.0	0.0	0.0	0.0
4	19	Ridge1	1.0	-2.1	0.0	0.0	0.0	0.0
5	19	Ridge1	1.0	-2.1	0.0	0.0	0.0	0.0
6	70	Ridge1	-12.3	-0.2	0.1	0.0	0.0	0.0
7	64	Ridge1	-12.3	-0.2	0.0	0.0	0.0	0.0



Plan View | Connection Elevation | End Plate Elevation | End Plate Section

Member Height (in):	8	Number of Bolts:	2
Member Width (in):	4	Bolt Diameter (in):	0.750
Member Thickness (in):	0.188	End Plate Thickness (in):	0.750
End Plate Weld Size (in):	0.188	Flange Plate Thickness (in):	0.750

BRACE TO GABLE BEAM

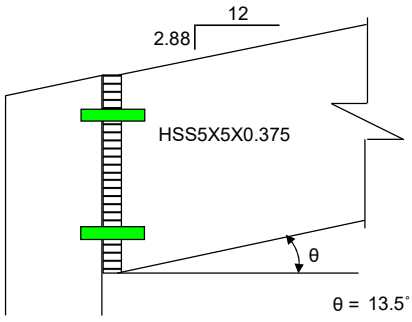
4 BOLTS - PRETENSIONED JOINT

Bolt Check: (4) 0.75" Diameter, A325 Bolts				Allowable		Actual	Load Combination / Member	
1	Shear		AISC (J3-1)	R_N/Ω	11.9 kip	1.7 kip	64 / Brace2	**OK**
2	Tension		AISC (J3-1)	R_N/Ω	19.9 kip	4.9 kip	70 / Brace1	**OK**
3	Bearing		AISC (J3-6b,d)	R_N/Ω	25.3 kip	1.7 kip	64 / Brace2	**OK**

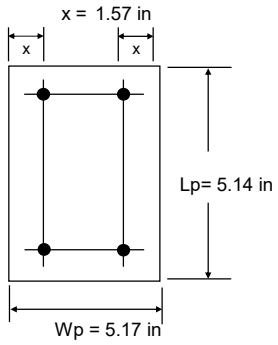
End Plate Check: 0.625" Thick				Allowable		Actual	Load Combination / Member	
4	Shear Yielding		AISC (J4-3)	R_N/Ω	46.6 kip	5.3 kip	68 / Brace2	**OK**
5	Shear Rupture		AISC (J4-4)	R_N/Ω	38.6 kip	5.3 kip	17 / Brace1	**OK**
6	Weld Check	*w = 0.3125"*	AISC (J2-3)	R_N/Ω	4.6 kip/in	1.0 kip/in	70 / Brace1	**OK**
7	Plate Thickness (t_P)			$\sqrt{\frac{4M_{PL}}{22W_P}}$	0.42 in	0.63 in	70 / Brace1	**OK**

Design Forces / Moments

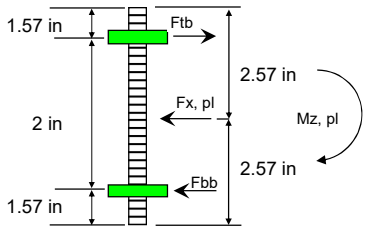
Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	64	Brace2	-20.4	0.2	0.1	0.0	0.0	0.0
2	70	Brace1	-20.7	0.2	0.0	0.0	0.0	0.0
3	64	Brace2	-20.4	0.2	0.1	0.0	0.0	0.0
4	68	Brace2	-19.9	0.5	0.3	0.0	0.0	0.0
5	17	Brace1	0.6	0.4	-0.1	0.0	0.0	0.0
6	70	Brace1	-20.7	0.2	0.0	0.0	0.0	0.0
7	70	Brace1	-20.7	0.2	0.0	0.0	0.0	0.0



Connection Elevation



End Plate Elevation



End Plate Section

Member Height (in):	5	Number of Bolts:	4
Member Width (in):	5	Bolt Diameter (in):	0.750
Member Thickness (in):	0.375	End Plate Thickness (in):	0.625
End Plate Weld Size (in):	0.313	Flange Plate Thickness (in):	0.750
	UNIQUE WELD SIZE		

BRACE TO COMPRESSION TUBE

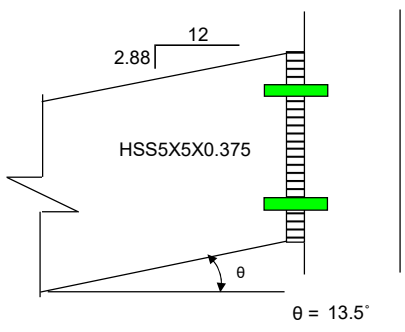
4 BOLTS - PRETENSIONED JOINT

Bolt Check: (4) 0.75" Diameter, A325 Bolts				Allowable		Actual		Load Combination / Member	
1	Shear		AISC (J3-1)	R_N/Ω	11.9 kip	1.8 kip		68 / Brace1	**OK**
2	Tension		AISC (J3-1)	R_N/Ω	19.9 kip	4.7 kip		70 / Brace1	**OK**
3	Bearing		AISC (J3-6b,d)	R_N/Ω	25.3 kip	1.8 kip		68 / Brace1	**OK**

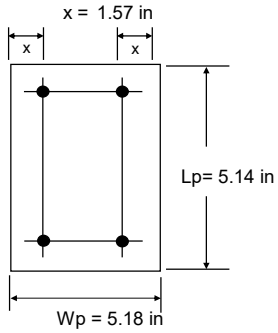
End Plate Check: 0.75" Thick				Allowable		Actual		Load Combination / Member	
4	Shear Yielding		AISC (J4-3)	R_N/Ω	37.0 kip	5.1 kip		68 / Brace1	**OK**
5	Shear Rupture		AISC (J4-4)	R_N/Ω	30.6 kip	5.1 kip		68 / Brace1	**OK**
6	Weld Check	*w = 0.3125"*	AISC (J2-3)	R_N/Ω	4.6 kip/in	1.0 kip/in		70 / Brace1	**OK**
7	Plate Thickness (t_P)			$\sqrt{\frac{4M_{PL}}{22W_P}}$	0.41 in	0.75 in		70 / Brace1	**OK**

Design Forces / Moments

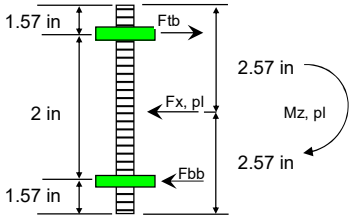
Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	68	Brace1	-19.9	-0.5	0.1	0.0	0.0	0.0
2	70	Brace1	-20.1	-0.2	0.0	0.0	0.0	0.0
3	68	Brace1	-19.9	-0.5	0.1	0.0	0.0	0.0
4	68	Brace1	-19.9	-0.5	0.1	0.0	0.0	0.0
5	68	Brace1	-19.9	-0.5	0.1	0.0	0.0	0.0
6	70	Brace1	-20.1	-0.2	0.0	0.0	0.0	0.0
7	70	Brace1	-20.1	-0.2	0.0	0.0	0.0	0.0



Connection Elevation



End Plate Elevation



End Plate Section

Member Height (in):	5	Number of Bolts:	4
Member Width (in):	5	Bolt Diameter (in):	0.750
Member Thickness (in):	0.375	End Plate Thickness (in):	0.750
End Plate Weld Size (in):	0.313	Flange Plate Thickness (in):	0.750
	UNIQUE WELD SIZE		

PURLIN CONNECTION

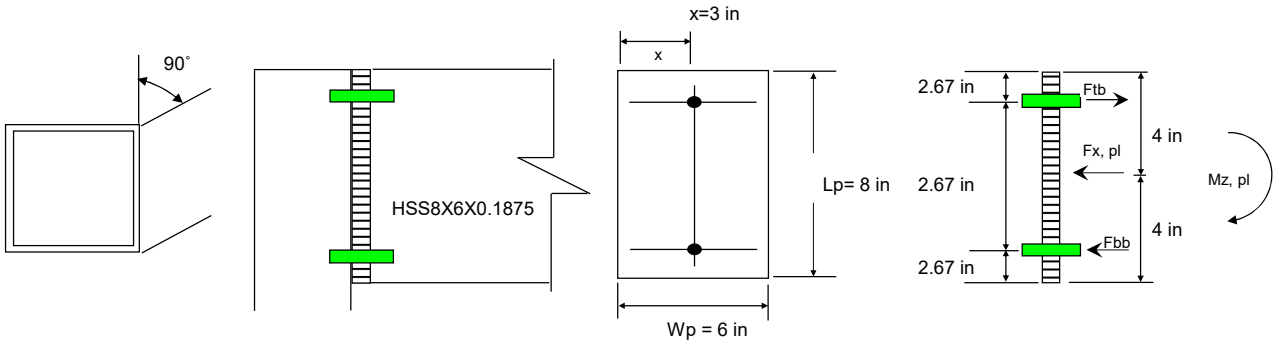
2 BOLTS - PRETENSIONED JOINT

Bolt Check: (2) 0.75" Diameter, A325 Bolts				Allowable		Actual		Load Combination / Member	
1	Shear		AISC (J3-1)	R_N/Ω	11.9 kip	1.8 kip		60 / Purlin1	**OK**
2	Tension		AISC (J3-1)	R_N/Ω	19.9 kip	0.6 kip		60 / Purlin3	**OK**
3	Bearing		AISC (J3-6b,d)	R_N/Ω	24.5 kip	1.8 kip		60 / Purlin1	**OK**

End Plate Check: 0.5" Thick				Allowable		Actual		Load Combination / Member	
4	Shear Yielding		AISC (J4-3)	R_N/Ω	57.6 kip	2.6 kip		20 / Purlin2	**OK**
5	Shear Rupture		AISC (J4-4)	R_N/Ω	55.5 kip	2.6 kip		20 / Purlin2	**OK**
6	Weld Check	*w = 0.1875"*	AISC (J2-3)	R_N/Ω	2.8 kip/in	0.1 kip/in		20 / Purlin2	**OK**
7	Plate Thickness (t_P)			$\sqrt{\frac{4M_{PL}}{22W_P}}$	0.14 in	0.50 in		60 / Purlin3	**OK**

Design Forces / Moments

Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	60	Purlin1	0.0	1.8	-0.3	0.0	0.0	0.0
2	60	Purlin3	-1.3	1.4	-0.7	0.0	0.0	0.0
3	60	Purlin1	0.0	1.8	-0.3	0.0	0.0	0.0
4	20	Purlin2	-0.4	2.6	-0.9	0.0	0.0	0.0
5	20	Purlin2	-0.4	2.6	-0.9	0.0	0.0	0.0
6	20	Purlin2	-0.4	2.6	-0.9	0.0	0.0	0.0
7	60	Purlin3	-1.3	1.4	-0.7	0.0	0.0	0.0



Plan View | Connection Elevation | End Plate Elevation | End Plate Section

Member Height (in):	8	Number of Bolts:	2
Member Width (in):	6	Bolt Diameter (in):	0.750
Member Thickness (in):	0.188	End Plate Thickness (in):	0.500
End Plate Weld Size (in):	0.188	Flange Plate Thickness (in):	0.750

NON-SLOPING TAIL CONNECTION

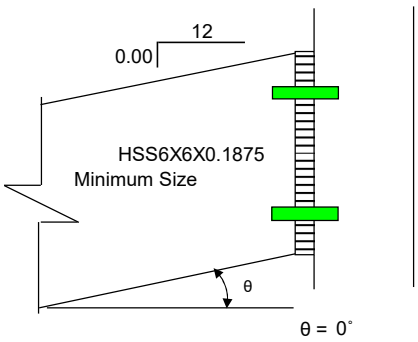
2 BOLTS - PRETENSIONED JOINT

Bolt Check: (2) 0.625" Diameter, A325 Bolts				**Allowable**		**Actual**		**Load Combination / Member**	
1	Shear		AISC (J3-1)	R_N/Ω	8.3 kip	0.5 kip		20 / Purlin Tail8	**OK**
2	Tension		AISC (J3-1)	R_N/Ω	13.8 kip	1.8 kip		20 / Purlin Tail1	**OK**
3	Bearing		AISC (J3-6b,d)	R_N/Ω	14.8 kip	0.5 kip		20 / Purlin Tail8	**OK**

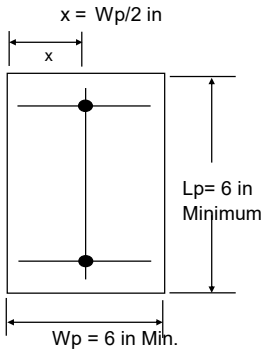
End Plate Check: 0.375" Thick				**Allowable**		**Actual**		**Load Combination / Member**	
4	Shear Yielding		AISC (J4-3)	R_N/Ω	32.4 kip	0.5 kip		20 / Purlin Tail1	**OK**
5	Shear Rupture		AISC (J4-4)	R_N/Ω	30.2 kip	0.5 kip		20 / Purlin Tail1	**OK**
6	Weld Check	*w = 0.1875"*	AISC (J2-3)	R_N/Ω	2.8 kip/in	0.2 kip/in		20 / Purlin Tail1	**OK**
7	Plate Thickness (t_p)			$\sqrt{\frac{4M_{PL}}{22W_P}}$	0.15 in	0.38 in		20 / Purlin Tail1	**OK**

Design Forces / Moments

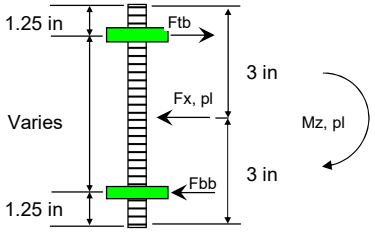
Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	20	Purlin Tail8	0.0	-0.5	-0.2	0.0	-2.1	6.2
2	20	Purlin Tail1	0.0	-0.5	0.2	0.0	2.1	6.2
3	20	Purlin Tail8	0.0	-0.5	-0.2	0.0	-2.1	6.2
4	20	Purlin Tail1	0.0	-0.5	0.2	0.0	2.1	6.2
5	20	Purlin Tail1	0.0	-0.5	0.2	0.0	2.1	6.2
6	20	Purlin Tail1	0.0	-0.5	0.2	0.0	2.1	6.2
7	20	Purlin Tail1	0.0	-0.5	0.2	0.0	2.1	6.2



Connection Elevation



End Plate Elevation



End Plate Section

Member Height (in):	6	Number of Bolts:	2
Member Width (in):	6	Bolt Diameter (in):	0.625
Member Thickness (in):	0.188	End Plate Thickness (in):	0.375
End Plate Weld Size (in):	0.188	Flange Plate Thickness (in):	NONE

WELDED CONNECTION IS PERMITTED

RISA ANALYSIS REPORT

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Point	Distributed	Area(Member)
1	FRAMEWEIGHT	DL		-1					
2	DL	DL							2
3	LL	LL				4			2
4	SL	SL							2
5	SLU	SL							3
6	SLsliding	SL							
7	SLdrift	SL							
8	X WINDWARD LOW	WL							3
9	X LEEWARD LOW	WL							3
10	X SIDEWARD LOW	WL							
11	X WINDWARD UPPER	WL							
12	X LEEWARD UPPER	WL							
13	X SIDEWARD UPPER	WL							
14	X10MINWIND	WL							1
15	Z WINDWARD LOW	WL							2
16	Z LEEWARD LOW	WL							
17	Z SIDEWARD LOW	WL							6
18	Z WINDWARD UPPER	WL							
19	Z LEEWARD UPPER	WL							
20	Z SIDEWARD UPPER	WL							
21	Z10MINWIND	WL							2
22	EX FRAME	EL	-1						
23	EX ROOF	EL							2
24	EZ FRAME	EL			-1				
25	EZ ROOF	EL							2
26	Wrap DL	None					4		
27	Wrap Ex	None				4			
28	Wrap Ez	None				4			
29	Wrap Ey	None					4		
30	BLC 2 Transient Area Loads	None						229	
31	BLC 3 Transient Area Loads	None						229	
32	BLC 4 Transient Area Loads	None						229	
33	BLC 5 Transient Area Loads	None						237	
34	BLC 8 Transient Area Loads	None						272	
35	BLC 9 Transient Area Loads	None						272	
36	BLC 14 Transient Area Loads	None						136	
37	BLC 15 Transient Area Loads	None						60	
38	BLC 17 Transient Area Loads	None						458	
39	BLC 21 Transient Area Loads	None						60	
40	BLC 23 Transient Area Loads	None						229	
41	BLC 25 Transient Area Loads	None						229	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC
1	SERVICE D			1	1	2	6	26						
2	SERVICE Lr			3	20									
3	SERVICE S			4	26.04									
4	SERVICE Su			5	41.171									
5	SERVICE Ssliding			6										
6	SERVICE Sdrift			7										
7	SERVICE Wx (LC A)			8	11.44	9	-1.778	10	-8.32	11		12		13
8	SERVICE Wx (LC B)			8	0.09	9	-10.011	10	8.32	11		12		13
9	SERVICE Wz (LC A)			15	11.44	16	-1.778	17	-8.32	18		19		20
10	SERVICE Wz (LC B)			15	0.087	16	-10.011	17	8.32	18		19		20
11	SERVICE Ex			22	0.966	23	5.795	27						
12	SERVICE Ez			24	0.966	25	5.795	28						
13	SERVICE Ev			1	0.186	2	1.114	29						
14														
15														
16														
17	D	Yes	Y	L1	1									
18	D + Lr	Yes	Y	L1	1	L2	1							
19	D + S	Yes	Y	L1	1	L3	1							
20	D + Su	Yes	Y	L1	1	L4	1							
21	D+Ssliding	Yes	Y	L1	1	L5	1							
22	D+Sdrift	Yes	Y	L1	1	L6	1							
23	D + 0.6Wx (LC A)	Yes	Y	L1	1	L7	1							
24	D + 0.6Wx (LC B)	Yes	Y	L1	1	L8	1							
25	D + 0.6Wz (LC A)	Yes	Y	L1	1	L9	1							
26	D + 0.6Wz (LC B)	Yes	Y	L1	1	L10	1							
27	D + (0.6Wx (Min.))	Yes	Y	L1	1	14	9.6							
28	D + (0.6Wz (Min.))	Yes	Y	L1	1	21	9.6							
29	D+0.6(0.75Wx(LC A)+0.75Wz(LC A))	Yes	Y	L1	1	L7	0.75	L9	0.75					
30	D+0.6(0.75Wx(LC B)+0.75Wz(LC B))	Yes	Y	L1	1	L8	0.75	L10	0.75					
31	D+0.6(0.75Wx(Min.)+0.75Wz(Min.))	Yes	Y	L1	1	14	7.2	21	7.2					
32	D + 0.75(0.6Wx (LC A)) + 0.75Lr	Yes	Y	L1	1	L7	0.75	L2	0.75					

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC
33	D + 0.75(0.6Wx (LC B)) + 0.75Lr	Yes	Y	L1	1	L8	0.75	L2	0.75					
34	D + 0.75(0.6Wz (LC A)) + 0.75Lr	Yes	Y	L1	1	L9	0.75	L2	0.75					
35	D + 0.75(0.6Wz (LC B)) + 0.75Lr	Yes	Y	L1	1	L10	0.75	L2	0.75					
36	D + 0.75(0.6Wx (Min.)) + 0.75Lr	Yes	Y	L1	1	14	7.2	L2	0.75					
37	D + 0.75(0.6Wz (Min.)) + 0.75Lr	Yes	Y	L1	1	21	7.2	L2	0.75					
38	D+0.75(0.6(0.75Wx(LC A)+0.75Wz(LC A))) + 0.75Lr	Yes	Y	L1	1	L7	0.563	L9	0.563	L2	0.75			
39	D+0.75(0.6(0.75Wx(LC B)+0.75Wz(LC B)) + 0.75Lr	Yes	Y	L1	1	L8	0.563	L10	0.563	L2	0.75			
40	D+ 0.75(0.6(0.75Wx(Min.)+0.75Wz(Min.))) + 0.75Lr	Yes	Y	L1	1	14	5.4	21	5.4	L2	0.75			
41	D + 0.75(0.6Wx (LC A)) + 0.75S	Yes	Y	L1	1	L7	0.75	L3	0.75					
42	D + 0.75(0.6Wx (LC B)) + 0.75S	Yes	Y	L1	1	L8	0.75	L3	0.75					
43	D + 0.75(0.6Wz (LC A)) + 0.75S	Yes	Y	L1	1	L9	0.75	L3	0.75					
44	D + 0.75(0.6Wz (LC B)) + 0.75S	Yes	Y	L1	1	L10	0.75	L3	0.75					
45	D + 0.75(0.6Wx (Min.)) + 0.75S	Yes	Y	L1	1	14	7.2	L3	0.75					
46	D + 0.75(0.6Wz (Min.)) + 0.75S	Yes	Y	L1	1	21	7.2	L3	0.75					
47	D+0.75(0.6(0.75Wx(LC A)+0.75Wz(LC A))) + 0.75S	Yes	Y	L1	1	L7	0.563	L9	0.563	L3	0.75			
48	D+0.75(0.6(0.75Wx(LC B)+0.75Wz(LC B)) + 0.75S	Yes	Y	L1	1	L8	0.563	L10	0.563	L3	0.75			
49	D+ 0.75(0.6(0.75Wx(Min.)+0.75Wz(Min.))) + 0.75S	Yes	Y	L1	1	14	5.4	21	5.4	L3	0.75			
50	0.6D + 0.6Wx (LC A)	Yes	Y	L1	0.6	L7	1							
51	0.6D + 0.6Wx (LC B)	Yes	Y	L1	0.6	L8	1							
52	0.6D + 0.6Wz (LC A)	Yes	Y	L1	0.6	L9	1							
53	0.6D + 0.6Wz (LC B)	Yes	Y	L1	0.6	L10	1							
54	0.6D + (0.6Wx (Min.))	Yes	Y	L1	0.6	14	9.6							
55	0.6D + (0.6Wz (Min.))	Yes	Y	L1	0.6	21	9.6							
56	0.6D+0.6(0.75Wx(LC A)+0.75Wz(LC A))	Yes	Y	L1	0.6	L7	0.75	L9	0.75					
57	0.6D+0.6(0.75Wx(LC B)+0.75Wz(LC B))	Yes	Y	L1	0.6	L8	0.75	L10	0.75					
58	0.6D+0.6(0.75Wx(Min.)+0.75Wz(Min.))	Yes	Y	L1	0.6	14	7.2	21	7.2					
59	1.0D+0.7Ev+0.7Ehx	Yes	Y	L1	1	L13	0.7	L11	0.7					
60	1.0D+0.525Ev+0.525Ehx+0.75S	Yes	Y	L1	1	L13	0.525	L11	0.525	L3	0.75			
61	0.6D-0.7Ev+0.7Ehx	Yes	Y	L1	0.6	L13	-0.7	L11	0.7					
62	1.0D+0.7Ev+0.7Ehz	Yes	Y	L1	1	L13	0.7	L12	0.7					
63	1.0D+0.525Ev+0.525Ehz+0.75S	Yes	Y	L1	1	L13	0.525	L12	0.525	L3	0.75			
64	0.6D-0.7Ev+0.7Ehz	Yes	Y	L1	0.6	L13	-0.7	L12	0.7					
65	1.0D+0.7Ev+0.7Ehx+0.21Ehz	Yes	Y	L1	1	L13	0.7	L11	0.7	L12	0.21			
66	1.0D+0.525Ev+0.525Ehx+0.1575Ehz+0.75S	Yes	Y	L1	1	L13	0.525	L11	0.525	L12	0.16	L3	0.75	
67	0.6D-0.7Ev+0.7Ehx+0.21Ehz	Yes	Y	L1	0.6	L13	-0.7	L11	0.7	L12	0.21			
68	1.0D+0.7Ev+0.7Ehz+0.21Ehx	Yes	Y	L1	1	L13	0.7	L12	0.7	L11	0.21			
69	1.0D+0.525Ev+0.525Ehz+0.1575Ehx+0.75S	Yes	Y	L1	1	L13	0.525	L12	0.525	L11	0.16	L3	0.75	
70	0.6D-0.7Ev+0.7Ehz+0.21Ehx	Yes	Y	L1	0.6	L13	-0.7	L12	0.7	L11	0.21			
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92	1.4D			L1	1.4									
93	1.2D + 0.5Lr			L1	1.2	L2	0.5							
94	1.2D + 0.5S			L1	1.2	L3	0.5							
95	1.2D + 1.6Lr + 0.5Wx (LC A)			L1	1.2	L2	1.6	L7	0.833					
96	1.2D + 1.6Lr + 0.5Wx (LC B)			L1	1.2	L2	1.6	L8	0.833					
97	1.2D + 1.6Lr + 0.5Wz (LC A)			L1	1.2	L2	1.6	L9	0.833					
98	1.2D + 1.6Lr + 0.5Wz (LC B)			L1	1.2	L2	1.6	L10	0.833					
99	1.2D + 1.6Lr + 0.5Wx (Min.)			L1	1.2	L2	1.6	14	8					
100	1.2D + 1.6Lr + 0.5Wz (Min.)			L1	1.2	L2	1.6	21	8					
101	1.2D + 1.6Lr + 0.5(0.75Wx (LC A)+0.75Wz (LC A))			L1	1.2	L2	1.6	L7	0.625	L9	0.63			
102	1.2D + 1.6Lr + 0.5(0.75Wx (LC B)+0.75Wz (LC B))			L1	1.2	L2	1.6	L8	0.625	L10	0.63			
103	1.2D + 1.6Lr + 0.5(0.75Wx (Min.)+0.75Wz (Min.))			L1	1.2	L2	1.6	14	6	21	6			
104	1.2D + 1.6S + 0.5Wx (LC A)			L1	1.2	L3	1.6	L7	0.833					
105	1.2D + 1.6S + 0.5Wx (LC B)			L1	1.2	L3	1.6	L8	0.833					
106	1.2D + 1.6S + 0.5Wz (LC A)			L1	1.2	L3	1.6	L9	0.833					
107	1.2D + 1.6S + 0.5Wz (LC B)			L1	1.2	L3	1.6	L10	0.833					
108	1.2D + 1.6S + 0.5Wx (Min.)			L1	1.2	L3	1.6	14	8					
109	1.2D + 1.6S + 0.5Wz (Min.)			L1	1.2	L3	1.6	21	8					

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC
110	1.2D + 1.6S + 0.5(0.75Wx (LC A)+0.75Wz (LC A))			L1	1.2	L3	1.6	L7	0.625	L9	0.63			
111	1.2D + 1.6S + 0.5(0.75Wx (LC B)+0.75Wz (LC B))			L1	1.2	L3	1.6	L8	0.625	L10	0.63			
112	1.2D + 1.6S + 0.5(0.75Wx (Min.)+0.75Wz (Min.))			L1	1.2	L3	1.6	14	6	21	6			
113	1.2D + 1.6Su + 0.5Wx (LC A)			L1	1.2	L4	1.6	L7	0.833					
114	1.2D + 1.6Su + 0.5Wx (LC B)			L1	1.2	L4	1.6	L8	0.833					
115	1.2D + 1.6Su + 0.5Wz (LC A)			L1	1.2	L4	1.6	L9	0.833					
116	1.2D + 1.6Su + 0.5Wz (LC B)			L1	1.2	L4	1.6	L10	0.833					
117	1.2D + 1.6Su + 0.5Wx (Min.)			L1	1.2	L4	1.6	14	8					
118	1.2D + 1.6Su + 0.5Wz (Min.)			L1	1.2	L4	1.6	21	8					
119	1.2D + 1.6Su + 0.5(0.75Wx (LC A)+0.75Wz (LC A))			L1	1.2	L4	1.6	L7	0.625	L9	0.63			
120	1.2D + 1.6Su + 0.5(0.75Wx (LC B)+0.75Wz (LC B))			L1	1.2	L4	1.6	L8	0.625	L10	0.63			
121	1.2D + 1.6Su + 0.5(0.75Wx (Min.)+0.75Wz (Min.))			L1	1.2	L4	1.6	14	6	21	6			
122	1.2D + 1.6Ssliding + 0.5Wx (LC A)			L1	1.2	L5	1.6	L7	0.833					
123	1.2D + 1.6Ssliding + 0.5Wx (LC B)			L1	1.2	L5	1.6	L8	0.833					
124	1.2D + 1.6Ssliding + 0.5Wz (LC A)			L1	1.2	L5	1.6	L9	0.833					
125	1.2D + 1.6Ssliding + 0.5Wz (LC B)			L1	1.2	L5	1.6	L10	0.833					
126	1.2D + 1.6Ssliding + 0.5Wx (Min.)			L1	1.2	L5	1.6	14	8					
127	1.2D + 1.6Ssliding + 0.5Wz (Min.)			L1	1.2	L5	1.6	21	8					
128	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A)+0.75Wz (LC A))			L1	1.2	L5	1.6	L7	0.625	L9	0.63			
129	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B)+0.75Wz (LC B))			L1	1.2	L5	1.6	L8	0.625	L10	0.63			
130	1.2D + 1.6Ssliding + 0.5(0.75Wx (Min.)+0.75Wz (Min.))			L1	1.2	L5	1.6	14	6	21	6			
131	1.2D + 1.6Sdrift + 0.5Wx (LC A)			L1	1.2	L6	1.6	L7	0.833					
132	1.2D + 1.6Sdrift + 0.5Wx (LC B)			L1	1.2	L6	1.6	L8	0.833					
133	1.2D + 1.6Sdrift + 0.5Wz (LC A)			L1	1.2	L6	1.6	L9	0.833					
134	1.2D + 1.6Sdrift + 0.5Wz (LC B)			L1	1.2	L6	1.6	L10	0.833					
135	1.2D + 1.6Sdrift + 0.5Wx (Min.)			L1	1.2	L6	1.6	14	8					
136	1.2D + 1.6Sdrift + 0.5Wz (Min.)			L1	1.2	L6	1.6	21	8					
137	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A)+0.75Wz (LC A))			L1	1.2	L6	1.6	L7	0.625	L9	0.63			
138	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B)+0.75Wz (LC B))			L1	1.2	L6	1.6	L8	0.625	L10	0.63			
139	1.2D + 1.6Sdrift + 0.5(0.75Wx (Min.)+0.75Wz (Min.))			L1	1.2	L6	1.6	14	6	21	6			
140	1.2D + 1.0Wx (LC A) + 0.5Lr			L1	1.2	L7	1.667	L2	0.5					
141	1.2D + 1.0Wx (LC B) + 0.5Lr			L1	1.2	L8	1.667	L2	0.5					
142	1.2D + 1.0Wz (LC A) + 0.5Lr			L1	1.2	L9	1.667	L2	0.5					
143	1.2D + 1.0Wz (LC B) + 0.5Lr			L1	1.2	L10	1.667	L2	0.5					
144	1.2D + 1.0Wx (Min.) + 0.5Lr			L1	1.2	14	16	L2	0.5					
145	1.2D + 1.0Wz (Min.) + 0.5Lr			L1	1.2	21	16	L2	0.5					
146	1.2D + 1.0(0.75Wx (LC A)+0.75Wz (LC A)) + 0.5Lr			L1	1.2	L7	1.25	L9	1.25	L2	0.5			
147	1.2D + 1.0(0.75Wx (LC B)+0.75Wz (LC B)) + 0.5Lr			L1	1.2	L8	1.25	L10	1.25	L2	0.5			
148	1.2D + 1.0(0.75Wx (Min.)+0.75Wz (Min.)) + 0.5Lr			L1	1.2	14	12	21	12	L2	0.5			
149	1.2D + 1.0Wx (LC A) + 0.5S			L1	1.2	L7	1.667	L3	0.5					
150	1.2D + 1.0Wx (LC B) + 0.5S			L1	1.2	L8	1.667	L3	0.5					
151	1.2D + 1.0Wz (LC A) + 0.5S			L1	1.2	L9	1.667	L3	0.5					
152	1.2D + 1.0Wz (LC B) + 0.5S			L1	1.2	L10	1.667	L3	0.5					
153	1.2D + 1.0Wx (Min.) + 0.5S			L1	1.2	14	16	L3	0.5					
154	1.2D + 1.0Wz (Min.) + 0.5S			L1	1.2	21	16	L3	0.5					
155	1.2D + 1.0(0.75Wx (LC A)+0.75Wz (LC A)) + 0.5S			L1	1.2	L7	1.25	L9	1.25	L3	0.5			
156	1.2D + 1.0(0.75Wx (LC B)+0.75Wz (LC B)) + 0.5S			L1	1.2	L8	1.25	L10	1.25	L3	0.5			
157	1.2D + 1.0(0.75Wx (Min.)+0.75Wz (Min.)) + 0.5S			L1	1.2	14	12	21	12	L3	0.5			
158	0.9D + 1.0Wx (LC A)			L1	0.9	L7	1.667							
159	0.9D + 1.0Wx (LC B)			L1	0.9	L8	1.667							
160	0.9D + 1.0Wz (LC A)			L1	0.9	L9	1.667							
161	0.9D + 1.0Wz (LC B)			L1	0.9	L10	1.667							
162	0.9D + 1.0Wx (Min.)			L1	0.9	14	16							
163	0.9D + 1.0Wz (Min.)			L1	0.9	21	16							
164	0.9D + 1.0(0.75Wx (LC A)+0.75Wz (LC A))			L1	0.9	L7	1.25	L9	1.25					
165	0.9D + 1.0(0.75Wx (LC B)+0.75Wz (LC B))			L1	0.9	L8	1.25	L10	1.25					
166	0.9D + 1.0(0.75Wx (Min.)+0.75Wz (Min.))			L1	0.9	14	12	21	12					
167	1.2D+Ev+Ehx+0.2S			L1	1.2	L13	1	L11	1	L3	0.2			
168	0.9D-Ev+Ehx			L1	0.9	L13	-1	L11	1					
169	1.2D+Ev+Ehz+0.2S			L1	1.2	L13	1	L12	1	L3	0.2			
170	0.9D-Ev+Ehz			L1	0.9	L13	-1	L12	1					
171	1.2D+Ev+Ehx+0.3Ehz+0.2S			L1	1.2	L13	1	L11	1	L12	0.3	L3	0.2	
172	0.9D-Ev+Ehx+0.3Ehz			L1	0.9	L13	-1	L11	1	L12	0.3			
173	1.2D+Ev+Ehz+0.3Ehx+0.2S			L1	1.2	L13	1	L12	1	L11	0.3	L3	0.2	
174	0.9D-Ev+Ehz+0.3Ehx			L1	0.9	L13	-1	L12	1	L11	0.3			
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Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC
187														
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189														
190														
191														
192														
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206														
207														
208	SERVICE Emx			22	0.929	23	5.572							
209	SERVICE Emz			24	0.929	25	5.572							
210														
211	1.0D+0.7Ev+0.7Emhx			L1	1	L13	0.7	L208	0.7					
212	1.0D+0.525Ev+0.525Emhx+0.75S			L1	1	L13	0.525	L208	0.525	L3	0.75			
213	0.6D-0.7Ev+0.7Emhx			L1	0.6	L13	-0.7	L208	0.7					
214	1.0D+0.7Ev+0.7Emhz			L1	1	L13	0.7	L209	0.7					
215	1.0D+0.525Ev+0.525Emhz+0.75S			L1	1	L13	0.525	L209	0.525	L3	0.75			
216	0.6D-0.7Ev+0.7Emhz			L1	0.6	L13	-0.7	L209	0.7					
217														
218														
219														
220														
221	1.2D+Ev+Emhx+0.2S			L1	1.2	L13	1	L208	1	L3	0.2			
222	0.9D-Ev+Emhx			L1	0.9	L13	-1	L208	1					
223	1.2D+Ev+Emhx+0.2S			L1	1.2	L13	1	L209	1	L3	0.2			
224	0.9D-Ev+Emhz			L1	0.9	L13	-1	L209	1					
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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	N140	Reaction	Reaction	Reaction			
2	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N6	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N4	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N9	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N75	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N76	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
8	N77	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
9	N78	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
10	N104	Reaction	Reaction	Reaction			

Node Boundary Conditions (Continued)

	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]
11	N124	Reaction	Reaction	Reaction			
12	N149	Reaction	Reaction	Reaction			

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	Column	HSS14X10X6	Column	Tube	A500 Gr.C Rect	Typical	16	267	447	528
2	Truss	HSS20X8X6	Beam	Tube	A500 Gr.C Rect	Typical	18.7	222	926	586
3	Tension	HSS6X6X3	Beam	Tube	A500 Gr.C Rect	Typical	3.98	22.3	22.3	35
4	Ridge	HSS8X4X3	Beam	Tube	A500 Gr.C Rect	Typical	3.98	11.3	33.1	27.2
5	Purlin	HSS8X6X3	Beam	Tube	A500 Gr.C Rect	Typical	4.67	28.2	43.7	53.7
6	Purlin Tail	HSS8X6X3	Beam	Tube	A500 Gr.C Rect	Typical	4.67	28.2	43.7	53.7
7	Tension Tail	HSS6X6X3	Beam	Tube	A500 Gr.C Rect	Typical	3.98	22.3	22.3	35
8	Ridge Tail	HSS8X4X3	Beam	Tube	A500 Gr.C Rect	Typical	3.98	11.3	33.1	27.2
9	Vert Ornamentation	HSS4X2X2	Column	Tube	A500 Gr.C Rect	Typical	1.3	0.898	2.65	2.2
10	Brace	HSS5X5X6	Beam	Tube	A500 Gr.C Rect	Typical	6.18	21.7	21.7	36.1

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	Column1	N1	N2	180	Column	Column	Tube	A500 Gr.C Rect	Typical
2	Column2	N77	N58	180	Column	Column	Tube	A500 Gr.C Rect	Typical
3	Column3	N78	N60		Column	Column	Tube	A500 Gr.C Rect	Typical
4	Column4	N76	N59		Column	Column	Tube	A500 Gr.C Rect	Typical
5	Column5	N75	N57	180	Column	Column	Tube	A500 Gr.C Rect	Typical
6	Column6	N9	N10		Column	Column	Tube	A500 Gr.C Rect	Typical
7	Column7	N6	N7	180	Column	Column	Tube	A500 Gr.C Rect	Typical
8	Column8	N4	N5		Column	Column	Tube	A500 Gr.C Rect	Typical
9	Purlin1	N65	NP401	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
10	Purlin2	N55	N56	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
11	Purlin3	N56	NP404	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
12	Purlin4	N66	N65	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
13	Purlin5	NP202	N71	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
14	Purlin6	NP403	N66	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
15	Purlin7	N71	N72	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
16	Purlin8	N72	NP204	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
17	Purlin9	NP303	N74	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
18	Purlin10	NP402	N55	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
19	Purlin11	N73	NP301	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
20	Purlin12	N74	N73	18.43	Purlin	Beam	Tube	A500 Gr.C Rect	Typical
21	Purlin Tail1	NPT402	NP402	18.43	Purlin Tail	Beam	Tube	A500 Gr.C Rect	Typical
22	Purlin Tail2	NPT403	NP403	18.43	Purlin Tail	Beam	Tube	A500 Gr.C Rect	Typical
23	Purlin Tail3	NPT401	NP401	341.57	Purlin Tail	Beam	Tube	A500 Gr.C Rect	Typical
24	Purlin Tail4	NPT303	NP303	18.43	Purlin Tail	Beam	Tube	A500 Gr.C Rect	Typical
25	Purlin Tail5	NPT204	NP204	341.57	Purlin Tail	Beam	Tube	A500 Gr.C Rect	Typical
26	Purlin Tail6	NPT202	NP202	18.43	Purlin Tail	Beam	Tube	A500 Gr.C Rect	Typical
27	Purlin Tail7	NPT301	NP301	341.57	Purlin Tail	Beam	Tube	A500 Gr.C Rect	Typical
28	Purlin Tail8	NPT404	NP404	341.57	Purlin Tail	Beam	Tube	A500 Gr.C Rect	Typical
29	RIGID1	N113	N81	180	RIGID	None	None	RIGID	Typical
30	RIGID2	N105	N112		RIGID	None	None	RIGID	Typical
31	RIGID3	N140	N139	180	RIGID	None	None	RIGID	Typical
32	RIGID4	N124	N116		RIGID	None	None	RIGID	Typical
33	RIGID5	N104	N83	180	RIGID	None	None	RIGID	Typical
34	RIGID6	N63	N98		RIGID	None	None	RIGID	Typical
35	RIGID7	N141	N142	180	RIGID	None	None	RIGID	Typical
36	RIGID8	N150	N135		RIGID	None	None	RIGID	Typical
37	RIGID9	N145	N144		RIGID	None	None	RIGID	Typical
38	RIGID10	N125	N132		RIGID	None	None	RIGID	Typical
39	RIGID11	N117	N119		RIGID	None	None	RIGID	Typical
40	RIGID12	N149	N143		RIGID	None	None	RIGID	Typical
41	RIGID13	N82	N97		RIGID	None	None	RIGID	Typical
42	RIGID14	N157	N138		RIGID	None	None	RIGID	Typical
43	RIGID15	N133	N115		RIGID	None	None	RIGID	Typical
44	RIGID16	N85	N99		RIGID	None	None	RIGID	Typical
45	Ridge1	N61	N62		Ridge	Beam	Tube	A500 Gr.C Rect	Typical
46	Ridge2	N3	N61		Ridge	Beam	Tube	A500 Gr.C Rect	Typical
47	Ridge3	N62	N8		Ridge	Beam	Tube	A500 Gr.C Rect	Typical
48	Ridge Tail1	NT16	N8		Ridge Tail	Beam	Tube	A500 Gr.C Rect	Typical
49	Ridge Tail2	NT15	N3		Ridge Tail	Beam	Tube	A500 Gr.C Rect	Typical
50	Tension1	N59	N60		Tension	Beam	Tube	A500 Gr.C Rect	Typical
51	Tension2	N60	N10		Tension	Beam	Tube	A500 Gr.C Rect	Typical
52	Tension3	N7	N58		Tension	Beam	Tube	A500 Gr.C Rect	Typical
53	Tension4	N5	N59		Tension	Beam	Tube	A500 Gr.C Rect	Typical
54	Tension5	N57	N2		Tension	Beam	Tube	A500 Gr.C Rect	Typical
55	Tension6	N58	N57		Tension	Beam	Tube	A500 Gr.C Rect	Typical
56	Tension Tail1	NT11	N2		Tension Tail	Beam	Tube	A500 Gr.C Rect	Typical
57	Tension Tail2	NT13	N7		Tension Tail	Beam	Tube	A500 Gr.C Rect	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
58	Tension Tail3	NT14	N10		Tension Tail	Beam	Tube	A500 Gr.C Rect	Typical
59	Tension Tail4	NT12	N5		Tension Tail	Beam	Tube	A500 Gr.C Rect	Typical
60	Truss1	N60	N62		Truss	Beam	Tube	A500 Gr.C Rect	Typical
61	Truss2	N58	N62		Truss	Beam	Tube	A500 Gr.C Rect	Typical
62	Truss3	N59	N61		Truss	Beam	Tube	A500 Gr.C Rect	Typical
63	Truss4	N57	N61		Truss	Beam	Tube	A500 Gr.C Rect	Typical
64	Truss5	N7	N8		Truss	Beam	Tube	A500 Gr.C Rect	Typical
65	Truss6	N5	N3		Truss	Beam	Tube	A500 Gr.C Rect	Typical
66	Truss7	N2	N3		Truss	Beam	Tube	A500 Gr.C Rect	Typical
67	Truss8	N10	N8		Truss	Beam	Tube	A500 Gr.C Rect	Typical
68	Vert Ornamentation1	N136	N154		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
69	Vert Ornamentation2	N144	N135		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
70	Vert Ornamentation3	N145	N150		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
71	Vert Ornamentation4	N146	N151		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
72	Vert Ornamentation5	N97	N98	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
73	Vert Ornamentation6	N87	N109	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
74	Vert Ornamentation7	N103	N110	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
75	Vert Ornamentation8	N137	N152		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
76	Vert Ornamentation9	N134	N153		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
77	Vert Ornamentation10	N102	N111	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
78	Vert Ornamentation11	N148	N155		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
79	Vert Ornamentation12	N147	N156		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
80	Vert Ornamentation13	N120	N126		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
81	Vert Ornamentation14	N119	N125		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
82	Vert Ornamentation15	N93	N90	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
83	Vert Ornamentation16	N94	N91	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
84	Vert Ornamentation17	N99	N105	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
85	Vert Ornamentation18	N84	N67	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
86	Vert Ornamentation19	N82	N63	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
87	Vert Ornamentation20	N100	N106	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
88	Vert Ornamentation21	N101	N107	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
89	Vert Ornamentation22	N117	N132		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
90	Vert Ornamentation23	N86	N69	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
91	Vert Ornamentation24	N89	N92	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
92	Vert Ornamentation25	N122	N131		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
93	Vert Ornamentation26	N118	N129		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
94	Vert Ornamentation27	N85	N112	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
95	Vert Ornamentation28	N80	N108	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
96	Vert Ornamentation29	N114	N128		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
97	Vert Ornamentation30	N121	N127		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
98	Vert Ornamentation31	N88	N79	180	Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
99	Vert Ornamentation32	N123	N130		Vert Ornamentation	Column	Tube	A500 Gr.C Rect	Typical
100	RIGID17	N173	N168		RIGID	None	None	RIGID	Typical
101	RIGID18	N172	N167		RIGID	None	None	RIGID	Typical
102	RIGID19	N170	N166		RIGID	None	None	RIGID	Typical
103	RIGID20	N171	N169		RIGID	None	None	RIGID	Typical
104	Brace1	N175	N62	13	Brace	Beam	Tube	A500 Gr.C Rect	Typical
105	Brace2	N177	N62	347	Brace	Beam	Tube	A500 Gr.C Rect	Typical
106	Brace3	N174	N61	347	Brace	Beam	Tube	A500 Gr.C Rect	Typical
107	Brace4	N176	N61	13	Brace	Beam	Tube	A500 Gr.C Rect	Typical

Member Advanced Data

	Label	I Release	J Release	Col-Wall Vert Release	Physical	Deflection Ratio Options	Seismic DR
1	Column1				Yes	** NA **	None
2	Column2				Yes	** NA **	None
3	Column3				Yes	** NA **	None
4	Column4				Yes	** NA **	None
5	Column5				Yes	** NA **	None
6	Column6				Yes	** NA **	None
7	Column7				Yes	** NA **	None
8	Column8				Yes	** NA **	None
9	Purlin1	AllPIN	BenPIN		Yes	Default	None
10	Purlin2	AllPIN	BenPIN		Yes	Default	None
11	Purlin3	AllPIN	BenPIN		Yes	Default	None
12	Purlin4	AllPIN	BenPIN		Yes	Default	None
13	Purlin5	AllPIN	BenPIN		Yes	Default	None
14	Purlin6	AllPIN	BenPIN		Yes	Default	None
15	Purlin7	AllPIN	BenPIN		Yes	Default	None
16	Purlin8	AllPIN	BenPIN		Yes	Default	None
17	Purlin9	AllPIN	BenPIN		Yes	Default	None
18	Purlin10	AllPIN	BenPIN		Yes	Default	None
19	Purlin11	AllPIN	BenPIN		Yes	Default	None
20	Purlin12	AllPIN	BenPIN		Yes	Default	None
21	Purlin Tail1				Yes	Default	None
22	Purlin Tail2				Yes	Default	None
23	Purlin Tail3				Yes	Default	None
24	Purlin Tail4				Yes	Default	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Col-Wall Vert Release	Physical	Deflection Ratio Options	Seismic DR
25	Purlin Tail5				Yes	Default	None
26	Purlin Tail6				Yes	Default	None
27	Purlin Tail7				Yes	Default	None
28	Purlin Tail8				Yes	Default	None
29	RIGID1		XOOOXX		Yes	** NA **	None
30	RIGID2				Yes	** NA **	None
31	RIGID3				Yes	** NA **	None
32	RIGID4				Yes	** NA **	None
33	RIGID5				Yes	** NA **	None
34	RIGID6				Yes	** NA **	None
35	RIGID7		XOOOXX		Yes	** NA **	None
36	RIGID8				Yes	** NA **	None
37	RIGID9				Yes	** NA **	None
38	RIGID10				Yes	** NA **	None
39	RIGID11				Yes	** NA **	None
40	RIGID12				Yes	** NA **	None
41	RIGID13				Yes	** NA **	None
42	RIGID14		XOOOXX		Yes	** NA **	None
43	RIGID15		XOOOXX		Yes	** NA **	None
44	RIGID16				Yes	** NA **	None
45	Ridge1	BenPIN	BenPIN		Yes	Default	None
46	Ridge2	BenPIN	BenPIN		Yes	Default	None
47	Ridge3	BenPIN	BenPIN		Yes	Default	None
48	Ridge Tail1				Yes	Default	None
49	Ridge Tail2				Yes	Default	None
50	Tension1	BenPIN	BenPIN		Yes	Default	None
51	Tension2	BenPIN	BenPIN		Yes	Default	None
52	Tension3	BenPIN	BenPIN		Yes	Default	None
53	Tension4	BenPIN	BenPIN		Yes	Default	None
54	Tension5	BenPIN	BenPIN		Yes	Default	None
55	Tension6	BenPIN	BenPIN		Yes	Default	None
56	Tension Tail1				Yes	Default	None
57	Tension Tail2				Yes	Default	None
58	Tension Tail3				Yes	Default	None
59	Tension Tail4				Yes	Default	None
60	Truss1	BenPIN			Yes	Default	None
61	Truss2	BenPIN			Yes	Default	None
62	Truss3	BenPIN			Yes	Default	None
63	Truss4	BenPIN			Yes	Default	None
64	Truss5	BenPIN			Yes	Default	None
65	Truss6	BenPIN			Yes	Default	None
66	Truss7	BenPIN			Yes	Default	None
67	Truss8	BenPIN			Yes	Default	None
68	Vert Ornamentation1				Yes	** NA **	None
69	Vert Ornamentation2				Yes	** NA **	None
70	Vert Ornamentation3				Yes	** NA **	None
71	Vert Ornamentation4				Yes	** NA **	None
72	Vert Ornamentation5				Yes	** NA **	None
73	Vert Ornamentation6				Yes	** NA **	None
74	Vert Ornamentation7				Yes	** NA **	None
75	Vert Ornamentation8				Yes	** NA **	None
76	Vert Ornamentation9				Yes	** NA **	None
77	Vert Ornamentation10				Yes	** NA **	None
78	Vert Ornamentation11				Yes	** NA **	None
79	Vert Ornamentation12				Yes	** NA **	None
80	Vert Ornamentation13				Yes	** NA **	None
81	Vert Ornamentation14				Yes	** NA **	None
82	Vert Ornamentation15				Yes	** NA **	None
83	Vert Ornamentation16				Yes	** NA **	None
84	Vert Ornamentation17				Yes	** NA **	None
85	Vert Ornamentation18				Yes	** NA **	None
86	Vert Ornamentation19				Yes	** NA **	None
87	Vert Ornamentation20				Yes	** NA **	None
88	Vert Ornamentation21				Yes	** NA **	None
89	Vert Ornamentation22				Yes	** NA **	None
90	Vert Ornamentation23				Yes	** NA **	None
91	Vert Ornamentation24				Yes	** NA **	None
92	Vert Ornamentation25				Yes	** NA **	None
93	Vert Ornamentation26				Yes	** NA **	None
94	Vert Ornamentation27				Yes	** NA **	None
95	Vert Ornamentation28				Yes	** NA **	None
96	Vert Ornamentation29				Yes	** NA **	None
97	Vert Ornamentation30				Yes	** NA **	None
98	Vert Ornamentation31				Yes	** NA **	None
99	Vert Ornamentation32				Yes	** NA **	None
100	RIGID17				Yes	** NA **	None
101	RIGID18				Yes	** NA **	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Col-Wall Vert Release	Physical	Deflection Ratio Options	Seismic DR
102	RIGID19				Yes	** NA **	None
103	RIGID20				Yes	** NA **	None
104	Brace1	BenPIN	AllPIN		Yes	Default	None
105	Brace2	BenPIN	AllPIN		Yes	Default	None
106	Brace3	BenPIN	AllPIN		Yes	Default	None
107	Brace4	BenPIN	AllPIN		Yes	Default	None

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lb y-y [ft]	K y-y	K z-z	Channel Conn.	a [ft]	Function
1	Column1	Column	11.75		2	2	N/A	N/A	Lateral
2	Column2	Column	11.75		2	2	N/A	N/A	Lateral
3	Column3	Column	11.75		2	2	N/A	N/A	Lateral
4	Column4	Column	11.75		2	2	N/A	N/A	Lateral
5	Column5	Column	11.75		2	2	N/A	N/A	Lateral
6	Column6	Column	11.75		2	2	N/A	N/A	Lateral
7	Column7	Column	11.75		2	2	N/A	N/A	Lateral
8	Column8	Column	11.75		2	2	N/A	N/A	Lateral
9	Purlin1	Purlin	20		1	1	N/A	N/A	Lateral
10	Purlin2	Purlin	20		1	1	N/A	N/A	Lateral
11	Purlin3	Purlin	20		1	1	N/A	N/A	Lateral
12	Purlin4	Purlin	20		1	1	N/A	N/A	Lateral
13	Purlin5	Purlin	20		1	1	N/A	N/A	Lateral
14	Purlin6	Purlin	20		1	1	N/A	N/A	Lateral
15	Purlin7	Purlin	20		1	1	N/A	N/A	Lateral
16	Purlin8	Purlin	20		1	1	N/A	N/A	Lateral
17	Purlin9	Purlin	20		1	1	N/A	N/A	Lateral
18	Purlin10	Purlin	20		1	1	N/A	N/A	Lateral
19	Purlin11	Purlin	20		1	1	N/A	N/A	Lateral
20	Purlin12	Purlin	20		1	1	N/A	N/A	Lateral
21	Purlin Tail1	Purlin Tail	2		2.1	2.1	N/A	N/A	Lateral
22	Purlin Tail2	Purlin Tail	2		2.1	2.1	N/A	N/A	Lateral
23	Purlin Tail3	Purlin Tail	2		2.1	2.1	N/A	N/A	Lateral
24	Purlin Tail4	Purlin Tail	2		2.1	2.1	N/A	N/A	Lateral
25	Purlin Tail5	Purlin Tail	2		2.1	2.1	N/A	N/A	Lateral
26	Purlin Tail6	Purlin Tail	2		2.1	2.1	N/A	N/A	Lateral
27	Purlin Tail7	Purlin Tail	2		2.1	2.1	N/A	N/A	Lateral
28	Purlin Tail8	Purlin Tail	2		2.1	2.1	N/A	N/A	Lateral
29	Ridge1	Ridge	20		0.65	0.65	N/A	N/A	Lateral
30	Ridge2	Ridge	20		0.65	0.65	N/A	N/A	Lateral
31	Ridge3	Ridge	20		0.65	0.65	N/A	N/A	Lateral
32	Ridge Tail1	Ridge Tail	2		2.1	2.1	N/A	N/A	Lateral
33	Ridge Tail2	Ridge Tail	2		2.1	2.1	N/A	N/A	Lateral
34	Tension1	Tension	20		1	1	N/A	N/A	Lateral
35	Tension2	Tension	20		1	1	N/A	N/A	Lateral
36	Tension3	Tension	20		1	1	N/A	N/A	Lateral
37	Tension4	Tension	20		1	1	N/A	N/A	Lateral
38	Tension5	Tension	20		1	1	N/A	N/A	Lateral
39	Tension6	Tension	20		1	1	N/A	N/A	Lateral
40	Tension Tail1	Tension Tail	2		2.1	2.1	N/A	N/A	Lateral
41	Tension Tail2	Tension Tail	2		2.1	2.1	N/A	N/A	Lateral
42	Tension Tail3	Tension Tail	2		2.1	2.1	N/A	N/A	Lateral
43	Tension Tail4	Tension Tail	2		2.1	2.1	N/A	N/A	Lateral
44	Truss1	Truss	18.974	Segment	0.8	0.8	N/A	N/A	Lateral
45	Truss2	Truss	18.974	Segment	0.8	0.8	N/A	N/A	Lateral
46	Truss3	Truss	18.974	Segment	0.8	0.8	N/A	N/A	Lateral
47	Truss4	Truss	18.974	Segment	0.8	0.8	N/A	N/A	Lateral
48	Truss5	Truss	18.974	Segment	0.8	0.8	N/A	N/A	Lateral
49	Truss6	Truss	18.974	Segment	0.8	0.8	N/A	N/A	Lateral
50	Truss7	Truss	18.974	Segment	0.8	0.8	N/A	N/A	Lateral
51	Truss8	Truss	18.974	Segment	0.8	0.8	N/A	N/A	Lateral
52	Vert Ornamentation1	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
53	Vert Ornamentation2	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
54	Vert Ornamentation3	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
55	Vert Ornamentation4	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
56	Vert Ornamentation5	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
57	Vert Ornamentation6	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
58	Vert Ornamentation7	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
59	Vert Ornamentation8	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
60	Vert Ornamentation9	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
61	Vert Ornamentation10	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
62	Vert Ornamentation11	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
63	Vert Ornamentation12	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
64	Vert Ornamentation13	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
65	Vert Ornamentation14	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
66	Vert Ornamentation15	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
67	Vert Ornamentation16	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
68	Vert Ornamentation17	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length [ft]	Lb y-y [ft]	K y-y	K z-z	Channel Conn.	a [ft]	Function
69	Vert Ornamentation18	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
70	Vert Ornamentation19	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
71	Vert Ornamentation20	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
72	Vert Ornamentation21	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
73	Vert Ornamentation22	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
74	Vert Ornamentation23	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
75	Vert Ornamentation24	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
76	Vert Ornamentation25	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
77	Vert Ornamentation26	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
78	Vert Ornamentation27	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
79	Vert Ornamentation28	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
80	Vert Ornamentation29	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
81	Vert Ornamentation30	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
82	Vert Ornamentation31	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
83	Vert Ornamentation32	Vert Ornamentation	9.9		1	1	N/A	N/A	Lateral
84	Brace1	Brace	20.689		1	1	N/A	N/A	Lateral
85	Brace2	Brace	20.689		1	1	N/A	N/A	Lateral
86	Brace3	Brace	20.689		1	1	N/A	N/A	Lateral
87	Brace4	Brace	20.689		1	1	N/A	N/A	Lateral

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e^{5}°F^{-1}]	Density [lb/ft^{3}]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A36 Gr.36	29000	11154	0.3	0.65	490	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	0.3	0.65	490	50	1.1	58	1.2
3	A992	29000	11154	0.3	0.65	490	50	1.1	58	1.2
4	A500 Gr.B RND	29000	11154	0.3	0.65	527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	527	46	1.4	58	1.3
6	A53 Gr. B	29000	11154	0.3	0.65	527	35	1.5	58	1.2
7	A500 Gr.C Rect	29000	11154	0.3	0.65	527	50	1.4	62	1.3
8	A500 Gr.C RND	29000	11154	0.3	0.65	527	46	1.4	62	1.3

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

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-in]	Mnzz/om [k-in]	Cb	Eqn
1	Column1	HSS14X10X6	0.426	0	63	0.037	0	z	62	338.102	479.042	1534.013	2284.431	1.654	H1-1b
2	Column2	HSS14X10X6	0.495	0	63	0.037	0	z	70	338.102	479.042	1534.013	2284.431	1.663	H1-1b
3	Column3	HSS14X10X6	0.544	0	69	0.041	0	y	66	338.102	479.042	1534.013	2284.431	1.667	H1-1b
4	Column4	HSS14X10X6	0.491	0	69	0.041	0	y	66	338.102	479.042	1534.013	2284.431	1.66	H1-1b
5	Column5	HSS14X10X6	0.442	0	63	0.038	0	z	68	338.102	479.042	1534.013	2284.431	1.653	H1-1b
6	Column6	HSS14X10X6	0.418	0	69	0.037	0	z	62	338.102	479.042	1534.013	2284.431	1.656	H1-1b
7	Column7	HSS14X10X6	0.373	0	63	0.037	0	z	68	338.102	479.042	1534.013	2284.431	1.645	H1-1b
8	Column8	HSS14X10X6	0.473	0	68	0.037	0	z	68	338.102	479.042	1534.013	2284.431	1.669	H1-1b
9	Purlin1	HSS8X6X3	0.419	9.495	19	0.041	0	y	41	69.61	139.82	253.574	347.791	1.14	H1-1b
10	Purlin2	HSS8X6X3	0.657	10.101	20	0.055	20	y	20	69.61	139.82	253.574	347.791	1.14	H1-1b
11	Purlin3	HSS8X6X3	0.517	9.495	20	0.047	0	y	20	69.61	139.82	253.574	347.791	1.142	H1-1b
12	Purlin4	HSS8X6X3	0.512	10.101	19	0.047	20	y	41	69.61	139.82	253.574	347.791	1.14	H1-1b
13	Purlin5	HSS8X6X3	0.505	10.101	19	0.043	20	y	44	69.61	139.82	253.574	347.791	1.14	H1-1b
14	Purlin6	HSS8X6X3	0.417	10.303	19	0.041	20	y	41	69.61	139.82	253.574	347.791	1.142	H1-1b
15	Purlin7	HSS8X6X3	0.507	10.101	19	0.043	20	y	44	69.61	139.82	253.574	347.791	1.14	H1-1b
16	Purlin8	HSS8X6X3	0.505	10.101	19	0.043	20	y	44	69.61	139.82	253.574	347.791	1.14	H1-1b
17	Purlin9	HSS8X6X3	0.505	10.101	41	0.047	20	y	41	69.61	139.82	253.574	347.791	1.14	H1-1b
18	Purlin10	HSS8X6X3	0.519	10.505	20	0.047	20	y	20	69.61	139.82	253.574	347.791	1.141	H1-1b
19	Purlin11	HSS8X6X3	0.505	10.101	41	0.047	20	y	41	69.61	139.82	253.574	347.791	1.14	H1-1b
20	Purlin12	HSS8X6X3	0.507	10.101	41	0.047	20	y	41	69.61	139.82	253.574	347.791	1.14	H1-1b
21	Purlin Tail1	HSS8X6X3	0.026	2	20	0.011	2	y	20	124.898	139.82	253.574	347.791	2.344	H1-1b
22	Purlin Tail2	HSS8X6X3	0.02	2	41	0.009	2	y	41	124.898	139.82	253.574	347.791	2.344	H1-1b
23	Purlin Tail3	HSS8X6X3	0.02	2	41	0.009	2	y	41	124.898	139.82	253.574	347.791	2.344	H1-1b
24	Purlin Tail4	HSS8X6X3	0.02	2	41	0.009	2	y	41	124.898	139.82	253.574	347.791	2.344	H1-1b
25	Purlin Tail5	HSS8X6X3	0.02	2	19	0.009	2	y	44	124.898	139.82	253.574	347.791	2.344	H1-1b
26	Purlin Tail6	HSS8X6X3	0.02	2	19	0.009	2	y	44	124.898	139.82	253.574	347.791	2.344	H1-1b
27	Purlin Tail7	HSS8X6X3	0.02	2	41	0.009	2	y	41	124.898	139.82	253.574	347.791	2.344	H1-1b
28	Purlin Tail8	HSS8X6X3	0.026	2	20	0.011	2	y	20	124.898	139.82	253.574	347.791	2.344	H1-1b
29	Ridge1	HSS8X4X3	0.488	9.899	66	0.045	20	y	19	63.673	119.162	150.638	305.389	1.14	H1-1b
30	Ridge2	HSS8X4X3	0.252	8.687	66	0.027	0	y	19	63.673	119.162	150.638	305.389	1.153	H1-1b
31	Ridge3	HSS8X4X3	0.288	10.707	68	0.026	20	y	19	63.673	119.162	150.638	305.389	1.147	H1-1a
32	Ridge Tail1	HSS8X4X3	0.018	2	66	0.009	2	y	19	102.074	119.162	150.638	305.389	2.344	H1-1b
33	Ridge Tail2	HSS8X4X3	0.018	2	66	0.009	2	y	19	102.074	119.162	150.638	305.389	2.344	H1-1b
34	Tension1	HSS6X6X3	0.476	10.101	44	0.052	20	y	19	56.195	119.162	234.49	234.49	1.14	H1-1b
35	Tension2	HSS6X6X3	0.475	9.899	44	0.06	20	y	19	56.195	119.162	234.49	234.49	1.139	H1-1b
36	Tension3	HSS6X6X3	0.515	10.101	41	0.062	0	y	41	56.195	119.162	234.49	234.49	1.14	H1-1b
37	Tension4	HSS6X6X3	0.475	10.101	44	0.06	0	y	19	56.195	119.162	234.49	234.49	1.14	H1-1b
38	Tension5	HSS6X6X3	0.515	9.899	41	0.062	20	y	41	56.195	119.162	234.49	234.49	1.14	H1-1b
39	Tension6	HSS6X6X3	0.516	10.101	41	0.055	20	y	41	56.195	119.162	234.49	234.49	1.14	H1-1b
40	Tension Tail1	HSS6X6X3	0.021	2	41	0.011	2	y	41	115.276	119.162	234.49	234.49	2.344	H1-1b
41	Tension Tail2	HSS6X6X3	0.021	2	41	0.011	2	y	41	115.276	119.162	234.49	234.49	2.344	H1-1b
42	Tension Tail3	HSS6X6X3	0.019	2	44	0.01	2	y	19	115.276	119.162	234.49	234.49	2.344	H1-1b

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

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-in]	Mnzz/om [k-in]	Cb	Eqn
43	Tension Tail4	HSS6X6X3	0.019	2	44	0.01	2	y	19	115.276	119.162	234.49	234.49	2.344	H1-1b
44	Truss1	HSS20X8X6	0.494	12.649	63	0.078	18.974	z	64	429.266	559.88	1306.05	3502.994	1.316	H1-1b
45	Truss2	HSS20X8X6	0.496	12.649	69	0.078	18.974	z	70	429.266	559.88	1306.05	3502.994	1.31	H1-1b
46	Truss3	HSS20X8X6	0.46	12.649	63	0.082	18.974	z	68	429.266	559.88	1306.05	3502.994	1.227	H1-1b
47	Truss4	HSS20X8X6	0.461	12.649	69	0.082	18.974	z	62	429.266	559.88	1306.05	3502.994	1.222	H1-1b
48	Truss5	HSS20X8X6	0.35	13.607	69	0.091	12.649	z	70	429.266	559.88	1306.05	3502.994	1.227	H1-1b
49	Truss6	HSS20X8X6	0.477	13.607	69	0.111	12.649	z	69	429.266	559.88	1306.05	3502.994	1.331	H1-1b
50	Truss7	HSS20X8X6	0.475	13.607	63	0.109	12.649	z	63	429.266	559.88	1306.05	3502.994	1.325	H1-1b
51	Truss8	HSS20X8X6	0.347	13.607	63	0.089	18.974	z	64	429.266	559.88	1306.05	3502.994	1.229	H1-1b
52	Vert Ornamentation1	HSS4X2X2	0.016	0	25	0.003	9.9	z	25	9.564	38.922	28.103	48.989	1	H1-1b
53	Vert Ornamentation2	HSS4X2X2	0.018	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.26	H1-1b
54	Vert Ornamentation3	HSS4X2X2	0.014	9.9	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.229	H1-1b
55	Vert Ornamentation4	HSS4X2X2	0.014	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.224	H1-1b
56	Vert Ornamentation5	HSS4X2X2	0.014	9.9	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.229	H1-1b
57	Vert Ornamentation6	HSS4X2X2	0.016	0	25	0.003	9.9	z	25	9.564	38.922	28.103	48.989	1	H1-1b
58	Vert Ornamentation7	HSS4X2X2	0.017	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.241	H1-1b
59	Vert Ornamentation8	HSS4X2X2	0.015	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.211	H1-1b
60	Vert Ornamentation9	HSS4X2X2	0.015	0	25	0.003	9.9	z	25	9.564	38.922	28.103	48.989	1	H1-1b
61	Vert Ornamentation10	HSS4X2X2	0.018	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.255	H1-1b
62	Vert Ornamentation11	HSS4X2X2	0.017	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.241	H1-1b
63	Vert Ornamentation12	HSS4X2X2	0.018	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.254	H1-1b
64	Vert Ornamentation13	HSS4X2X2	0.018	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.254	H1-1b
65	Vert Ornamentation14	HSS4X2X2	0.018	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.26	H1-1b
66	Vert Ornamentation15	HSS4X2X2	0.015	0	25	0.003	9.9	z	25	9.564	38.922	28.103	48.989	1	H1-1b
67	Vert Ornamentation16	HSS4X2X2	0.015	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.212	H1-1b
68	Vert Ornamentation17	HSS4X2X2	0.014	9.9	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.229	H1-1b
69	Vert Ornamentation18	HSS4X2X2	0.018	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.254	H1-1b
70	Vert Ornamentation19	HSS4X2X2	0.018	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.26	H1-1b
71	Vert Ornamentation20	HSS4X2X2	0.014	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.224	H1-1b
72	Vert Ornamentation21	HSS4X2X2	0.015	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.212	H1-1b
73	Vert Ornamentation22	HSS4X2X2	0.014	9.9	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.229	H1-1b
74	Vert Ornamentation23	HSS4X2X2	0.017	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.241	H1-1b
75	Vert Ornamentation24	HSS4X2X2	0.014	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.224	H1-1b
76	Vert Ornamentation25	HSS4X2X2	0.014	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.224	H1-1b
77	Vert Ornamentation26	HSS4X2X2	0.015	0	25	0.003	9.9	z	25	9.564	38.922	28.103	48.989	1	H1-1b
78	Vert Ornamentation27	HSS4X2X2	0.018	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.261	H1-1b
79	Vert Ornamentation28	HSS4X2X2	0.015	0	25	0.003	9.9	z	25	9.564	38.922	28.103	48.989	1	H1-1b
80	Vert Ornamentation29	HSS4X2X2	0.016	0	25	0.003	9.9	z	25	9.564	38.922	28.103	48.989	1	H1-1b
81	Vert Ornamentation30	HSS4X2X2	0.017	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.241	H1-1b
82	Vert Ornamentation31	HSS4X2X2	0.016	0	25	0.003	9.9	z	25	9.564	38.922	28.103	48.989	1	H1-1b
83	Vert Ornamentation32	HSS4X2X2	0.015	0	25	0.003	9.9	z	25	9.564	38.922	28.103	49.701	2.211	H1-1b
84	Brace1	HSS5X5X6	0.331	10.24	19	0.025	20.689	y	41	52.918	185.03	317.365	317.365	1.14	H1-1b
85	Brace2	HSS5X5X6	0.432	10.24	20	0.033	20.689	y	20	52.918	185.03	317.365	317.365	1.14	H1-1b
86	Brace3	HSS5X5X6	0.486	10.24	63	0.025	0	y	41	52.918	185.03	317.365	317.365	1.14	H1-1a
87	Brace4	HSS5X5X6	0.499	10.24	69	0.032	0	y	20	52.918	185.03	317.365	317.365	1.14	H1-1a

Material Take-Off

	Material	Size	Pieces	Length[ft]	Weight[LB]
1	General Members				
2	RIGID		20	32.5	0
3	Total General		20	32.5	0
4					
5	Hot Rolled Steel				
6	A500 Gr.C Rect	HSS14X10X6	8	94	5504.222
7	A500 Gr.C Rect	HSS20X8X6	8	151.8	10387.977
8	A500 Gr.C Rect	HSS4X2X2	32	316.8	1507.22
9	A500 Gr.C Rect	HSS5X5X6	4	82.8	1871.697
10	A500 Gr.C Rect	HSS6X6X3	10	128	1864.409
11	A500 Gr.C Rect	HSS8X4X3	5	64	932.204
12	A500 Gr.C Rect	HSS8X6X3	20	256	4375.271
13	Total HR Steel		87	1093.3	26443

PANEL DATA

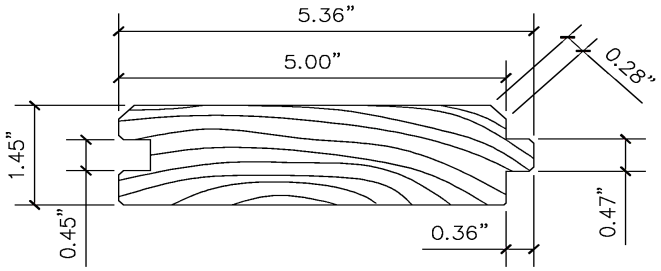
2 x 6 Tongue and Groove Panels

Allowable Loads

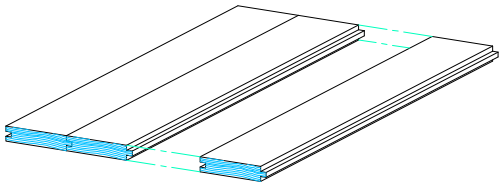
Hem Fir No. 1

Factory Stained

Section / Isometric View of Panel Cross-Section



Section View of Typical Panel



Isometric View of Panels

Section Properties (Out of Plane Bending)

Member Size	Weight (psf)	F_b (ksi)	I_x (in^4)	S_e (in^3)	M_a (in-kips)
2" X 6"	3.15	0.979	1.251	1.734	1.698

Allowable Loads

Span Type	Span Lengths (ft)	Allowable Load (psf)
Single Span	4	160
	5	102
	6	71
	7	52
	8	40
Two Span	4	106
	5	68
	6	47
	7	35
	8	27
Three Span	4	133
	5	85
	6	59
	7	43
	8	33

Load Duration Factors (C_D)

Typical Design Loads	C_D
Dead Load	0.9
Live Load	1.0
Snow Load	1.15
Wind Load	1.6
Earthquake Load	1.6

Notes

1. All calculations for properties of panels are calculated in accordance with the National Design Specification (NDS) for Wood Construction, 2018 Edition. Allowable loads are based on at least two sections of the tongue and groove decking in place, with tongue and groove in contact.
2. The spans shown assume equal spacing between the multi-span conditions.
3. Weight of panels and roof covering material must be deducted from values to obtain net allowable load.
4. Per NDS 2018 Section 2.3.2, reference design values shall be multiplied by the appropriate load duration factor, C_D.

Medallion-Lok 16"

Bare & Painted

SECTION PROPERTIES						TOP IN COMPRESSION			BOTTOM IN COMPRESSION		
GAUGE	FY (KSI)	WEIGHT (PSF)	V_a kip/ft.	P_{a_end} lbs/ft.	P_{a_int} lbs/ft.	I_x ($in.^4$/ft.)	S_e ($in.^3$/ft.)	M_a kip-in./ft.	I_x ($in.^4$/ft.)	S_e ($in.^3$/ft.)	M_a kip-in./ft.
24	50.0	1.30	0.7920	125.03	371.48	0.0848	0.0565	1.4115	0.0390	0.0476	1.0305

1. Section properties are calculated in accordance with the 2016 AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
2. Va is the allowable shear.
3. Pa is the allowable load for web crippling on end & interior supports.
4. Ix is for deflection determination.
5. Se is for bending.
6. Ma is the allowable bending moment.
7. All values are for one foot of panel width.

Allowable Uniform Loads (PSF)

		Span in Feet															
Span Type	Load Type	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50
Single	Positive Wind	500	418	235	150	104	76	58	46	37	31	26	22	19	16	14	13
	Live	500	418	235	150	104	76	58	46	37	31	26	22	19	16	14	13
	Deflection (L/180)	500	500	500	474	274	172	115	81	59	44	34	26	21	17	14	12
	Deflection (L/240)	500	500	500	355	205	129	86	60	44	33	25	20	16	13	10	9
2 Span	Positive Wind	500	287	165	107	75	55	42	33	27	22	19	16	13	12	10	9
	Live	500	287	165	107	75	55	42	33	27	22	19	16	13	12	10	9
	Deflection (L/180)	500	500	500	500	482	303	203	142	104	78	60	47	37	30	25	21
	Deflection (L/240)	500	500	500	500	361	227	152	107	78	58	45	35	28	23	19	15
3 Span	Positive Wind	500	350	204	132	93	68	52	41	34	28	23	20	17	15	13	11
	Live	500	350	204	132	93	68	52	41	34	28	23	20	17	15	13	11
	Deflection (L/180)	500	500	500	500	377	238	159	111	81	61	47	37	29	24	19	16
	Deflection (L/240)	500	500	500	489	283	178	119	83	61	46	35	27	22	18	14	12
4 Span	Positive Wind	500	329	191	124	87	64	49	39	31	26	22	18	16	14	12	11
	Live	500	329	191	124	87	64	49	39	31	26	22	18	16	14	12	11
	Deflection (L/180)	500	500	500	500	401	252	169	118	86	65	50	39	31	25	21	17
	Deflection (L/240)	500	500	500	500	300	189	126	89	65	48	37	29	23	19	15	13
ASTM E1592 Uplift Testing		75.7	66.4	57.0	53.2	49.4	45.6	41.8	38.0	34.2							

Notes:

1. Allowable uniform loads are based upon equal span lengths.
2. Live is the allowable live or snow load.
3. Deflection (L/180) is the allowable load that limits the panel's deflection to L/180 while under positive or live load.
4. Deflection (L/240) is the allowable load that limits the panel's deflection to L/240 while under positive or live load.
5. The weight of the panel has **NOT** been deducted from the allowable loads.
6. Positive wind and Live load values are limited to combined shear & bending using Eq. H2-1 of the AISI Specification.
7. Values of ASTM E1592 Wind Uplift Testing include a factor of safety of 1.67. Shaded areas are outside of test range. Contact McElroy Metal for more information.
8. Positive Wind and Live Load values are limited by web crippling using a bearing length of 2".
9. Web crippling values are determined using a ratio of the uniform load **actually** supported by the top flanges of the section.
10. Load Tables are limited to a maximum allowable load of 500 psf.