poligon®

CALCULATIONS FOR:

POLIGON CWC 15X61.33
MULTI RIB
2022 CALIFORNIA BUILDING CODE

PROFESSIONAL ENGINEER
CHRISTOPHER M EVANS
C78816
CIVIL
STATE OF CALIFORNIA

Christopher Evans
2024.06.11
12:36:41
-04'00'

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.

TABLE OF CONTENTS

DESIGN CRITERIA

GENERAL

Building Code:	See Cover Sheet	Roof Slope (°):	9.46	*2:12 Pitch*
Design Code:	ASCE 7-16			
Risk Category:	II	Equivalent Roof Height:	15.00 ft	

DEAD LOAD

Weight of Roofing System	2.0	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	0.0	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	0.0	psf	*ASCE 7 Section 7.3*
Leeward Unbalanced Snow Load	0.0	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} 95	mph	V_{asd}	74 mph	*ASCE 7 Section 26.5*
Exposure Category	C				*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				*ASCE 7 Table 26.6-1*
Topographic Factor, K_{zt}	1.00				*ASCE 7 Section 26.8.2*
Velocity Pressure, q_z	16.69	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)

	Upper Surface		*Lower Surface*	
Load Case	A	B	A	B
γ = 0				
Windward Cp =	-0.68	-1.53	-1.08	0.00
p (psf):	-9.63	-21.72	-15.30	0.00
γ = 180				
Leeward Cp=	1.53	0.38	1.00	1.65
p (psf):	21.65	5.37	14.25	23.44
γ = 90				
Sideward Cp=	-0.80	0.80	-0.80	0.80
p (psf):	-11.35	11.35	-11.35	11.35

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:	1.65	-1.53
	p (psf):	23.44	-21.72
Zone 2	Cn:	1.65	-1.53
	p (psf):	23.44	-21.72
Zone 1	Cn:	1.65	-1.53
	p (psf):	23.44	-21.72

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	0.57		
1-Sec Spectral Response Parameter, S_1	0.22		
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}	0.51		*ASCE 7 Section 11.4.4*
1-Sec Design Spectral Response Parameter, S_{D1}	0.48		*ASCE 7 Section 11.4.4*
Seismic Response Coefficient, C_s	0.41		*ASCE 7 Section 12.8.1.1*
Effective Seismic Weight, W	2.00	psf	*ASCE 7 Section 12.7.2*
Seismic Base Shear, V	0.82	psf	*ASCE 7 Section 12.8.1*
Seismic Load, E	1.07	psf	*ASCE 7 Section 12.4*
Seismic Load with Overstrength Factor, E_m	1.03	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.

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; y = 0°)
8	SERVICE Wx (LC B; y = 0°)
9	SERVICE Wx (LC A; y = 180°)
10	SERVICE Wx (LC B; y = 180°)
11	SERVICE Wz (LC A; y = 90°)
12	SERVICE Wz (LC B; y = 90°)
13	SERVICE Ex
14	SERVICE Ez
15	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; y = 0°)
24	D + 0.6Wx (LC B; y = 0°)
25	D + 0.6Wx (LC A; y = 180°)
26	D + 0.6Wx (LC B; y = 180°)
27	D + 0.6Wz (LC A; y = 90°)
28	D + 0.6Wz (LC B; y = 90°)
29	D + 0.6Wx (Min.)
30	D + 0.6Wz (Min.)
31	D + 0.6(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))
32	D + 0.6(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))
33	D + 0.6(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))
34	D + 0.6(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))
35	D + 0.6(0.75Wx (Min.) + 0.75Wx (Min.))
36	D + 0.75(0.6Wx (LC A; y = 0°)) + 0.75Lr
37	D + 0.75(0.6Wx (LC B; y = 0°)) + 0.75Lr
38	D + 0.75(0.6Wx (LC A; y = 180°)) + 0.75Lr
39	D + 0.75(0.6Wx (LC B; y = 180°)) + 0.75Lr
40	D + 0.75(0.6Wz (LC A; y = 90°)) + 0.75Lr
41	D + 0.75(0.6Wz (LC B; y = 90°)) + 0.75Lr
42	D + 0.75(0.6Wx (Min.)) + 0.75Lr
43	D + 0.75(0.6Wz (Min.)) + 0.75Lr
44	D + 0.75(0.6(0.75Wx (LC A; y=0°) + 0.75Wz (LC A; y=90°))) + 0.75Lr
45	D + 0.75(0.6(0.75Wx (LC A; y=180°) + 0.75Wz (LC A; y=90°))) + 0.75Lr
46	D + 0.75(0.6(0.75Wx (LC B; y=0°) + 0.75Wz (LC B; y=90°))) + 0.75Lr
47	D + 0.75(0.6(0.75Wx (LC B; y=180°) + 0.75Wz (LC B; y=90°))) + 0.75Lr
48	D + 0.75(0.6(0.75Wx (Min.) + 0.75Wz (Min.))) + 0.75Lr
49	D + 0.75(0.6Wx (LC A; y = 0°)) + 0.75S
50	D + 0.75(0.6Wx (LC B; y = 0°)) + 0.75S
51	D + 0.75(0.6Wx (LC A; y = 180°)) + 0.75S
52	D + 0.75(0.6Wx (LC B; y = 180°)) + 0.75S
53	D + 0.75(0.6Wz (LC A; y = 90°)) + 0.75S
54	D + 0.75(0.6Wz (LC B; y = 90°)) + 0.75S
55	D + 0.75(0.6Wx (Min.)) + 0.75S
56	D + 0.75(0.6Wz (Min.)) + 0.75S
57	D + 0.75(0.6(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))) + 0.75S
58	D + 0.75(0.6(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))) + 0.75S
59	D + 0.75(0.6(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))) + 0.75S
60	D + 0.75(0.6(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))) + 0.75
61	D + 0.75(0.6(0.75Wx (Min.) + 0.75Wz (Min.))) + 0.75S
62	0.6D + 0.6Wx (LC A; y = 0°)
63	0.6D + 0.6Wx (LC B; y = 0°)
64	0.6D + 0.6Wx (LC A; y = 180°)
65	0.6D + 0.6Wx (LC B; y = 180°)
66	0.6D + 0.6Wz (LC A; y = 90°)
67	0.6D + 0.6Wz (LC B; y = 90°)
68	0.6D + 0.6Wx (Min.)
69	0.6D + 0.6Wz (Min.)
70	0.6 + 0.6(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))
71	0.6D + 0.6(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))
72	0.6D + 0.6(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))
73	0.6D + 0.6(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))
74	0.6D + 0.6(0.75Wx (Min.) + 0.75Wz (Min.))
75	1.0D+0.7Ev+0.7Ehx
76	1.0D+0.525Ev+0.525Ehx+0.75S
77	0.6D-0.7Ev+0.7Ehx
78	1.0D+0.7Ev+0.7Ehz
79	1.0D+0.525Ev+0.525Ehz+0.75S
80	0.6D-0.7Ev+0.7Ehz
81	1.0D+0.7Ev+0.7Ehx+0.21Ehz
82	1.0D+0.525Ev+0.525Ehx+0.1575Ehz+0.75S
83	0.6D-0.7Ev+0.7Ehx+0.21Ehz
84	1.0D+0.7Ev+0.7Ehz+0.21Ehx
85	1.0D+0.525Ev+0.525Ehz+0.1575Ehx+0.75S
86	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; y = 0°)
96	1.2D + 1.6Lr + 0.5Wx (LC B; y = 0°)
97	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)
98	1.2D + 1.6Lr + 0.5Wx (LC B; y = 180°)
99	1.2D + 1.6Lr + 0.5Wz (LC A; y = 90°)
100	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)
101	1.2D + 1.6Lr + 0.5Wx (Min.)
102	1.2D + 1.6Lr + 0.5Wz (Min.)
103	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))
104	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))
105	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))
106	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))
107	1.2D + 1.6Lr + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))
108	1.2D + 1.6S + 0.5Wx (LC A; y = 0°)
109	1.2D + 1.6S + 0.5Wx (LC B; y = 0°)
110	1.2D + 1.6S + 0.5Wx (LC A; y = 180°)
111	1.2D + 1.6S + 0.5Wx (LC B; y = 180°)
112	1.2D + 1.6S + 0.5Wz (LC A; y = 90°)
113	1.2D + 1.6S + 0.5Wz (LC B; y = 90°)
114	1.2D + 1.6S + 0.5Wx (Min.)
115	1.2D + 1.6S + 0.5Wz (Min.)
116	1.2D + 1.6S + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))
117	1.2D + 1.6S + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))
118	1.2D + 1.6S + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))
119	1.2D + 1.6S + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))
120	1.2D + 1.6S + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))
121	1.2D + 1.6Su + 0.5Wx (LC A; y = 0°)
122	1.2D + 1.6Su + 0.5Wx (LC B; y = 0°)
123	1.2D + 1.6Su + 0.5Wx (LC A; y = 180°)
124	1.2D + 1.6Su + 0.5Wx (LC B; y = 180°)
125	1.2D + 1.6Su + 0.5Wz (LC A; y = 90°)
126	1.2D + 1.6Su + 0.5Wz (LC B; y = 90°)
127	1.2D + 1.6Su + 0.5Wx (Min.)
128	1.2D + 1.6Su + 0.5Wz (Min.)
129	1.2D + 1.6Su + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))
130	1.2D + 1.6Su + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))
131	1.2D + 1.6Su + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))
132	1.2D + 1.6Su + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))
133	1.2D + 1.6Su + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))
134	1.2D + 1.6Ssliding + 0.5Wx (LC A; y = 0°)
135	1.2D + 1.6Ssliding + 0.5Wx (LC B; y = 0°)
136	1.2D + 1.6Ssliding + 0.5Wx (LC A; y = 180°)
137	1.2D + 1.6Ssliding + 0.5Wx (LC B; y = 180°)
138	1.2D + 1.6Ssliding + 0.5Wz (LC A; y = 90°)
139	1.2D + 1.6Ssliding + 0.5Wz (LC B; y = 90°)
140	1.2D + 1.6Ssliding + 0.5Wx (Min.)
141	1.2D + 1.6Ssliding + 0.5Wz (Min.)
142	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))
143	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))
144	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))
145	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))
146	1.2D + 1.6Ssliding + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))
147	1.2D + 1.6Sdrift + 0.5Wx (LC A; y = 0°)
148	1.2D + 1.6Sdrift + 0.5Wx (LC B; y = 0°)
149	1.2D + 1.6Sdrift + 0.5Wx (LC A; y = 180°)
150	1.2D + 1.6Sdrift + 0.5Wx (LC B; y = 180°)
151	1.2D + 1.6Sdrift + 0.5Wz (LC A; y = 90°)
152	1.2D + 1.6Sdrift + 0.5Wz (LC B; y = 90°)
153	1.2D + 1.6Sdrift + 0.5Wx (Min.)
154	1.2D + 1.6Sdrift + 0.5Wz (Min.)
155	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))
156	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°)
157	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))
158	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°)
159	1.2D + 1.6Sdrift + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))
160	1.2D + 1.0Wx (LC A; y = 0°) + 0.5Lr
161	1.2D + 1.0Wx (LC B; y = 0°) + 0.5Lr
162	1.2D + 1.0Wx (LC A; y = 180°) + 0.5Lr
163	1.2D + 1.0Wx (LC B; y = 180°) + 0.5Lr
164	1.2D + 1.0Wz (LC A; y = 90°) + 0.5Lr
165	1.2D + 1.0Wz (LC B; y = 90°) + 0.5Lr
166	1.2D + 1.0Wx (Min.) + 0.5Lr
167	1.2D + 1.0Wz (Min.) + 0.5Lr
168	1.2D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°)) + 0.5Lr
169	1.2D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°)) + 0.5Lr
170	1.2D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°)) + 0.5Lr
171	1.2D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°)) + 0.5Lr
172	1.2D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.)) +0.5Lr
173	1.2D + 1.0Wx (LC A; y = 0°) + 0.5S
174	1.2D + 1.0Wx (LC B; y = 0°) + 0.5S
175	1.2D + 1.0Wx (LC A; y = 180°) + 0.5S
176	1.2D + 1.0Wx (LC B; y = 180°) + 0.5S
177	1.2D + 1.0Wz (LC A; y = 90°) + 0.5S
178	1.2D + 1.0Wz (LC B; y = 90°) + 0.5S
179	1.2D + 1.0Wx (Min.) + 0.5S
180	1.2D + 1.0Wz (Min.) + 0.5S
181	1.2D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°)) + 0.5S
182	1.2D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°)) + 0.5S
183	1.2D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°)) + 0.5S
184	1.2D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°)) + 0.5S
185	1.2D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.)) +0.5S
186	0.9D + 1.0Wx (LC A; y = 0°)
187	0.9D + 1.0Wx (LC B; y = 0°)
188	0.9D + 1.0Wx (LC A; y = 180°)
189	0.9D + 1.0Wx (LC B; y = 180°)
190	0.9D + 1.0Wz (LC A; y = 90°)
191	0.9D + 1.0Wz (LC B; y = 90°)
192	0.9D + 1.0Wx (Min.)
193	0.9D + 1.0Wz (Min.)
194	0.9D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))
195	0.9D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))
196	0.9D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))
197	0.9D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))
198	0.9D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.))
199	1.2D+Ev+Ehx+0.2S
200	0.9D-Ev+Ehx
201	1.2D+Ev+Ehz+0.2S
202	0.9D-Ev+Ehz
203	1.2D+Ev+Ehx+0.3Ehz+0.2S

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.

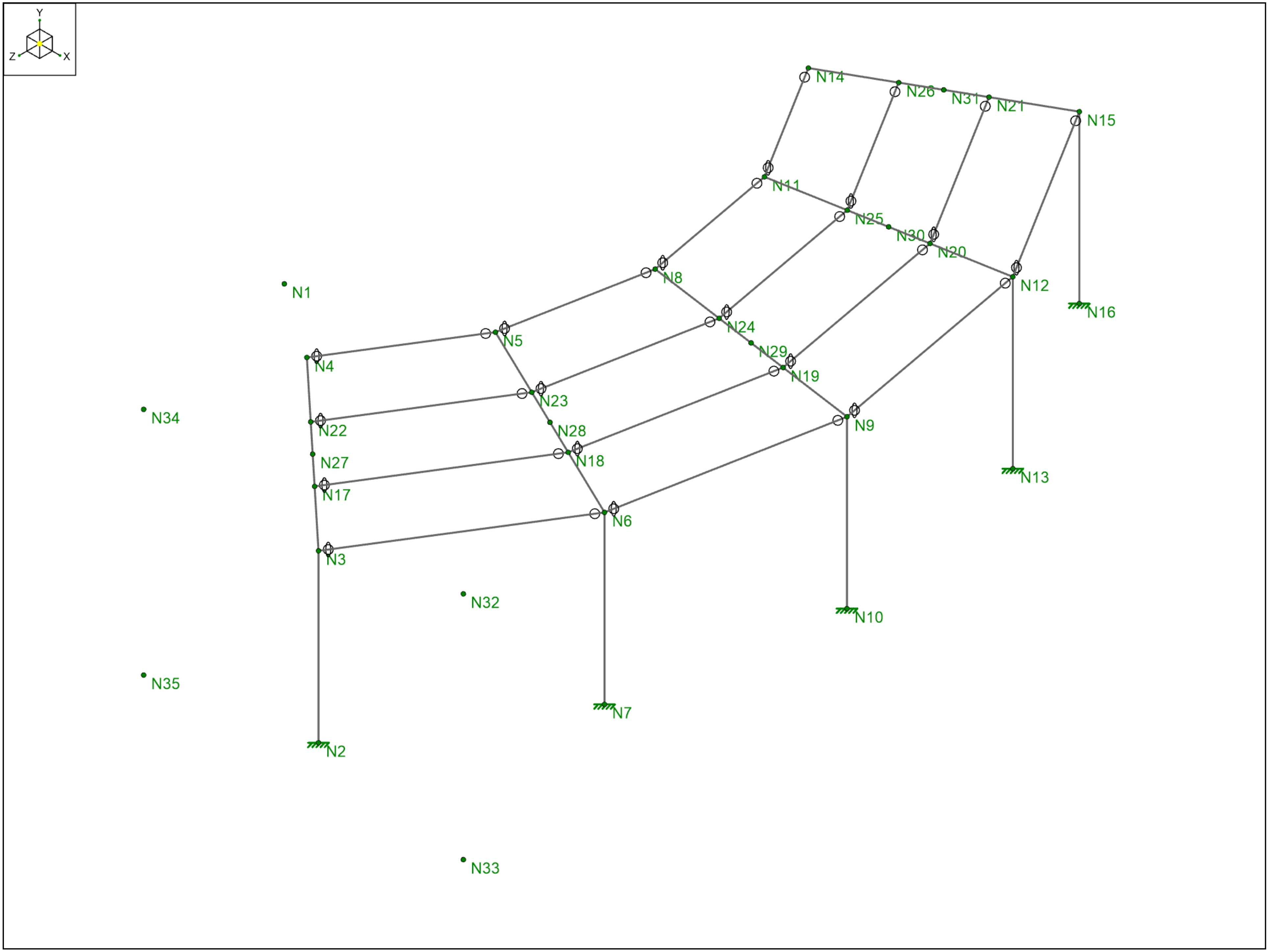
MATERIALS

Column	HSS12x8x1/4
Truss	HSS12x8x1/4
Eave	HSS4x4x1/8
Purlin	HSS4x4x1/8

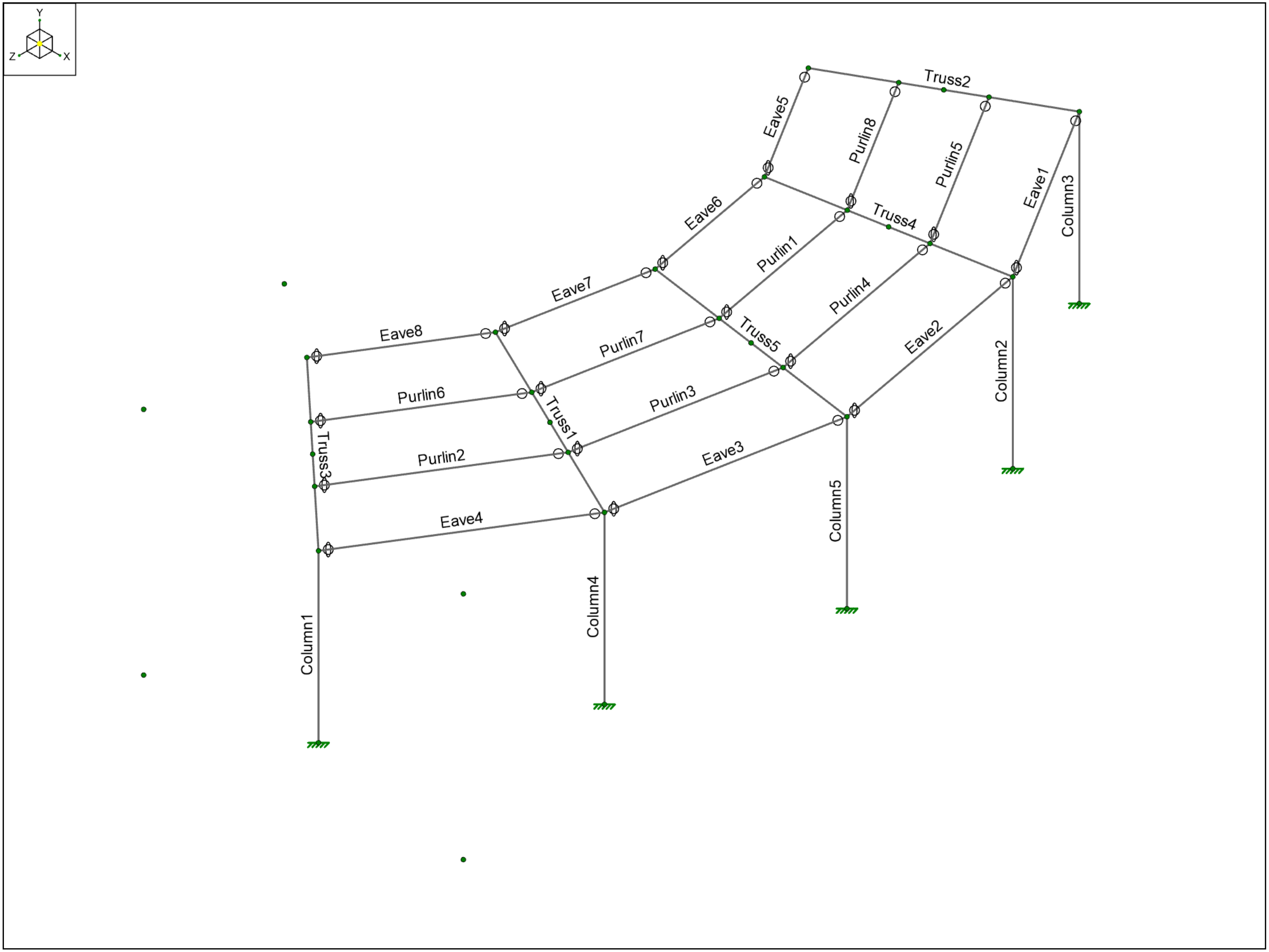
HSS Sections:	ASTM A500 Gr. C
Pipe Sections:	ASTM A53 Gr. B
RMT Sections:	ASTM A519
Channel & Angle Sections:	ASTM A36
Connection Plates:	ASTM A36
Connections Bolts	ASTM A325
Welding Process:	Gas Metal Arc Welding
Welding Electrode:	E70xx

RISA MODEL VIEWS

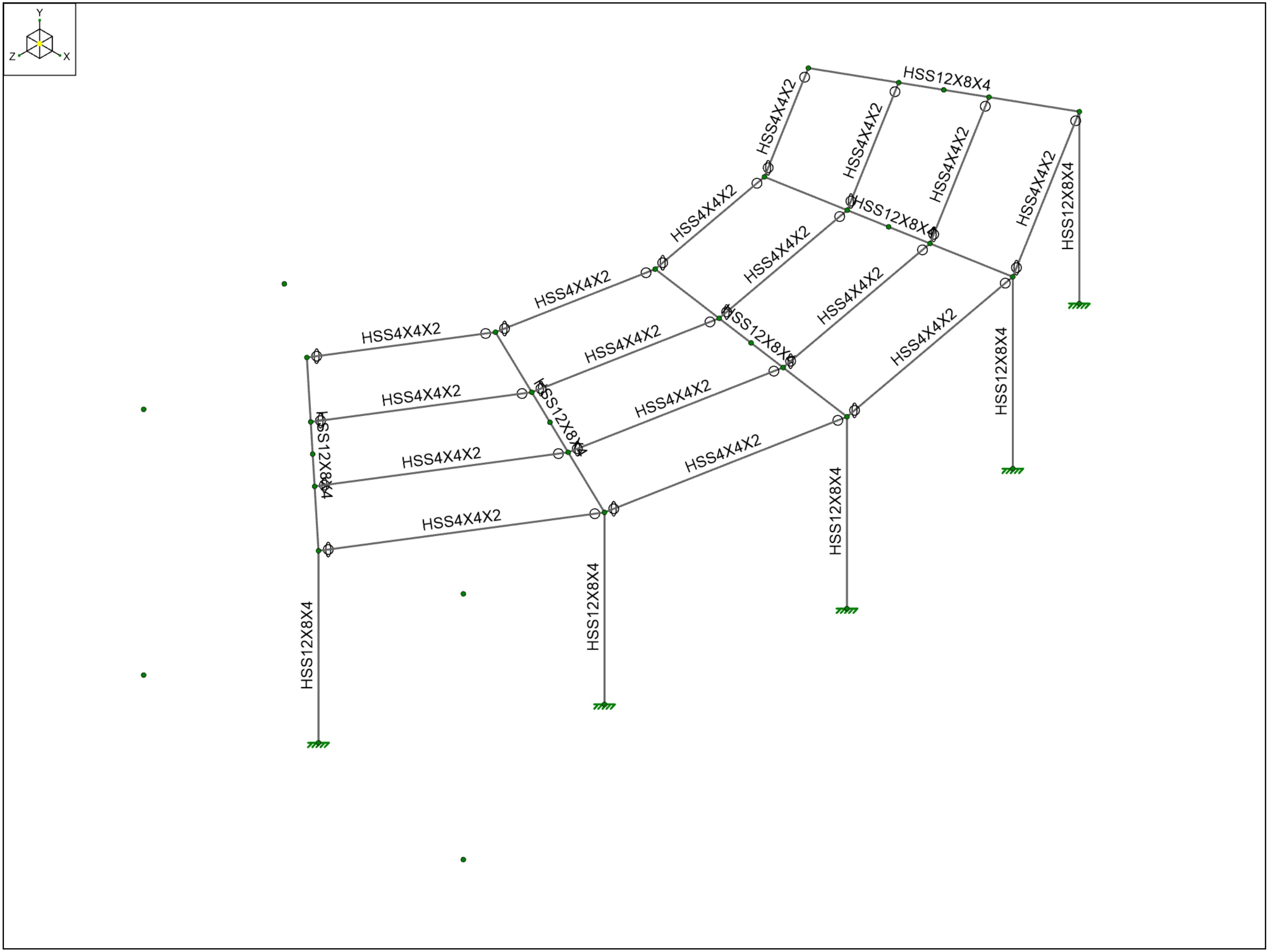
Joint Labels
Member Labels
Member Shapes
Member Lengths
Member Local Axis



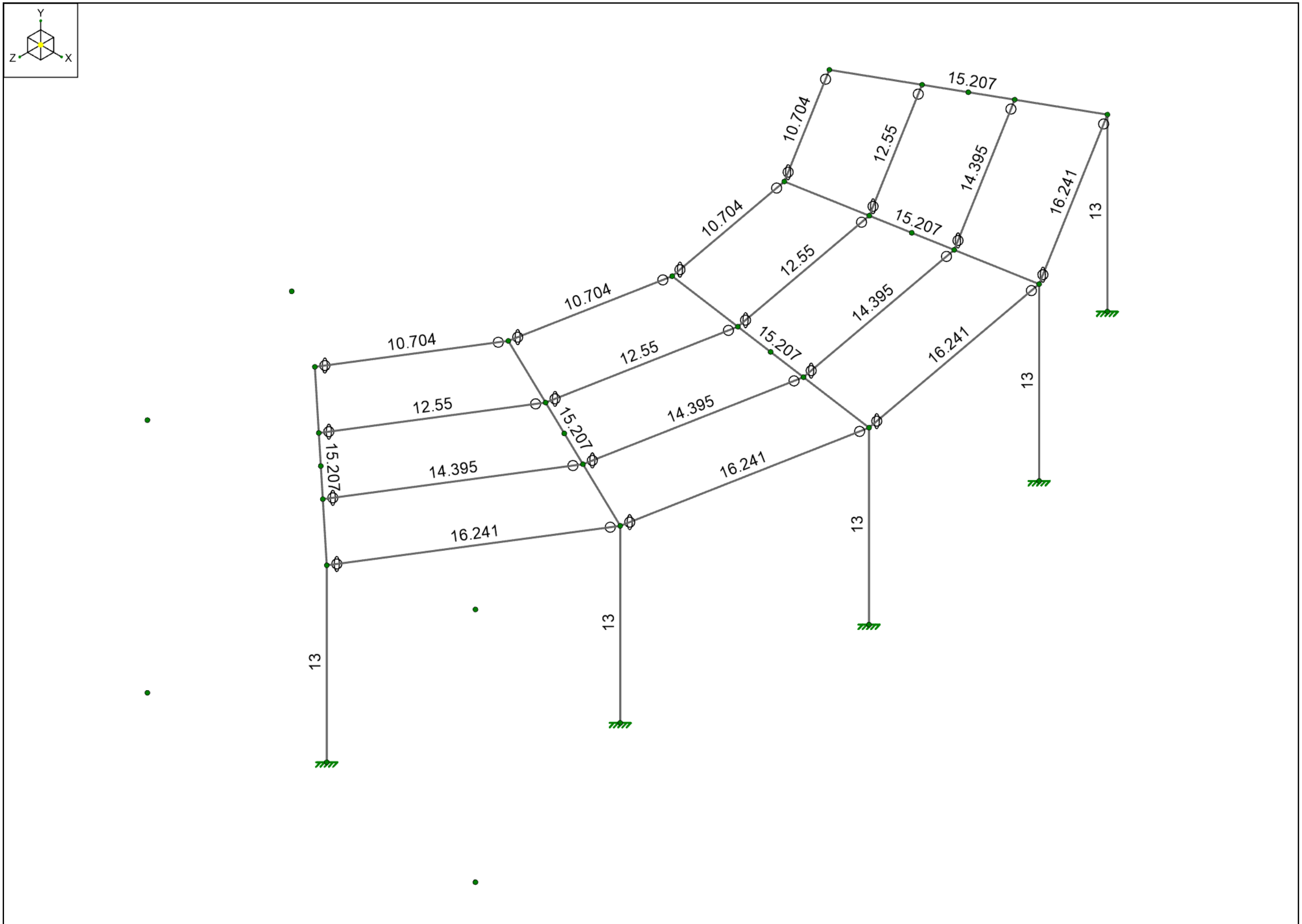
Y
Z
X
N14
N26
N31
N21
N15
N11
N25
N30
N20
N12
N16
N8
N1
N24
N5
N4
N29
N19
N23
N34
N22
N9
N28
N27
N18
N13
N17
N6
N3
N32
N10
N7
N35
N2
N33



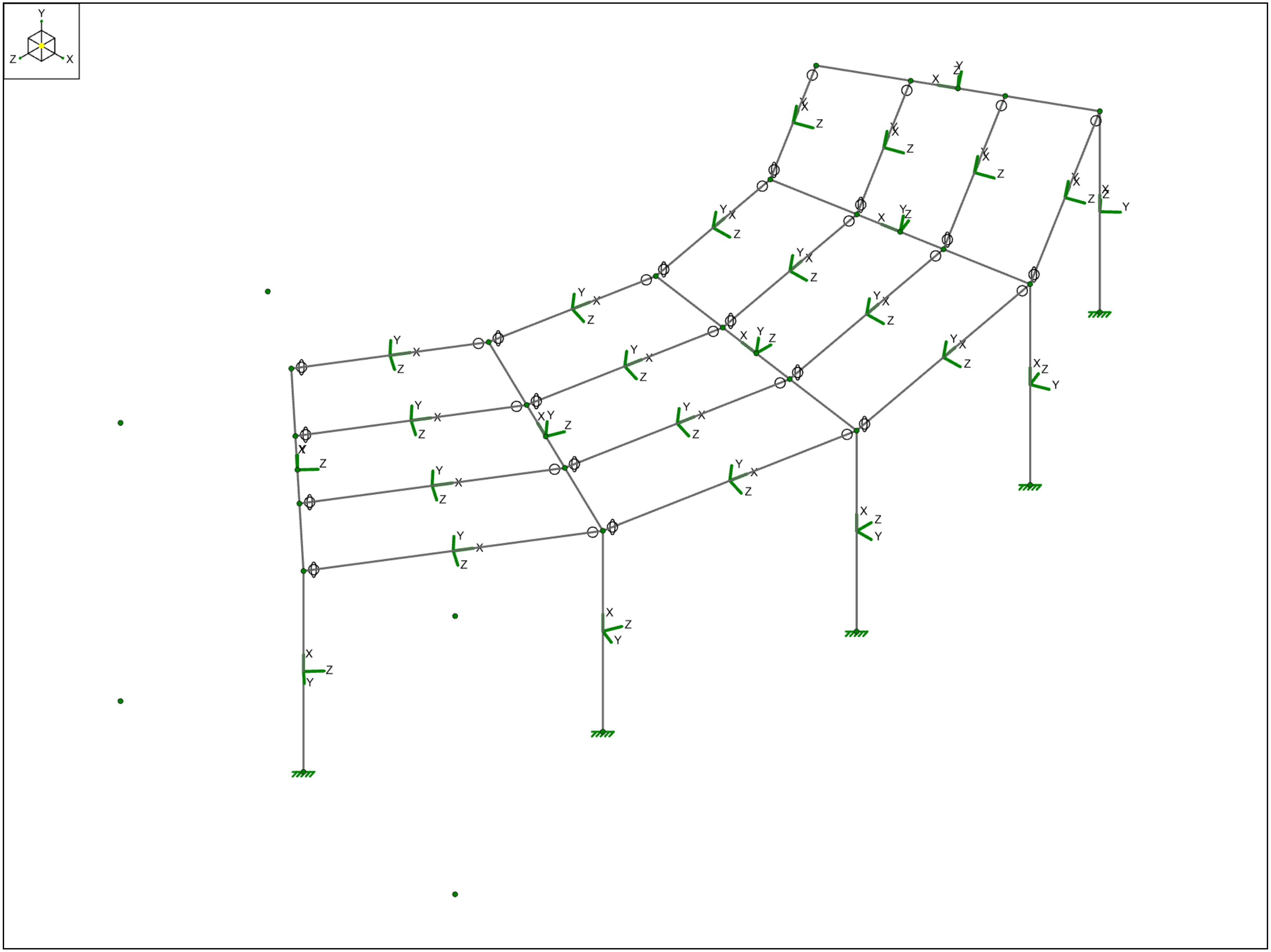
Y
Z
X
Truss2
Eave5
Purlin8
Purlin5
Eave1
Column3
Eave6
Truss4
Purlin1
Purlin4
Eave7
Truss5
Eave2
Eave8
Purlin7
Column2
Purlin6
Purlin3
Truss1
Truss3
Purlin2
Eave3
Eave4
Column5
Column4
Column1



Y
Z
X
HSS12X8X4
HSS4X4X2



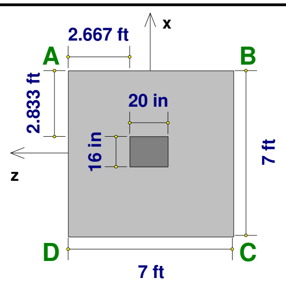
Member Length (ft) Displayed

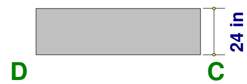


FOUNDATION DESIGN

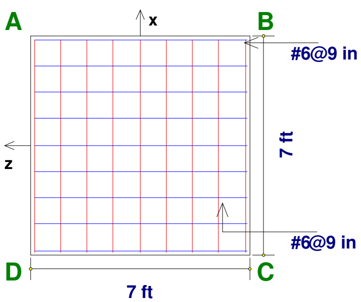
The foundation design contained herein is site specific, and is based on Geotechnical Investigation for the Fourth Street Community Center and Park, Southeast corner of N. 4th Street & E. Henderson Avenue, Porterville, Tulare County, California, by Soils Engineering, Inc.. Dated January 13, 2023. Report No. 22-18633. 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.

Sketch





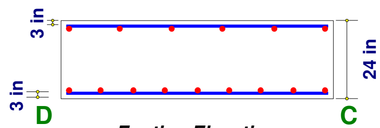
Details



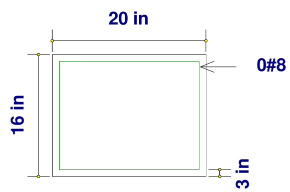
x Dir. Steel: 3.98 in^2 (9 #6)

z Dir. Steel: 3.98 in^2 (9 #6)

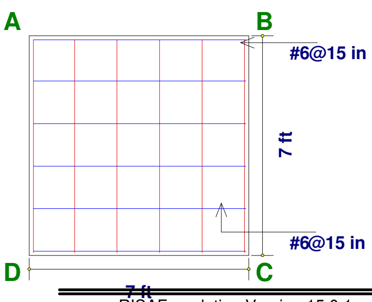
Bottom Rebar Plan



Footing Elevation



Pedestal Rebar Plan



x Dir. Steel: 2.65 in^2 (6 #6)

z Dir. Steel: 2.65 in^2 (6 #6)

Company :
Designer :
Job Number :
June 3, 2024
Footing 1 - N1
Checked By:_____

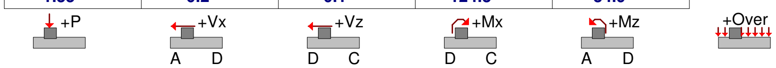
Geometry, Materials and Criteria

Length:	7 ft	eX:	0 in	Net Allowable Bearing:	2500 psf (net)	Steel fy:	60 ksi
Width:	7 ft	eZ:	0 in	Concrete Weight:	145 lb/ft^3	Minimum Steel:	.0018
Thickness:	24 in	pX:	16 in	Concrete f'c:	4.5 ksi	Maximum Steel:	.0075
Height:	0 in	pZ:	20 in	Design Code:	ACI 318-19		
Rot. Angle:	0 deg						

Footing Top Bar Cover:	3 in	Overturning / Sliding SF:	1.5	Φ for Flexure:	0.9
Footing Bottom Bar Cover:	3 in	Coefficient of Friction:	0.4	Φ for Shear:	0.75
Pedestal Longitudinal Bar Cover:	3 in	Passive Resistance of Soil:	0 k	Φ for Bearing:	0.65

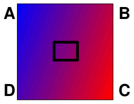
Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-in)	Mz (k-in)	Overburden (psf)
DL	1.68	-0.2	0.1	83.8	-26.1	0
RLL	3.97	-0.53	0.41	270.09	-83.45	
ELX		-0.23	-0.88	131.08	-29.18	
ELZ		-0.75	0.36	-53.73	-108.1	
WL+X	-1.52	0.2	0.1	-124.2	34.7	
WL+Z	2.1	-0.38	-0.05	211.06	-59.75	
WL-X	-1.16	0.29	-0.06	-156.83	45.8	
WL-Z	1.83	-0.22	-0.14	124.6	-33.75	
OL1	-1.35	0.22	0.04	-122.56	34.6	
OL2	1.35	-0.2	-0.1	124.3	-34.9	

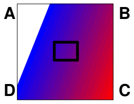


Soil Bearing

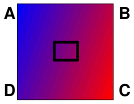
Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
D	1DL	2790	487.988 (C)	0.175
-0.2	1DL+1RLL	2790	1147.475 (C)	0.411
0.1	1DL+1SL	2790	487.988 (C)	0.175
124.3	1DL+1OL3	2790	487.988 (C)	0.175
34.9	1DL+0.75RLL	2790	955.783 (C)	0.343
ASCE 2.4.1-4b	1DL+0.75SL	2790	487.988 (C)	0.175
ASCE 2.4.1-4b	1DL+0.75OL3	2790	487.988 (C)	0.175
ASCE 2.4.1-5a	1DL+1WL+X	2790	371.691 (A)	0.133
ASCE 2.4.1-5a	1DL+1WL-X	2790	440.335 (A)	0.158
ASCE 2.4.1-5a	1DL+1WL+Z	2790	973.778 (C)	0.349
ASCE 2.4.1-5a	1DL+1WL-Z	2790	769.365 (C)	0.276
ASCE 2.4.1-5a	1DL+1OL1	2790	371.224 (A)	0.133
ASCE 2.4.1-5a	1DL+1OL2	2790	759.137 (C)	0.272
ASCE 2.4.1-5b	1.14DL+0.7ELX	2790	747.025 (C)	0.268
ASCE 2.4.1-5b	1.14DL+0.7ELZ	2790	621.337 (C)	0.223
ASCE 2.4.1-6a..	1DL+0.75WL+X+0.75RLL	2790	733.571 (C)	0.263
ASCE 2.4.1-6a..	1DL+0.75WL-X+0.75RLL	2790	693.101 (C)	0.248
ASCE 2.4.1-6a..	1DL+0.75WL+Z+0.75RLL	2790	1476.885 (C)	0.529
ASCE 2.4.1-6a..	1DL+0.75WL-Z+0.75RLL	2790	1235.264 (C)	0.443
ASCE 2.4.1-6a..	1DL+0.75OL1+0.75RLL	2790	739.126 (C)	0.265
ASCE 2.4.1-6a..	1DL+0.75OL2+0.75RLL	2790	1234.503 (C)	0.442
ASCE 2.4.1-6a..	1DL+0.75WL+X+0.75SL	2790	322.631 (D)	0.116
ASCE 2.4.1-6a..	1DL+0.75WL-X+0.75SL	2790	370.397 (A)	0.133
ASCE 2.4.1-6a..	1DL+0.75WL+Z+0.75SL	2790	834.938 (C)	0.299
ASCE 2.4.1-6a..	1DL+0.75WL-Z+0.75SL	2790	698.568 (C)	0.25
ASCE 2.4.1-6a..	1DL+0.75OL1+0.75SL	2790	321.45 (D)	0.115
ASCE 2.4.1-6a..	1DL+0.75OL2+0.75SL	2790	690.576 (C)	0.248
ASCE 2.4.1-6b	1.105DL+0.525ELX+0.75SL	2790	682.263 (C)	0.245
ASCE 2.4.1-6b	1.105DL+0.525ELZ+0.75SL	2790	588 (C)	0.211
ASCE 2.4.1-7	0.6DL+1WL+X	2790	307.458 (A)	0.11
ASCE 2.4.1-7	0.6DL+1WL-X	2790	377.148 (A)	0.135
ASCE 2.4.1-7	0.6DL+1WL+Z	2790	887.164 (C)	0.318
ASCE 2.4.1-7	0.6DL+1WL-Z	2790	587.201 (C)	0.21
ASCE 2.4.1-7	0.6DL+1OL1	2790	306.991 (A)	0.11
ASCE 2.4.1-7	0.6DL+1OL2	2790	580.661 (C)	0.208
ASCE 2.4.1-8	0.46DL+0.7ELX	2790	451.094 (C)	0.162
ASCE 2.4.1-8	0.46DL+0.7ELZ	2790	307.732 (D)	0.11



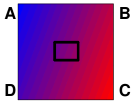
1DL
QA: 160.583 psf
QB: 397.901 psf
QC: 487.988 psf
QD: 250.671 psf
NAZ: 172.726 in
NAX: 455.014 in



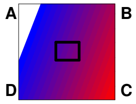
1DL+1RLL
QA: 0 psf
QB: 714.008 psf
QC: 1147.475 psf
QD: 59.688 psf
NAZ: 88.609 in
NAX: 222.365 in



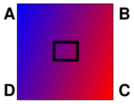
1DL+1SL
QA: 160.583 psf
QB: 397.901 psf
QC: 487.988 psf
QD: 250.671 psf
NAZ: 172.726 in
NAX: 455.014 in



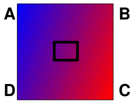
1DL+1OL3
QA: 160.583 psf
QB: 397.901 psf
QC: 487.988 psf
QD: 250.671 psf
NAZ: 172.726 in
NAX: 455.014 in



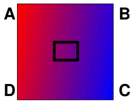
1DL+0.75RLL
QA: 0 psf
QB: 636.021 psf
QC: 955.783 psf
QD: 124.783 psf
NAZ: 96.613 in
NAX: 251.079 in



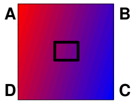
1DL+0.75SL
QA: 160.583 psf
QB: 397.901 psf
QC: 487.988 psf
QD: 250.671 psf
NAZ: 172.726 in
NAX: 455.014 in



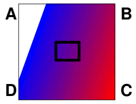
1DL+0.75OL3
QA: 160.583 psf
QB: 397.901 psf
QC: 487.988 psf
QD: 250.671 psf
NAZ: 172.726 in
NAX: 455.014 in



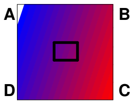
1DL+1WL+X
QA: 371.691 psf
QB: 239.913 psf
QC: 214.84 psf
QD: 346.618 psf
NAZ: 236.928 in
NAX: 1245.251 in



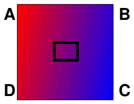
1DL+1WL-X
QA: 440.335 psf
QB: 224.621 psf
QC: 160.889 psf
QD: 376.603 psf
NAZ: 171.468 in
NAX: 580.372 in



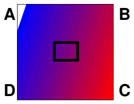
1DL+1WL+Z
QA: 0 psf
QB: 647.452 psf
QC: 973.778 psf
QD: 67.237 psf
NAZ: 90.23 in
NAX: 250.661 in



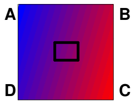
1DL+1WL-Z
QA: 0 psf
QB: 564.781 psf
QC: 769.365 psf
QD: 158.219 psf
NAZ: 105.747 in
NAX: 315.892 in



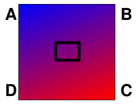
1DL+1OL1
QA: 371.224 psf
QB: 248.426 psf
QC: 222.245 psf
QD: 345.044 psf
NAZ: 253.934 in
NAX: 1191.06 in



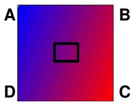
1DL+1OL2
QA: 0 psf
QB: 552.104 psf
QC: 759.137 psf
QD: 151.106 psf
NAZ: 104.875 in
NAX: 308.007 in



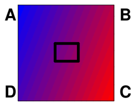
1.14DL+0.7ELX
QA: 0 psf
QB: 573.504 psf
QC: 747.025 psf
QD: 165.866 psf
NAZ: 107.974 in
NAX: 361.629 in



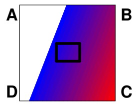
1.14DL+0.7ELZ
QA: 118.034 psf
QB: 261.291 psf
QC: 621.337 psf
QD: 478.081 psf
NAZ: 364.328 in
NAX: 144.96 in



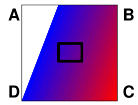
1DL+0.75WL+X+..
QA: 0 psf
QB: 519.561 psf
QC: 733.571 psf
QD: 204.007 psf
NAZ: 116.36 in
NAX: 287.93 in



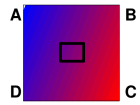
1DL+0.75WL-X+..
QA: 41.491 psf
QB: 508.094 psf
QC: 693.101 psf
QD: 226.498 psf
NAZ: 124.775 in
NAX: 314.693 in



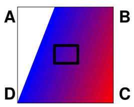
1DL+0.75WL+Z+..
QA: 0 psf
QB: 835.889 psf
QC: 1476.885 psf
QD: 0 psf
NAZ: 75.476 in
NAX: 193.54 in



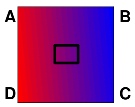
1DL+0.75WL-Z+..
QA: 0 psf
QB: 760.556 psf
QC: 1235.264 psf
QD: 7.113 psf
NAZ: 84.486 in
NAX: 218.581 in



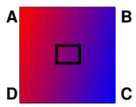
1DL+0.75OL1+0..
QA: 0 psf
QB: 525.946 psf
QC: 739.126 psf
QD: 202.826 psf
NAZ: 115.768 in
NAX: 291.24 in



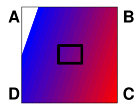
1DL+0.75OL2+0..
QA: 0 psf
QB: 751.369 psf
QC: 1234.503 psf
QD: 0 psf
NAZ: 83.694 in
NAX: 214.636 in



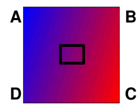
1DL+0.75WL+X+..
QA: 318.914 psf
QB: 279.41 psf
QC: 283.127 psf
QD: 322.631 psf
NAZ: 686.026 in
NAX: 7290.706 in



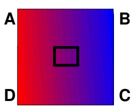
1DL+0.75WL-X+..
QA: 370.397 psf
QB: 267.941 psf
QC: 242.664 psf
QD: 345.12 psf
NAZ: 303.675 in
NAX: 1230.898 in



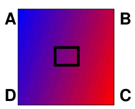
1DL+0.75WL+Z+..
QA: 0 psf
QB: 585.861 psf
QC: 834.938 psf
QD: 123.25 psf
NAZ: 98.547 in
NAX: 281.578 in



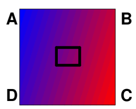
1DL+0.75WL-Z+..
QA: 6.024 psf
QB: 523.138 psf
QC: 698.568 psf
QD: 181.454 psf
NAZ: 113.475 in
NAX: 334.491 in



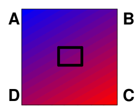
1DL+0.75OL1+0..
QA: 318.564 psf
QB: 285.794 psf
QC: 288.681 psf
QD: 321.45 psf
NAZ: 823.988 in
NAX: 9355.182 in



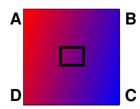
1DL+0.75OL2+0..
QA: 0 psf
QB: 513.681 psf
QC: 690.576 psf
QD: 176.217 psf
NAZ: 112.778 in
NAX: 327.925 in



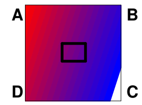
1.105DL+0.525..
QA: 34.409 psf
QB: 529.604 psf
QC: 682.263 psf
QD: 187.067 psf
NAZ: 115.732 in
NAX: 375.413 in



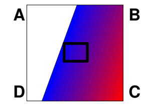
1.105DL+0.525..
QA: 128.671 psf
QB: 295.443 psf
QC: 588 psf
QD: 421.228 psf
NAZ: 296.165 in
NAX: 168.829 in



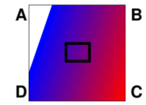
0.6DL+1WL+X
QA: 307.458 psf
QB: 80.752 psf
QC: 19.644 psf
QD: 246.35 psf
NAZ: 113.921 in
NAX: 422.637 in



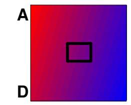
0.6DL+1WL-X
QA: 377.148 psf
QB: 65.129 psf
QC: 0 psf
QD: 276.179 psf
NAZ: 101.534 in
NAX: 313.765 in



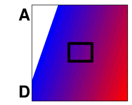
0.6DL+1WL+Z
QA: 0 psf
QB: 504.354 psf
QC: 887.164 psf
QD: 0 psf
NAZ: 71.303 in
NAX: 194.671 in



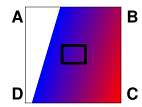
0.6DL+1WL-Z
QA: 0 psf
QB: 404.609 psf
QC: 587.201 psf
QD: 51.56 psf
NAZ: 92.086 in
NAX: 270.138 in



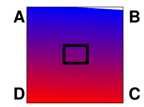
0.6DL+1OL1
QA: 306.991 psf
QB: 89.265 psf
QC: 27.05 psf
QD: 244.776 psf
NAZ: 118.439 in
NAX: 414.481 in



0.6DL+1OL2
QA: 0 psf
QB: 391.856 psf
QC: 580.661 psf
QD: 42.023 psf
NAZ: 90.554 in
NAX: 258.339 in



0.46DL+0.7ELX
QA: 0 psf
QB: 306.788 psf
QC: 451.094 psf
QD: 0 psf
NAZ: 77.786 in
NAX: 262.58 in



0.46DL+0.7ELZ
QA: 8.793 psf
QB: 0 psf
QC: 289.498 psf
QD: 307.732 psf
NAZ: 1417.659 in
NAX: 86.471 in

Footing Flexure Design (Bottom Bars)

As-min x-dir (Top Flexure): 0 in^2
As-min z-dir (Top Flexure): 0 in^2
As-min x-dir (Bot Flexure): 3.629 in^2
As-min z-dir (Bot Flexure): 3.629 in^2
As-min x-dir (T & S): 3.629 in^2
As-min z-dir (T & S): 3.629 in^2

Description	Categories and Factors	Mu-xx UC Max	Mu-xx (k-in)	z-Dir As Required (in^2)	z-Dir As Provided (in^2)	Mu-zz UC Max	Mu-zz (k-in)	x-Dir As Required (in^2)	x-Dir As Provided (in^2)
ACI318R-14 ..	1.4DL	0.01203	51.35	0.047	3.976	0.00743	31.71	0.029	3.976
ACI318R-14 ..	1.2DL+0.5RLL	0.02305	98.39	0.09	3.976	0.01361	58.1	0.053	3.976
ACI318R-14 ..	1.2DL+0.5SL	0.01031	44.01	0.04	3.976	0.00637	27.18	0.025	3.976
ACI318R-14 ..	1.2DL+0.5OL3	0.01031	44.01	0.04	3.976	0.00637	27.18	0.025	3.976
ACI318R-14 ..	1.2DL+1.6RLL+0.8..	0.04249	181.35	0.166	3.976	0.02523	107.69	0.099	3.976
ACI318R-14 ..	1.2DL+1.6RLL+0.8..	0.04059	173.26	0.159	3.976	0.02467	105.29	0.096	3.976
ACI318R-14 ..	1.2DL+1.6RLL+0.8..	0.08001	341.48	0.313	3.976	0.03833	163.62	0.15	3.976
ACI318R-14 ..	1.2DL+1.6RLL+0.8..	0.06926	295.62	0.271	3.976	0.03567	152.23	0.139	3.976
ACI318R-14 ..	1.2DL+1.6RLL+0.8..	0.04289	183.04	0.168	3.976	0.02543	108.53	0.099	3.976
ACI318R-14 ..	1.2DL+1.6RLL+0.8..	0.06905	294.71	0.27	3.976	0.03509	149.76	0.137	3.976
ACI318R-14 ..	1.2DL+1.6SL+0.83..	0.00166	7.1	0.006	3.976	0.00156	6.66	0.006	3.976
ACI318R-14 ..	1.2DL+1.6SL+0.83..	0.00392	16.71	0.015	3.976	0.00227	9.69	0.009	3.976
ACI318R-14 ..	1.2DL+1.6SL+0.83..	0.02636	112.52	0.103	3.976	0.01409	60.12	0.055	3.976
ACI318R-14 ..	1.2DL+1.6SL+0.83..	0.0206	87.93	0.08	3.976	0.01156	49.34	0.045	3.976
ACI318R-14 ..	1.2DL+1.6SL+0.83..	0.00167	7.13	0.007	3.976	0.00176	7.52	0.007	3.976

ACI318R-14 ..	1.2DL+1.6SL+0.83..	0.01995	85.15	0.078	3.976	0.01096	46.78	0.043	3.976
ACI318R-14 ..	1.2DL+1.67WL+X+0..	0.00334	14.24	0.013	3.976	0.00397	16.95	0.016	3.976
ACI318R-14 ..	1.2DL+1.67WL-X+0..	0.00536	22.87	0.021	3.976	0.00357	15.26	0.014	3.976
ACI318R-14 ..	1.2DL+1.67WL+Z+0..	0.06328	270.07	0.247	3.976	0.02975	126.98	0.116	3.976
ACI318R-14 ..	1.2DL+1.67WL-Z+0..	0.04553	194.34	0.178	3.976	0.02448	104.49	0.096	3.976
ACI318R-14 ..	1.2DL+1.67OL1+0...	0.00413	17.64	0.016	3.976	0.00438	18.68	0.017	3.976
ACI318R-14 ..	1.2DL+1.67OL2+0...	0.04454	190.12	0.174	3.976	0.02331	99.48	0.091	3.976
ACI318R-14 ..	1.2DL+1.67WL+X+0..	0.00791	33.76	0.031	3.976	0.00159	6.77	0.006	3.976
ACI318R-14 ..	1.2DL+1.67WL-X+0..	0.01243	53.04	0.049	3.976	0.00442	18.86	0.017	3.976
ACI318R-14 ..	1.2DL+1.67WL+Z+0..	0.04529	193.31	0.177	3.976	0.0222	94.75	0.087	3.976
ACI318R-14 ..	1.2DL+1.67WL-Z+0..	0.03114	132.9	0.122	3.976	0.01691	72.15	0.066	3.976
ACI318R-14 ..	1.2DL+1.67OL1+0...	0.00792	33.82	0.031	3.976	0.0021	8.95	0.008	3.976
ACI318R-14 ..	1.2DL+1.67OL2+0...	0.0299	127.63	0.117	3.976	0.01574	67.18	0.061	3.976
ACI318R-14 ..	1.2DL+1ELX+0.2SL	0.02194	93.66	0.086	3.976	0.00932	39.79	0.036	3.976
ACI318R-14 ..	1.2DL+1ELZ+0.2SL	0.00557	23.76	0.022	3.976	0.01697	72.43	0.066	3.976
ACI318R-14 ..	0.9DL+1.67WL+X	0.00905	38.63	0.035	3.976	0.00155	6.64	0.006	3.976
ACI318R-14 ..	0.9DL+1.67WL-X	0.01378	58.8	0.054	3.976	0.0045	19.19	0.018	3.976
ACI318R-14 ..	0.9DL+1.67WL+Z	0.04606	196.59	0.18	3.976	0.02067	88.23	0.081	3.976
ACI318R-14 ..	0.9DL+1.67WL-Z	0.02899	123.75	0.113	3.976	0.01542	65.81	0.06	3.976
ACI318R-14 ..	0.9DL+1.67OL1	0.00906	38.68	0.035	3.976	0.00206	8.81	0.008	3.976
ACI318R-14 ..	0.9DL+1.67OL2	0.02788	118.99	0.109	3.976	0.01425	60.8	0.056	3.976
ACI318R-14 ..	0.9DL+1ELX	0.01962	83.72	0.077	3.976	0.00782	33.36	0.031	3.976
ACI318R-14 ..	0.9DL+1ELZ	0.00299	12.75	0.012	3.976	0.01538	65.64	0.06	3.976
ACI318R-14 ..	1.2DL+1.67WL+Z+0..	0.04529	193.31	0.177	3.976	0.0222	94.75	0.087	3.976
ACI318R-14 ..	1.2DL+1.67WL-Z+0..	0.03114	132.9	0.122	3.976	0.01691	72.15	0.066	3.976
ACI318R-14 ..	1.2DL+1.67OL1+0...	0.00792	33.82	0.031	3.976	0.0021	8.95	0.008	3.976
ACI318R-14 ..	1.2DL+1.67OL2+0...	0.0299	127.63	0.117	3.976	0.01574	67.18	0.061	3.976
ACI318R-14 ..	1.2DL+1ELX+0.2SL	0.02194	93.66	0.086	3.976	0.00932	39.79	0.036	3.976
ACI318R-14 ..	1.2DL+1ELZ+0.2SL	0.00557	23.76	0.022	3.976	0.01697	72.43	0.066	3.976
ACI318R-14 ..	0.9DL+1.67WL+X	0.00905	38.63	0.035	3.976	0.00155	6.64	0.006	3.976
ACI318R-14 ..	0.9DL+1.67WL-X	0.01378	58.8	0.054	3.976	0.0045	19.19	0.018	3.976
ACI318R-14 ..	0.9DL+1.67WL+Z	0.04606	196.59	0.18	3.976	0.02067	88.23	0.081	3.976
ACI318R-14 ..	0.9DL+1.67WL-Z	0.02899	123.75	0.113	3.976	0.01542	65.81	0.06	3.976
ACI318R-14 ..	0.9DL+1.67OL1	0.00906	38.68	0.035	3.976	0.00206	8.81	0.008	3.976
ACI318R-14 ..	0.9DL+1.67OL2	0.02788	118.99	0.109	3.976	0.01425	60.8	0.056	3.976
ACI318R-14 ..	0.9DL+1ELX	0.01962	83.72	0.077	3.976	0.00782	33.36	0.031	3.976
ACI318R-14 ..	0.9DL+1ELZ	0.00299	12.75	0.012	3.976	0.01538	65.64	0.06	3.976

Footing Flexure Design (Top Bars)

Description	Categories and Factors	Mu-xx (k-in)	z Dir As (in^2)	Mu-zz (k-in)	x Dir As (in^2)
SW+OB	**1SW+1OB-(ACI318R-..,ACI318R-..)**	**86.291**	**0.079**	**54.608**	**0.05**

Moment Capacity of Plain Concrete Section Along xx and zz= 1363.644k-in,1363.644k-in Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: **675.982 k** One Way (x Dir. Cut) Vc: **121.148 k** One Way (z Dir. Cut) Vc: **121.148 k**

		Punching		x Dir. Cut		z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/(ϕVc)	Vu(k)	Vu/(ϕVc)	Vu(k)	Vu/(ϕVc)
ACI318R-14 5...	**1.4DL**	**1.866**	**0.004**	**1.308**	**0.014**	**0.808**	**0.009**
ACI318R-14 5...	**1.2DL+0.5RLL**	**3.174**	**0.006**	**2.518**	**0.028**	**1.488**	**0.016**
ACI318R-14 5...	**1.2DL+0.5SL**	**1.599**	**0.003**	**1.121**	**0.012**	**0.693**	**0.008**
ACI318R-14 5...	**1.2DL+0.5OL3**	**1.599**	**0.003**	**1.121**	**0.012**	**0.693**	**0.008**
ACI318R-14 5...	**1.2DL+1.6RLL+0.833WL+X**	**5.845**	**0.012**	**4.668**	**0.051**	**2.787**	**0.031**
ACI318R-14 5...	**1.2DL+1.6RLL+0.833WL-X**	**5.99**	**0.012**	**4.438**	**0.049**	**2.706**	**0.03**
ACI318R-14 5...	**1.2DL+1.6RLL+0.833WL+Z**	**10.42**	**0.021**	**9.211**	**0.101**	**4.269**	**0.047**
ACI318R-14 5...	**1.2DL+1.6RLL+0.833WL-Z**	**9.397**	**0.019**	**7.806**	**0.086**	**3.954**	**0.044**
ACI318R-14 5...	**1.2DL+1.6RLL+0.833OL1**	**5.957**	**0.012**	**4.71**	**0.052**	**2.806**	**0.031**
ACI318R-14 5...	**1.2DL+1.6RLL+0.833OL2**	**9.158**	**0.018**	**7.807**	**0.086**	**3.897**	**0.043**
ACI318R-14 5...	**1.2DL+1.6SL+0.833WL+X**	**0.595**	**0.001**	**0.172**	**0.002**	**0.164**	**0.002**
ACI318R-14 5...	**1.2DL+1.6SL+0.833WL-X**	**0.833**	**0.002**	**0.42**	**0.005**	**0.239**	**0.003**
ACI318R-14 5...	**1.2DL+1.6SL+0.833WL+Z**	**3**	**0.006**	**2.898**	**0.032**	**1.55**	**0.017**
ACI318R-14 5...	**1.2DL+1.6SL+0.833WL-Z**	**2.808**	**0.006**	**2.251**	**0.025**	**1.26**	**0.014**
ACI318R-14 5...	**1.2DL+1.6SL+0.833OL1**	**0.707**	**0.001**	**0.169**	**0.002**	**0.184**	**0.002**
ACI318R-14 5...	**1.2DL+1.6SL+0.833OL2**	**2.491**	**0.005**	**2.186**	**0.024**	**1.2**	**0.013**
ACI318R-14 5...	**1.2DL+1.67WL+X+0.5RLL**	**1.16**	**0.002**	**0.345**	**0.004**	**0.427**	**0.005**
ACI318R-14 5...	**1.2DL+1.67WL-X+0.5RLL**	**1.637**	**0.003**	**0.561**	**0.006**	**0.367**	**0.004**
ACI318R-14 5...	**1.2DL+1.67WL+Z+0.5RLL**	**7.537**	**0.015**	**7.196**	**0.079**	**3.318**	**0.037**
ACI318R-14 5...	**1.2DL+1.67WL-Z+0.5RLL**	**5.923**	**0.012**	**5.025**	**0.055**	**2.7**	**0.03**
ACI318R-14 5...	**1.2DL+1.67OL1+0.5RLL**	**1.385**	**0.003**	**0.429**	**0.005**	**0.467**	**0.005**
ACI318R-14 5...	**1.2DL+1.67OL2+0.5RLL**	**5.355**	**0.011**	**4.937**	**0.054**	**2.584**	**0.028**
ACI318R-14 5...	**1.2DL+1.67WL+X+0.5SL**	**NA**	**NA**	**1.051**	**0.012**	**0.368**	**0.004**
ACI318R-14 5...	**1.2DL+1.67WL-X+0.5SL**	**0.063**	**0**	**1.402**	**0.015**	**0.512**	**0.006**
ACI318R-14 5...	**1.2DL+1.67WL+Z+0.5SL**	**4.946**	**0.01**	**5.056**	**0.056**	**2.473**	**0.027**
ACI318R-14 5...	**1.2DL+1.67WL-Z+0.5SL**	**4.051**	**0.008**	**3.411**	**0.038**	**1.848**	**0.02**
ACI318R-14 5...	**1.2DL+1.67OL1+0.5SL**	**NA**	**NA**	**0.967**	**0.011**	**0.328**	**0.004**
ACI318R-14 5...	**1.2DL+1.67OL2+0.5SL**	**3.426**	**0.007**	**3.29**	**0.036**	**1.733**	**0.019**
ACI318R-14 5...	**1.2DL+1ELX+0.2SL**	**1.605**	**0.003**	**2.436**	**0.027**	**1.037**	**0.011**
ACI318R-14 5...	**1.2DL+1ELZ+0.2SL**	**1.599**	**0.003**	**0.585**	**0.006**	**1.926**	**0.021**
ACI318R-14 5...	**0.9DL+1.67WL+X**	**NA**	**NA**	**1.33**	**0.015**	**0.541**	**0.006**
ACI318R-14 5...	**0.9DL+1.67WL-X**	**NA**	**NA**	**1.587**	**0.017**	**0.639**	**0.007**
ACI318R-14 5...	**0.9DL+1.67WL+Z**	**5.183**	**0.01**	**5.259**	**0.058**	**2.31**	**0.025**
ACI318R-14 5...	**0.9DL+1.67WL-Z**	**3.723**	**0.007**	**3.187**	**0.035**	**1.695**	**0.019**
ACI318R-14 5...	**0.9DL+1.67OL1**	**NA**	**NA**	**1.247**	**0.014**	**0.501**	**0.006**
ACI318R-14 5...	**0.9DL+1.67OL2**	**3.122**	**0.006**	**3.082**	**0.034**	**1.579**	**0.017**
ACI318R-14 5...	**0.9DL+1ELX**	**1.243**	**0.002**	**2.187**	**0.024**	**0.878**	**0.01**
ACI318R-14 5...	**0.9DL+1ELZ**	**1.199**	**0.002**	**0.305**	**0.003**	**1.752**	**0.019**
ACI318R-14 5...	**1.2DL+1.67WL+Z+0.5SL**	**4.946**	**0.01**	**5.056**	**0.056**	**2.473**	**0.027**
ACI318R-14 5...	**1.2DL+1.67WL-Z+0.5SL**	**4.051**	**0.008**	**3.411**	**0.038**	**1.848**	**0.02**
ACI318R-14 5...	**1.2DL+1.67OL1+0.5SL**	**NA**	**NA**	**0.967**	**0.011**	**0.328**	**0.004**
ACI318R-14 5...	**1.2DL+1.67OL2+0.5SL**	**3.426**	**0.007**	**3.29**	**0.036**	**1.733**	**0.019**
ACI318R-14 5...	**1.2DL+1ELX+0.2SL**	**1.605**	**0.003**	**2.436**	**0.027**	**1.037**	**0.011**

ACI318R-14 5...	1.2DL+1ELZ+0.2SL	1.599	0.003	0.585	0.006	1.926	0.021
ACI318R-14 5...	0.9DL+1.67WL+X	NA	NA	1.33	0.015	0.541	0.006
ACI318R-14 5...	0.9DL+1.67WL-X	NA	NA	1.587	0.017	0.639	0.007
ACI318R-14 5...	0.9DL+1.67WL+Z	5.183	0.01	5.259	0.058	2.31	0.025
ACI318R-14 5...	0.9DL+1.67WL-Z	3.723	0.007	3.187	0.035	1.695	0.019
ACI318R-14 5...	0.9DL+1.67OL1	NA	NA	1.247	0.014	0.501	0.006
ACI318R-14 5...	0.9DL+1.67OL2	3.122	0.006	3.082	0.034	1.579	0.017
ACI318R-14 5...	0.9DL+1ELX	1.243	0.002	2.187	0.024	0.878	0.01
ACI318R-14 5...	0.9DL+1ELZ	1.199	0.002	0.305	0.003	1.752	0.019

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : **2448 k**

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/⌀Bc
ACI318R-14 5...	1.4DL	2.352	0.001
ACI318R-14 5...	1.2DL+0.5RLL	4.001	0.003
ACI318R-14 5...	1.2DL+0.5SL	2.016	0.001
ACI318R-14 5...	1.2DL+0.5OL3	2.016	0.001
ACI318R-14 5...	1.2DL+1.6RLL+0.833WL+X	7.102	0.004
ACI318R-14 5...	1.2DL+1.6RLL+0.833WL-X	7.402	0.005
ACI318R-14 5...	1.2DL+1.6RLL+0.833WL+Z	10.117	0.006
ACI318R-14 5...	1.2DL+1.6RLL+0.833WL-Z	9.892	0.006
ACI318R-14 5...	1.2DL+1.6RLL+0.833OL1	7.243	0.005
ACI318R-14 5...	1.2DL+1.6RLL+0.833OL2	9.493	0.006
ACI318R-14 5...	1.2DL+1.6SL+0.833WL+X	0.75	0
ACI318R-14 5...	1.2DL+1.6SL+0.833WL-X	1.05	0
ACI318R-14 5...	1.2DL+1.6SL+0.833WL+Z	3.765	0.002
ACI318R-14 5...	1.2DL+1.6SL+0.833WL-Z	3.54	0.002
ACI318R-14 5...	1.2DL+1.6SL+0.833OL1	0.891	0
ACI318R-14 5...	1.2DL+1.6SL+0.833OL2	3.141	0.002
ACI318R-14 5...	1.2DL+1.67WL+X+0.5RLL	1.463	0
ACI318R-14 5...	1.2DL+1.67WL-X+0.5RLL	2.064	0.001
ACI318R-14 5...	1.2DL+1.67WL+Z+0.5RLL	7.508	0.005
ACI318R-14 5...	1.2DL+1.67WL-Z+0.5RLL	7.057	0.004
ACI318R-14 5...	1.2DL+1.67OL1+0.5RLL	1.747	0.001
ACI318R-14 5...	1.2DL+1.67OL2+0.5RLL	6.256	0.004
ACI318R-14 5...	1.2DL+1.67WL+X+0.5SL	0	0
ACI318R-14 5...	1.2DL+1.67WL-X+0.5SL	0.079	0
ACI318R-14 5...	1.2DL+1.67WL+Z+0.5SL	5.523	0.003
ACI318R-14 5...	1.2DL+1.67WL-Z+0.5SL	5.072	0.003
ACI318R-14 5...	1.2DL+1.67OL1+0.5SL	0	0
ACI318R-14 5...	1.2DL+1.67OL2+0.5SL	4.27	0.003
ACI318R-14 5...	1.2DL+1ELX+0.2SL	2.016	0.001
ACI318R-14 5...	1.2DL+1ELZ+0.2SL	2.016	0.001
ACI318R-14 5...	0.9DL+1.67WL+X	0	0
ACI318R-14 5...	0.9DL+1.67WL-X	0	0
ACI318R-14 5...	0.9DL+1.67WL+Z	5.019	0.003
ACI318R-14 5...	0.9DL+1.67WL-Z	4.568	0.003
ACI318R-14 5...	0.9DL+1.67OL1	0	0

ACI318R-14 5...	0.9DL+1.67OL2	3.766	0.002
ACI318R-14 5...	0.9DL+1ELX	1.512	0
ACI318R-14 5...	0.9DL+1ELZ	1.512	0
ACI318R-14 5...	1.2DL+1.67WL+Z+0.5SL	5.523	0.003
ACI318R-14 5...	1.2DL+1.67WL-Z+0.5SL	5.072	0.003
ACI318R-14 5...	1.2DL+1.67OL1+0.5SL	0	0
ACI318R-14 5...	1.2DL+1.67OL2+0.5SL	4.27	0.003
ACI318R-14 5...	1.2DL+1ELX+0.2SL	2.016	0.001
ACI318R-14 5...	1.2DL+1ELZ+0.2SL	2.016	0.001
ACI318R-14 5...	0.9DL+1.67WL+X	0	0
ACI318R-14 5...	0.9DL+1.67WL-X	0	0
ACI318R-14 5...	0.9DL+1.67WL+Z	5.019	0.003
ACI318R-14 5...	0.9DL+1.67WL-Z	4.568	0.003
ACI318R-14 5...	0.9DL+1.67OL1	0	0
ACI318R-14 5...	0.9DL+1.67OL2	3.766	0.002
ACI318R-14 5...	0.9DL+1ELX	1.512	0
ACI318R-14 5...	0.9DL+1ELZ	1.512	0

Overturning Check (Service)

Description	Categories and Factors	Mo-xx (k-in)	Ms-xx (k-in)	Mo-zz (k-in)	Ms-zz (k-in)	OSF-xx	OSF-zz
D	1DL	83.8	669.78	30.9	667.38	7.993	21.598
-0.2	1DL+1RLL	353.89	846.36	127.07	834.12	2.392	6.564
0.1	1DL+1SL	83.8	669.78	30.9	667.38	7.993	21.598
124.3	1DL+1OL3	83.8	669.78	30.9	667.38	7.993	21.598
34.9	1DL+0.75RLL	286.368	802.215	103.028	792.435	2.801	7.691
ASCE 2.4.1-4b	1DL+0.75SL	83.8	669.78	30.9	667.38	7.993	21.598
ASCE 2.4.1-4b	1DL+0.75OL3	83.8	669.78	30.9	667.38	7.993	21.598
ASCE 2.4.1-5a	1DL+1WL+X	192.84	751.18	103.34	698.28	3.895	6.757
ASCE 2.4.1-5a	1DL+1WL-X	207.95	752.62	101.48	698.28	3.619	6.881
ASCE 2.4.1-5a	1DL+1WL+Z	296.06	757.98	99.77	755.58	2.56	7.573
ASCE 2.4.1-5a	1DL+1WL-Z	211.76	746.64	69.93	744.24	3.526	10.643
ASCE 2.4.1-5a	1DL+1OL1	182.62	751.18	96.58	698.28	4.113	7.23
ASCE 2.4.1-5a	1DL+1OL2	210.5	726.48	70.6	724.08	3.451	10.256
ASCE 2.4.1-5b	1.14DL+0.7ELX	202.072	763.549	59.516	760.813	3.779	12.783
ASCE 2.4.1-5b	1.14DL+0.7ELZ	95.532	807.208	123.496	760.813	8.45	6.161
ASCE 2.4.1-6a..	1DL+0.75WL+X+0.7..	334.248	897.165	150.907	822.06	2.684	5.447
ASCE 2.4.1-6a..	1DL+0.75WL-X+0.7..	323.988	919.837	139.567	832.005	2.839	5.961
ASCE 2.4.1-6a..	1DL+0.75WL+Z+0.7..	445.562	868.365	154.68	858.585	1.949	5.551
ASCE 2.4.1-6a..	1DL+0.75WL-Z+0.7..	382.337	859.86	132.3	850.08	2.249	6.425
ASCE 2.4.1-6a..	1DL+0.75OL1+0.75..	328.893	894.855	145.553	822.345	2.721	5.65
ASCE 2.4.1-6a..	1DL+0.75OL2+0.75..	381.393	844.74	132.803	834.96	2.215	6.287
ASCE 2.4.1-6a..	1DL+0.75WL+X+0.7..	145.23	751.18	78.78	697.005	5.172	8.847
ASCE 2.4.1-6a..	1DL+0.75WL-X+0.7..	156.562	752.26	76.11	698.28	4.805	9.175
ASCE 2.4.1-6a..	1DL+0.75WL+Z+0.7..	242.995	735.93	82.553	733.53	3.029	8.886
ASCE 2.4.1-6a..	1DL+0.75WL-Z+0.7..	179.77	727.425	60.172	725.025	4.046	12.049
ASCE 2.4.1-6a..	1DL+0.75OL1+0.75SL	137.565	751.18	73.425	697.29	5.461	9.497
ASCE 2.4.1-6a..	1DL+0.75OL2+0.75SL	178.825	712.305	60.675	709.905	3.983	11.7
ASCE 2.4.1-6b	1.105DL+0.525ELX..	172.504	740.107	52.362	737.455	4.29	14.084
ASCE 2.4.1-6b	1.105DL+0.525ELZ..	92.599	772.851	100.347	737.455	8.346	7.349
ASCE 2.4.1-7	0.6DL+1WL+X	191.88	450.708	103.34	418.968	2.349	4.054
ASCE 2.4.1-7	0.6DL+1WL-X	206.99	452.148	101.48	418.968	2.184	4.129
ASCE 2.4.1-7	0.6DL+1WL+Z	262.54	490.068	87.41	488.628	1.867	5.59
ASCE 2.4.1-7	0.6DL+1WL-Z	178.24	478.728	57.57	477.288	2.686	8.291
ASCE 2.4.1-7	0.6DL+1OL1	181.66	450.708	96.58	418.968	2.481	4.338
ASCE 2.4.1-7	0.6DL+1OL2	176.98	458.568	58.24	457.128	2.591	7.849
ASCE 2.4.1-8	0.46DL+0.7ELX	145.088	308.099	38.504	306.995	2.124	7.973
ASCE 2.4.1-8	0.46DL+0.7ELZ	44.763	345.543	102.484	306.995	7.719	2.996

Mo-xx: Governing Overturning Moment about AD or BC
Ms-xx: Governing Stablizing Moment about AD or BC
OSF-xx: Ratio of Ms-xx to Mo-xx

Sliding Check (Service)

Description	Categories and Factors	Va-xx (k)	Vr-xx (k)	Va-zz (k)	Vr-zz (k)	SR-xx	SR-zz
D	1DL	0.2	6.356	0.1	6.356	31.78	63.56
-0.2	1DL+1RLL	0.73	7.944	0.51	7.944	10.882	15.576
0.1	1DL+1SL	0.2	6.356	0.1	6.356	31.78	63.56
124.3	1DL+1OL3	0.2	6.356	0.1	6.356	31.78	63.56
34.9	1DL+0.75RLL	0.598	7.547	0.407	7.547	12.631	18.52
ASCE 2.4.1-4b	1DL+0.75SL	0.2	6.356	0.1	6.356	31.78	63.56
ASCE 2.4.1-4b	1DL+0.75OL3	0.2	6.356	0.1	6.356	31.78	63.56
ASCE 2.4.1-5a	1DL+1WL+X	0	5.748	0.2	5.748	NA	28.74
ASCE 2.4.1-5a	1DL+1WL-X	0.09	5.892	0.04	5.892	65.467	147.3
ASCE 2.4.1-5a	1DL+1WL+Z	0.58	7.196	0.05	7.196	12.407	143.92
ASCE 2.4.1-5a	1DL+1WL-Z	0.42	7.088	0.04	7.088	16.876	177.2
ASCE 2.4.1-5a	1DL+1OL1	0.02	5.816	0.14	5.816	290.8	41.543
ASCE 2.4.1-5a	1DL+1OL2	0.4	6.896	0	6.896	17.24	NA
ASCE 2.4.1-5b	1.14DL+0.7ELX	0.389	7.246	0.502	7.246	18.627	14.434
ASCE 2.4.1-5b	1.14DL+0.7ELZ	0.753	7.246	0.366	7.246	9.623	19.797
ASCE 2.4.1-6a..	1DL+0.75WL+X+0.7..	0.448	7.091	0.482	7.091	15.846	14.696
ASCE 2.4.1-6a..	1DL+0.75WL-X+0.7..	0.38	7.199	0.362	7.199	18.945	19.859
ASCE 2.4.1-6a..	1DL+0.75WL+Z+0.7..	0.883	8.177	0.37	8.177	9.266	22.1
ASCE 2.4.1-6a..	1DL+0.75WL-Z+0.7..	0.763	8.096	0.302	8.096	10.618	26.764
ASCE 2.4.1-6a..	1DL+0.75OL1+0.75..	0.432	7.142	0.438	7.142	16.513	16.325
ASCE 2.4.1-6a..	1DL+0.75OL2+0.75..	0.747	7.952	0.332	7.952	10.638	23.916
ASCE 2.4.1-6a..	1DL+0.75WL+X+0.7..	0.05	5.9	0.175	5.9	118	33.714
ASCE 2.4.1-6a..	1DL+0.75WL-X+0.7..	0.017	6.008	0.055	6.008	343.314	109.236
ASCE 2.4.1-6a..	1DL+0.75WL+Z+0.7..	0.485	6.986	0.062	6.986	14.404	111.776
ASCE 2.4.1-6a..	1DL+0.75WL-Z+0.7..	0.365	6.905	0.005	6.905	18.918	1381
ASCE 2.4.1-6a..	1DL+0.75OL1+0.75SL	0.035	5.951	0.13	5.951	170.029	45.777
ASCE 2.4.1-6a..	1DL+0.75OL2+0.75SL	0.35	6.761	0.025	6.761	19.317	270.44
ASCE 2.4.1-6b	1.105DL+0.525ELX..	0.342	7.023	0.352	7.023	20.551	19.981
ASCE 2.4.1-6b	1.105DL+0.525ELZ..	0.615	7.023	0.299	7.023	11.425	23.45
ASCE 2.4.1-7	0.6DL+1WL+X	0.08	3.206	0.16	3.206	40.07	20.035
ASCE 2.4.1-7	0.6DL+1WL-X	0.17	3.35	0	3.35	19.704	NA
ASCE 2.4.1-7	0.6DL+1WL+Z	0.5	4.654	0.01	4.654	9.307	465.36
ASCE 2.4.1-7	0.6DL+1WL-Z	0.34	4.546	0.08	4.546	13.369	56.82
ASCE 2.4.1-7	0.6DL+1OL1	0.1	3.274	0.1	3.274	32.736	32.736
ASCE 2.4.1-7	0.6DL+1OL2	0.32	4.354	0.04	4.354	13.605	108.84
ASCE 2.4.1-8	0.46DL+0.7ELX	0.253	2.924	0.57	2.924	11.556	5.129
ASCE 2.4.1-8	0.46DL+0.7ELZ	0.617	2.924	0.298	2.924	4.739	9.811

Va-xx: Applied Lateral Force to Cause Sliding Along xx Axis
Vr-xx: Resisting Lateral Force Against Sliding Along xx Axis
SR-xx: Ratio of Vr-xx to Va-xx

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	1.302	-0.057	0.316	-3.052	-49.773	66.924	SERVICE D
1	Column2	1	1.677	-0.145	-0.166	1.696	26.137	83.835	SERVICE D
1	Column3	1	1.300	-0.057	-0.316	3.051	49.752	66.688	SERVICE D
1	Column4	1	1.677	-0.145	0.166	-1.695	-26.123	83.830	SERVICE D
1	Column5	1	1.677	-0.176	0.000	0.000	0.007	78.880	SERVICE D
2	Column1	1	1.997	-0.168	0.939	-9.060	-147.996	141.537	SERVICE Lr
2	Column2	1	3.973	-0.409	-0.529	5.265	83.448	270.093	SERVICE Lr
2	Column3	1	1.974	-0.168	-0.938	9.050	147.783	139.183	SERVICE Lr
2	Column4	1	3.973	-0.409	0.528	-5.260	-83.317	270.035	SERVICE Lr
2	Column5	1	3.972	-0.512	0.000	0.003	0.062	253.608	SERVICE Lr
3	Column1	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
3	Column2	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
3	Column3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
3	Column4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
3	Column5	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE S
4	Column1	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Su
4	Column2	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Su
4	Column3	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Su
4	Column4	1	0.000	0.000	0.000	0.000	0.000	0.000	SERVICE Su
4	Column5	1	0.000	0.000	0.000	0.000	0.000	0.000	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
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
7	Column1	1	-0.763	-0.057	-0.392	3.262	61.675	-65.975	SERVICE Wx (LC A; y = 0°)
7	Column2	1	-1.520	-0.067	0.220	-1.880	-34.676	-124.185	SERVICE Wx (LC A; y = 0°)
7	Column3	1	-0.757	-0.056	0.391	-3.236	-61.581	-65.356	SERVICE Wx (LC A; y = 0°)
7	Column4	1	-1.520	-0.067	-0.220	1.903	34.685	-124.169	SERVICE Wx (LC A; y = 0°)
7	Column5	1	-1.520	-0.026	0.000	0.012	0.005	-117.770	SERVICE Wx (LC A; y = 0°)
8	Column1	1	-0.583	-0.002	-0.517	4.765	81.422	-83.515	SERVICE Wx (LC B; y = 0°)
8	Column2	1	-1.161	0.055	0.291	-2.750	-45.798	-156.830	SERVICE Wx (LC B; y = 0°)
8	Column3	1	-0.579	-0.002	0.516	-4.728	-81.320	-82.736	SERVICE Wx (LC B; y = 0°)
8	Column4	1	-1.161	0.056	-0.291	2.782	45.790	-156.811	SERVICE Wx (LC B; y = 0°)
8	Column5	1	-1.161	0.109	0.000	0.016	-0.003	-148.445	SERVICE Wx (LC B; y = 0°)
9	Column1	1	1.051	0.058	0.674	-5.823	-106.155	110.819	SERVICE Wx (LC A; y = 180°)
9	Column2	1	2.095	0.054	-0.379	3.356	59.752	211.062	SERVICE Wx (LC A; y = 180°)
9	Column3	1	1.043	0.057	-0.673	5.776	106.003	109.769	SERVICE Wx (LC A; y = 180°)
9	Column4	1	2.095	0.054	0.379	-3.397	-59.759	211.033	SERVICE Wx (LC A; y = 180°)
9	Column5	1	2.094	-0.020	0.000	-0.020	-0.005	199.478	SERVICE Wx (LC A; y = 180°)
10	Column1	1	0.917	0.088	0.381	-2.940	-59.976	65.426	SERVICE Wx (LC B; y = 180°)
10	Column2	1	1.828	0.140	-0.215	1.692	33.745	124.600	SERVICE Wx (LC B; y = 180°)
10	Column3	1	0.911	0.087	-0.381	2.915	59.874	64.805	SERVICE Wx (LC B; y = 180°)
10	Column4	1	1.828	0.140	0.215	-1.714	-33.764	124.582	SERVICE Wx (LC B; y = 180°)
10	Column5	1	1.828	0.099	0.000	-0.011	-0.011	118.165	SERVICE Wx (LC B; y = 180°)
11	Column1	1	-0.680	-0.043	-0.391	3.351	61.568	-65.316	SERVICE Wz (LC A; y = 90°)
11	Column2	1	-1.353	-0.039	0.220	-1.920	-34.603	-122.562	SERVICE Wz (LC A; y = 90°)
11	Column3	1	-0.673	-0.042	0.390	-3.308	-61.423	-64.328	SERVICE Wz (LC A; y = 90°)
11	Column4	1	-1.353	-0.039	-0.220	1.958	34.612	-122.537	SERVICE Wz (LC A; y = 90°)
11	Column5	1	-1.353	0.001	0.000	0.019	0.006	-116.161	SERVICE Wz (LC A; y = 90°)
12	Column1	1	0.680	0.045	0.394	-3.351	-62.085	65.597	SERVICE Wz (LC B; y = 90°)
12	Column2	1	1.353	0.050	-0.222	1.919	34.918	124.255	SERVICE Wz (LC B; y = 90°)
12	Column3	1	0.673	0.043	-0.393	3.308	61.936	64.596	SERVICE Wz (LC B; y = 90°)
12	Column4	1	1.353	0.050	0.222	-1.957	-34.930	124.228	SERVICE Wz (LC B; y = 90°)
12	Column5	1	1.353	0.008	0.000	-0.019	-0.008	117.570	SERVICE Wz (LC B; y = 90°)
13	Column1	1	0.000	0.525	0.404	-0.985	-51.181	74.541	SERVICE Ex
13	Column2	1	0.000	0.877	-0.228	0.562	29.175	131.075	SERVICE Ex
13	Column3	1	0.000	0.524	-0.404	0.951	51.112	74.374	SERVICE Ex
13	Column4	1	0.000	0.877	0.228	-0.595	-29.224	131.094	SERVICE Ex
13	Column5	1	0.000	0.956	0.000	-0.017	-0.024	143.440	SERVICE Ex
14	Column1	1	0.000	0.495	-0.644	44.370	94.817	70.213	SERVICE Ez
14	Column2	1	0.000	-0.359	-0.751	44.515	108.103	-53.725	SERVICE Ez
14	Column3	1	0.000	-0.494	-0.644	44.380	94.775	-70.074	SERVICE Ez
14	Column4	1	0.000	0.359	-0.752	44.508	108.129	53.554	SERVICE Ez
14	Column5	1	0.000	0.000	-0.796	44.576	113.853	-0.006	SERVICE Ez

Company:		Page:	1
Address:		Specifier:	chreva
Phone I Fax:	|	E-Mail:	
Design:	P17798	Date:	5/29/2024
Fastening point:			

Specifier's comments:

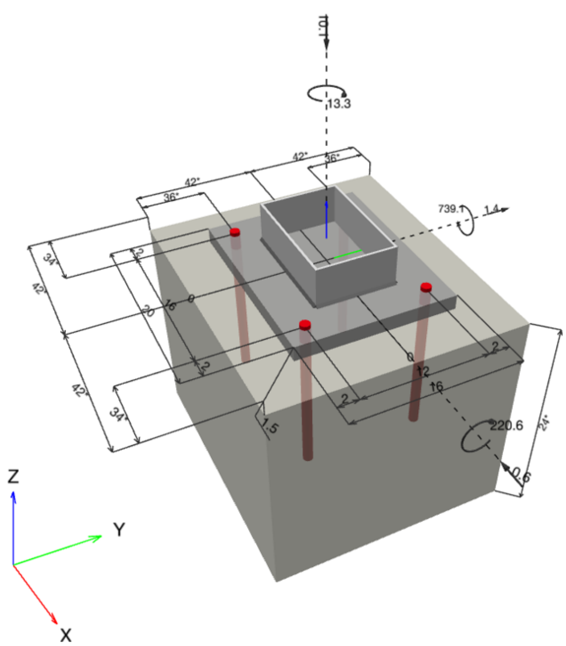
1 Anchor Design

1.1 Input data

Anchor type and diameter:	**Heavy Hex Head ASTM F 1554 GR. 55 1**
Item number:	not available
Effective embedment depth:	h_{ef} = 15.000 in.
Material:	ASTM F 1554
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-19 / CIP
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 = 20.000 in. x 16.000 in. x 1.500 in.;
Profile:	Rectangular HSS (AISC), HSS12X8X.250; (L x W x T) = 12.000 in. x 8.000 in. x 0.250 in.
Base material:	cracked concrete, Custom, f_c' = 4,500 psi; h = 24.000 in.
Reinforcement:	tension: not present, shear: not present;
	edge reinforcement: none or < No. 4 bar

^{CBFEM} - The anchor calculation is based on a component-based Finite Element Method (CBFEM)

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



Company:		Page:	2
Address:		Specifier:	chreva
Phone I Fax:	|	E-Mail:	
Design:	P17798	Date:	5/29/2024
Fastening point:			

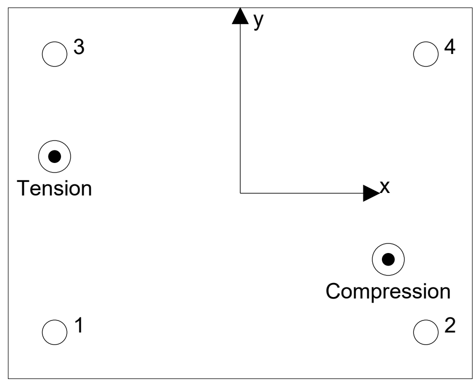
1.1.1 Load combination and design results

Case	Description	Forces [kip] / Moments [in.kip]	Seismic	Max. Util. Anchor [%]
1	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	$N = -10.100$; $V_x = -0.600$; $V_y = -1.400$; $M_x = 220.800000$; $M_y = 739.300000$; $M_z = 13.300000$;	no	88
2	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	$N = -10.100$; $V_x = -0.600$; $V_y = 1.400$; $M_x = -220.600000$; $M_y = 739.100000$; $M_z = -13.300000$;	no	88
3	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	$N = -10.400$; $V_x = -0.500$; $V_y = -1.400$; $M_x = 214.100000$; $M_y = 719.600000$; $M_z = 12.800000$;	no	85
4	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	$N = -10.400$; $V_x = -0.500$; $V_y = 1.400$; $M_x = -214.000000$; $M_y = 719.500000$; $M_z = -12.800000$;	no	85
5	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	$N = -5.600$; $V_x = -0.300$; $V_y = 2.500$; $M_x = -395.200000$; $M_y = 405.700000$; $M_z = -23.100000$;	no	79
6	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	$N = -5.600$; $V_x = -0.300$; $V_y = -2.500$; $M_x = 394.600000$; $M_y = 400.600000$; $M_z = 23.100000$;	no	79
7	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	$N = -5.800$; $V_x = -0.200$; $V_y = 2.400$; $M_x = -383.300000$; $M_y = 395.800000$; $M_z = -22.200000$;	no	77
8	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	$N = -5.700$; $V_x = -0.200$; $V_y = -2.400$; $M_x = 382.800000$; $M_y = 390.500000$; $M_z = 22.200000$;	no	76
9	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)	$N = -9.500$; $V_x = -0.700$; $V_y = -1.300$; $M_x = 199.000000$; $M_y = 661.400000$; $M_z = 12.100000$;	no	78
10	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)	$N = -9.500$; $V_x = -0.700$; $V_y = 1.300$; $M_x = -198.900000$; $M_y = 661.300000$; $M_z = -12.100000$;	no	78
11	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	$N = -10.100$; $V_x = -0.900$; $V_y = 0.000$; $M_x = 0.100000$; $M_y = 692.500000$; $M_z = 0.000000$;	no	62
12	1.2D + 1.6Lr + 0.5Wx (LC B; y = 180°)	$N = -9.900$; $V_x = -0.600$; $V_y = -1.300$; $M_x = 198.200000$; $M_y = 662.600000$; $M_z = 11.900000$;	no	78
13	1.2D + 1.6Lr + 0.5Wx (LC B; y = 180°)	$N = -9.900$; $V_x = -0.600$; $V_y = 1.300$; $M_x = -198.100000$; $M_y = 662.400000$; $M_z = -11.900000$;	no	78
14	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	$N = -10.400$; $V_x = -0.800$; $V_y = 0.000$; $M_x = 0.100000$; $M_y = 674.500000$; $M_z = 0.000000$;	no	60
15	1.2D + 1.0Wx (LC A; y = 180°) + 0.5Lr	$N = -7.500$; $V_x = -0.200$; $V_y = -1.100$; $M_x = 176.000000$; $M_y = 604.200000$; $M_z = 10.300000$;	no	72
16	1.2D + 1.0Wx (LC A; y = 180°) + 0.5Lr	$N = -7.500$; $V_x = -0.200$; $V_y = 1.100$; $M_x = -175.900000$; $M_y = 604.100000$; $M_z = -10.300000$;	no	72
17	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))	$N = -8.800$; $V_x = -0.700$; $V_y = -1.200$; $M_x = 184.300000$; $M_y = 606.400000$; $M_z = 11.400000$;	no	72

Case	Description	Forces [kip] / Moments [in.kip]	Seismic	Max. Util. Anchor [%]
18	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))	N = -8.800; V_x = -0.700; V_y = 1.200; M_x = -184.100000; M_y = 606.300000; M_z = -11.400000;	no	72
19	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)	N = -9.500; V_x = -0.900; V_y = 0.000; M_x = 0.100000; M_y = 619.700000; M_z = 0.000000;	no	55
20	1.2D + 1.6Lr + 0.5Wx (Min.)	N = -8.400; V_x = -0.500; V_y = -1.100; M_x = 177.200000; M_y = 589.300000; M_z = 10.700000;	no	70

1.2 Load case/Resulting anchor forces

Controlling load case: 2 1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)



Anchor reactions [kip]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	17.356	0.542	0.047	-0.540
2	-0.002	0.126	0.058	-0.112
3	29.793	0.756	-0.315	-0.687
4	-0.000	0.395	-0.390	-0.061

resulting tension force in (x/y)=(-8.000/1.583): 47.147 [kip]
resulting compression force in (x/y)=(6.380/-2.854): 58.509 [kip]

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

1.3 Tension load

	Load N_{ua} [kip]	Capacity ϕ N_n [kip]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	29.793	34.087	88	OK
Pullout Strength*	29.793	37.825	79	OK
Concrete Breakout Failure**	47.149	81.118	59	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}	$\phi\ N_{sa}$ [kip]	N_{ua} [kip]
45.450	0.750	34.087	29.793

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]	$\phi_{concrete}$	$\phi\ N_{pn}$ [kip]	N_{ua} [kip]
54.036	0.700	37.825	29.793

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.]	$\psi_{c,N}$
15.000	0.000	1.583	34.000	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]
2,565.00	2,025.00	1.000	0.934	1.000	1.000	97.922

Results

N_{cbg} [kip]	$\phi_{concrete}$	$\phi\ N_{cbg}$ [kip]	N_{ua} [kip]
115.883	0.700	81.118	47.149

1.4 Shear load

	Load V_{ua} [kip]	Capacity ϕ V_n [kip]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	0.756	17.725	5	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength*	0.756	58.847	2	OK
Concrete edge failure in direction y-**	1.568	40.866	4	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}	ϕ V_{sa} [kip]	V_{ua} [kip]
27.270	0.650	17.725	0.756

1.4.2 Pryout Strength

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

$\phi\ V_{cp} \geq V_{ua}$ 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)

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

$\psi_{cp,N} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ 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

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	15.000	0.000	0.000	34.000

$\psi_{c,N}$	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]
869.25	2,025.00	1.000	1.000	1.000	1.000	97.922

Results

V_{cp} [kip]	$\phi_{concrete}$	$\phi\ V_{cp}$ [kip]	V_{ua} [kip]
84.067	0.700	58.847	0.756

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.]
22.667	34.000	5.381	1.000	24.000

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]
2,016.00	2,312.00	0.863	1.000	1.190	65.152

Results

V_{cbg} [kip]	$\phi_{concrete}$	$\phi\ V_{cbg}$ [kip]	V_{ua} [kip]
58.380	0.700	40.866	1.568

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

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.874	0.043	1.000	77	OK

$\beta_{NV} = (\beta_N + \beta_V) / 1.2 <= 1$

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!
- 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.
- 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."

1.7 Installation data

Profile: Rectangular HSS (AISC), HSS12X8X.250; (L x W x T) = 12.000 in. x 8.000 in. x 0.250 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

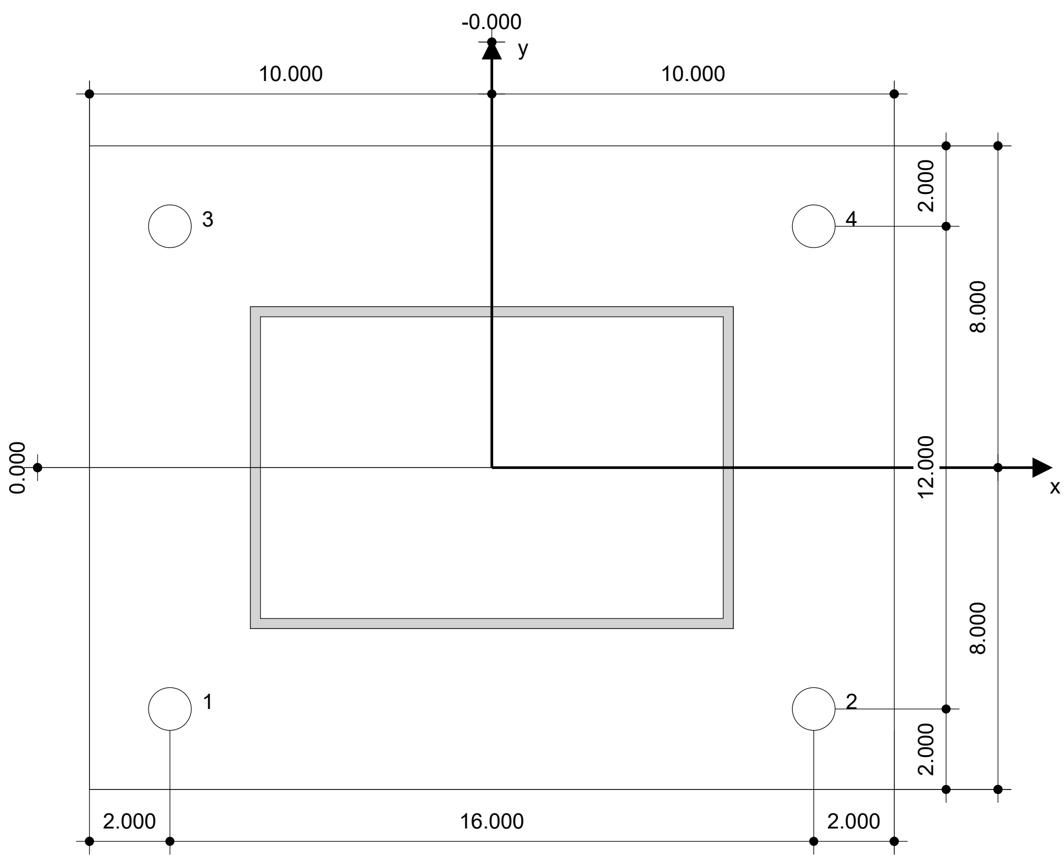
Maximum installation torque: -

Hole diameter in the base material: - in.

Hole depth in the base material: 15.000 in.

Minimum thickness of the base material: 16.172 in.

Hilti Heavy Hex Head headed stud anchor with 15 in embedment, 1, Steel galvanized, installation per instruction for use



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-8.000	-6.000	34.000	50.000	36.000	48.000
2	8.000	-6.000	50.000	34.000	36.000	48.000
3	-8.000	6.000	34.000	50.000	48.000	36.000
4	8.000	6.000	50.000	34.000	48.000	36.000

Company:		Page:	11
Address:		Specifier:	chreva
Phone I Fax:	|	E-Mail:	
Design:	P17798	Date:	5/29/2024
Fastening point:			

2 Anchor plate design

2.1 Input data

Anchor plate:	Shape: Rectangular l_x x l_y x t = 20.000 in x 16.000 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} = 15.000 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
Stand-off installation:	e_b = 0.000 in (No stand-off); t = 1.500 in
Profile:	HSS12X8X.250; (L x W x T x FT) = 12.000 in x 8.000 in x 0.250 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 = 24.000 in; E = 3,823,676 psi; G = 1,662,467 psi; v = 0.15; D = 145.00 lb/ft³
Welds (profile to 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		Anchor plate			Welds [%]	Concrete [%]
		σ_{Ed} [psi]	ε_{Pl} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Hole bearing [%]		
1	**1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)**	**35,784**	**0.00**	**24,633**	**0.00**	**1**	**85**	**12**
2	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	35,784	0.00	24,601	0.00	1	85	12
3	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	35,024	0.00	23,817	0.00	1	84	12
4	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	35,030	0.00	23,790	0.00	1	84	12
5	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	32,462	0.00	22,276	0.00	1	83	10
6	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	32,394	0.00	22,179	0.00	1	83	10
7	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y	31,922	0.00	21,615	0.00	1	82	10

	= 90°))							
8	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	31,862	0.00	21,531	0.00	1	82	10
9	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)	32,956	0.00	21,871	0.00	1	82	11
10	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)	32,966	0.00	21,838	0.00	1	82	11
11	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	27,624	0.00	17,356	0.00	1	78	10
12	1.2D + 1.6Lr + 0.5Wx (LC B; y = 180°)	32,994	0.00	21,808	0.00	1	82	11
13	1.2D + 1.6Lr + 0.5Wx (LC B; y = 180°)	33,001	0.00	21,772	0.00	1	82	11
14	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	27,142	0.00	16,730	0.00	1	78	10
15	1.2D + 1.0Wx (LC A; y = 180°) + 0.5Lr	30,760	0.00	19,915	0.00	1	81	10
16	1.2D + 1.0Wx (LC A; y = 180°) + 0.5Lr	30,771	0.00	19,867	0.00	1	81	10
17	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))	31,175	0.00	20,026	0.00	1	81	10
18	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))	31,185	0.00	19,975	0.00	1	81	10
19	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)	25,778	0.00	15,162	0.00	1	78	9
20	1.2D + 1.6Lr + 0.5Wx (Min.)	30,511	0.00	19,438	0.00	1	80	10

2.3 Anchor plate classification

Results below are displayed for the decisive load combinations: 1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)

Anchor tension forces	Equivalent rigid anchor plate (CBFEM)	Component-based Finite Element Method (CBFEM) anchor plate design
Anchor 1	15.568 kip	17.356 kip
Anchor 2	-0.003 kip	-0.002 kip
Anchor 3	29.479 kip	29.793 kip
Anchor 4	-0.001 kip	-0.000 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

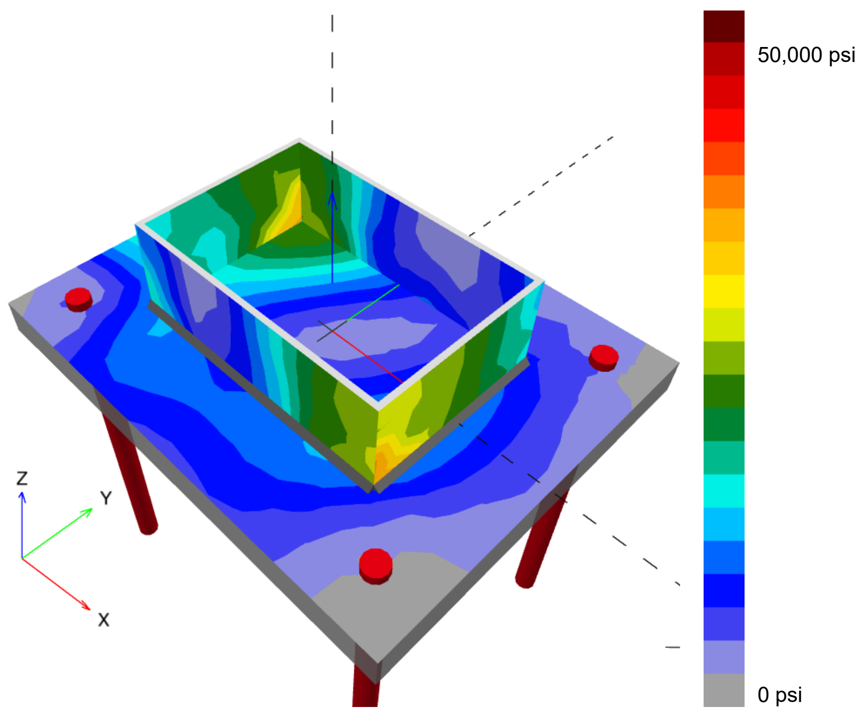
Profile and stiffeners are verified at the level of the steel to concrete connection. The connection design does not replace the steel design for critical cross sections, which should be performed outside of PROFIS Engineering.

2.4.1 Equivalent stress and plastic strain

Part	Load combination	Material	f_y [psi]	ε_{lim} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Status
Plate	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	ASTM A36	36,000	5.00	24,633	0.00	OK
Profile	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	ASTM A500 Gr.C Rect	50,000	5.00	33,988	0.00	OK
Profile	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	ASTM A500 Gr.C Rect	50,000	5.00	35,784	0.00	OK
Profile	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	ASTM A500 Gr.C Rect	50,000	5.00	27,673	0.00	OK
Profile	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	ASTM A500 Gr.C Rect	50,000	5.00	24,745	0.00	OK

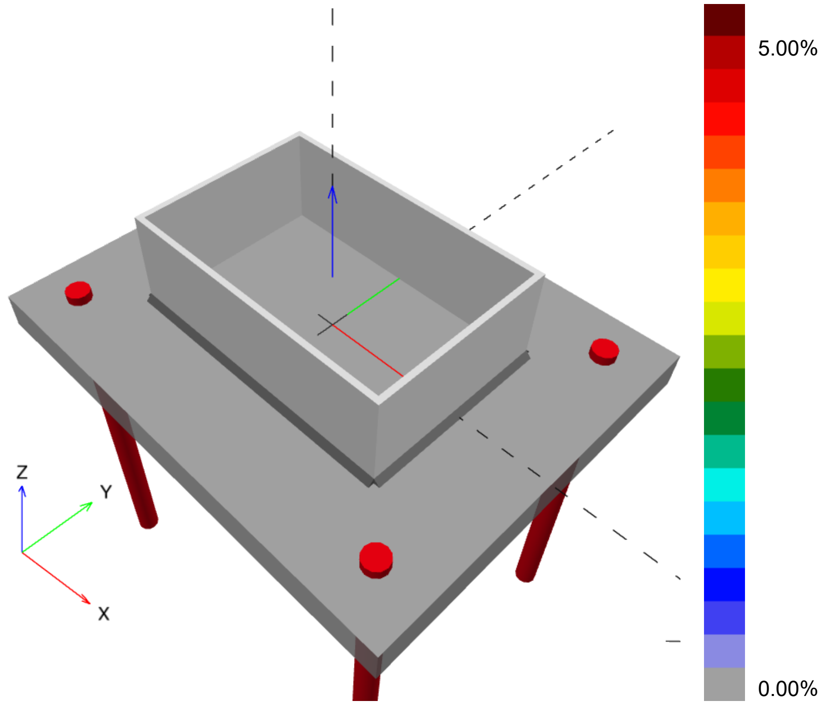
2.4.1.1 Equivalent stress

Results below are displayed for the decisive load combination: 1 - 1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)



2.4.1.2 Plastic strain

Results below are displayed for the decisive load combination: 1 - 1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)



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

Decisive load combination: 1 - 1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)

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	10.938	1.500	58,000	1.000	208.800
Anchor 2	15.244	1.500	58,000	1.000	208.800
Anchor 3	1.669	1.500	58,000	1.000	174.252
Anchor 4	1.493	1.500	58,000	1.000	155.878

Results

	V [kip]	ΦR_n [kip]	Utilization [%]	Status
Anchor 1	0.542	156.600	1	OK
Anchor 2	0.126	156.600	1	OK
Anchor 3	0.756	130.689	1	OK

	V [kip]	ΦR_n [kip]	Utilization [%]	Status
Anchor 4	0.395	116.909	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 + 1.6Lr + 0.5Wx (LC A; y = 180°)

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]
Member 1-tfl 1	E70xx	◢0.176	0.249	7.988	1.331	70,000	71.2	0.23
Member 1-bfl 1	E70xx	0.176◣	0.249	7.988	1.331	70,000	77.1	0.23
Member 1-w 1	E70xx	◢0.176	0.249	11.482	1.276	70,000	78.2	0.22
Member 1-w 2	E70xx	0.176◣	0.249	11.482	1.276	70,000	76.5	0.22

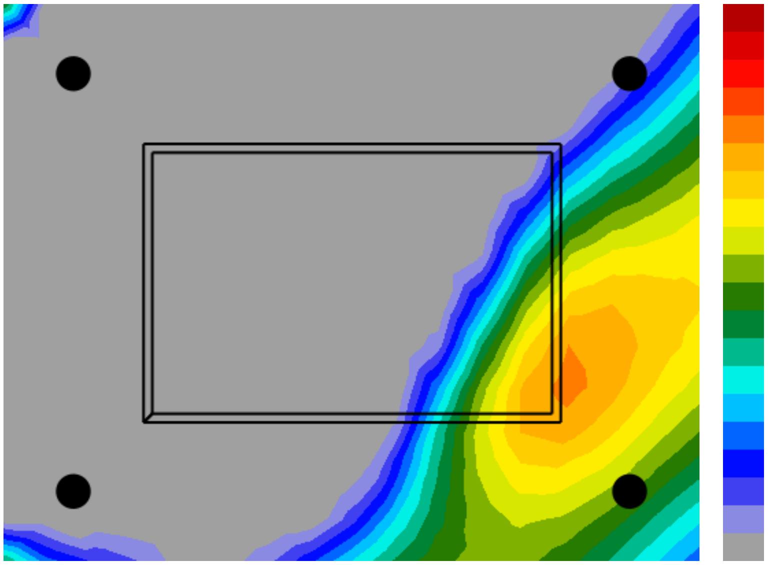
Results

Edge	F_n [kip]	ΦR_n [kip]	Utilization [%]	Status
Member 1-tfl 1	9.140	10.780	85	OK
Member 1-bfl 1	8.918	10.932	82	OK
Member 1-w 1	8.557	10.497	82	OK
Member 1-w 2	8.796	10.464	85	OK

2.6 Concrete

Decisive load combination: 1 - 1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)

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

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

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

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

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

Variables

N [kip]	f_c' [psi]	Φ	A_1 [in²]	A_2 [in²]
58.509	4,500	0.65	103.60	5,167.78

Results

Load combination	F_p [psi]	σ [psi]	Utilization [%]	Status
1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	4,973	565	12	OK

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.

Company:		Page:	18
Address:		Specifier:	chreva
Phone I Fax:	|	E-Mail:	
Design:	P17798	Date:	5/29/2024
Fastening point:			

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 + 1.6Lr + 0.5Wx (LC A; y = 180°)	88%	OK
Anchor plate	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	69%	OK
Welds	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	85%	OK
Concrete	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	12%	OK
Profile	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	72%	OK

Fastening meets the design criteria!

Company:		Page:	19
Address:		Specifier:	chreva
Phone I Fax:	|	E-Mail:	
Design:	P17798	Date:	5/29/2024
Fastening point:			

4 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

STRENGTH DESIGN COLUMN BASE REACTIONS

Strength Design Reactions (Factored)

LC	Load Combination Description	N [k]	Vx [k]	Vy [k]	Mz [in-kip]	Mx [in-kip]	My [in-kip] (strong axis)	Column*
92	1.4D	-1.8	-0.1	0.4	-4.3	-69.8	93.9	Column1
93	1.2D + 0.5Lr	-2.6	-0.1	0.9	-8.2	-134.2	151.8	Column1
94	1.2D + 0.5S	-1.6	-0.1	0.4	-3.7	-59.8	80.4	Column1
95	1.2D + 1.6Lr + 0.5Wx (LC A; y = 0°)	-7.1	-0.8	-0.9	8.9	137.6	436.9	Column2
96	1.2D + 1.6Lr + 0.5Wx (LC B; y = 0°)	-7.4	-0.8	-0.8	8.2	128.2	408.6	Column2
97	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)	-10.1	-0.6	-1.4	13.3	220.8	739.3	Column2
98	1.2D + 1.6Lr + 0.5Wx (LC B; y = 180°)	-9.9	-0.6	-1.3	11.9	198.2	662.6	Column2
99	1.2D + 1.6Lr + 0.5Wz (LC A; y = 90°)	-7.2	-0.8	-0.9	8.9	137.8	438.6	Column2
100	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)	-9.5	-0.7	-1.3	12.1	199.0	661.4	Column2
101	1.2D + 1.6Lr + 0.5Wx (Min.)	-8.4	-0.5	-1.1	10.7	177.2	589.3	Column2
102	1.2D + 1.6Lr + 0.5Wz (Min.)	-8.4	-0.9	-1.3	22.5	201.9	534.4	Column2
103	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y =	-3.9	-0.4	1.4	-14.1	-220.7	226.0	Column1
104	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A;	-8.8	-0.7	-1.2	11.4	184.3	606.4	Column2
105	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y =	-8.5	-0.7	1.0	-10.0	-161.0	527.3	Column4
106	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B;	-10.4	-0.5	-1.4	12.8	214.1	719.6	Column2
107	1.2D + 1.6Lr + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))	-8.4	-0.6	-1.3	19.6	200.2	568.1	Column2
108	1.2D + 1.6S + 0.5Wx (LC A; y = 0°)	-0.9	-0.1	0.0	1.0	7.8	25.1	Column3
109	1.2D + 1.6S + 0.5Wx (LC B; y = 0°)	-1.0	-0.1	0.0	-0.3	-7.2	-32.0	Column2
110	1.2D + 1.6S + 0.5Wx (LC A; y = 180°)	-3.8	-0.1	-0.5	4.8	81.7	279.1	Column2
111	1.2D + 1.6S + 0.5Wx (LC B; y = 180°)	-2.3	0.0	0.7	-6.1	-110.3	135.5	Column1
112	1.2D + 1.6S + 0.5Wz (LC A; y = 90°)	-1.0	-0.1	-0.1	0.9	8.0	26.0	Column3
113	1.2D + 1.6S + 0.5Wz (LC B; y = 90°)	-2.1	0.0	0.7	-6.5	-112.1	135.6	Column1
114	1.2D + 1.6S + 0.5Wx (Min.)	-1.6	0.0	0.5	-4.0	-74.4	94.6	Column1
115	1.2D + 1.6S + 0.5Wz (Min.)	-1.6	-0.2	-0.6	15.4	88.3	56.9	Column3
116	1.2D + 1.6S + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y =	-0.2	-0.3	0.1	-0.4	-12.5	-56.3	Column2
117	1.2D + 1.6S + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y	-1.8	-0.1	0.6	-5.2	-87.1	108.5	Column1
118	1.2D + 1.6S + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y =	-1.6	0.0	0.3	-2.8	-47.6	69.3	Column1
119	1.2D + 1.6S + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y	-2.6	0.0	0.9	-7.6	-137.4	163.5	Column1
120	1.2D + 1.6S + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))	-2.0	-0.1	-0.4	11.0	62.6	119.5	Column2
121	1.2D + 1.6Su + 0.5Wx (LC A; y = 0°)	-0.9	-0.1	0.0	1.0	7.8	25.1	Column3
122	1.2D + 1.6Su + 0.5Wx (LC B; y = 0°)	-1.0	-0.1	0.0	-0.3	-7.2	-32.0	Column2
123	1.2D + 1.6Su + 0.5Wx (LC A; y = 180°)	-3.8	-0.1	-0.5	4.8	81.7	279.1	Column2
124	1.2D + 1.6Su + 0.5Wx (LC B; y = 180°)	-2.3	0.0	0.7	-6.1	-110.3	135.5	Column1
125	1.2D + 1.6Su + 0.5Wz (LC A; y = 90°)	-1.0	-0.1	-0.1	0.9	8.0	26.0	Column3
126	1.2D + 1.6Su + 0.5Wz (LC B; y = 90°)	-2.1	0.0	0.7	-6.5	-112.1	135.6	Column1
127	1.2D + 1.6Su + 0.5Wx (Min.)	-1.6	0.0	0.5	-4.0	-74.4	94.6	Column1
128	1.2D + 1.6Su + 0.5Wz (Min.)	-1.6	-0.2	-0.6	15.4	88.3	56.9	Column3
129	1.2D + 1.6Su + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y	-0.2	-0.3	0.1	-0.4	-12.5	-56.3	Column2
130	1.2D + 1.6Su + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A	-1.8	-0.1	0.6	-5.2	-87.1	108.5	Column1
131	1.2D + 1.6Su + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y	-1.6	0.0	0.3	-2.8	-47.6	69.3	Column1
132	1.2D + 1.6Su + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B	-2.6	0.0	0.9	-7.6	-137.4	163.5	Column1
133	1.2D + 1.6Su + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))	-2.0	-0.1	-0.4	11.0	62.6	119.5	Column2
134	1.2D + 1.6Ssliding + 0.5Wx (LC A; y = 0°)	-0.9	-0.1	0.0	1.0	7.8	25.1	Column3
135	1.2D + 1.6Ssliding + 0.5Wx (LC B; y = 0°)	-1.0	-0.1	0.0	-0.3	-7.2	-32.0	Column2
136	1.2D + 1.6Ssliding + 0.5Wx (LC A; y = 180°)	-3.8	-0.1	-0.5	4.8	81.7	279.1	Column2
137	1.2D + 1.6Ssliding + 0.5Wx (LC B; y = 180°)	-2.3	0.0	0.7	-6.1	-110.3	135.5	Column1
138	1.2D + 1.6Ssliding + 0.5Wz (LC A; y = 90°)	-1.0	-0.1	-0.1	0.9	8.0	26.0	Column3
139	1.2D + 1.6Ssliding + 0.5Wz (LC B; y = 90°)	-2.1	0.0	0.7	-6.5	-112.1	135.6	Column1
140	1.2D + 1.6Ssliding + 0.5Wx (Min.)	-1.6	0.0	0.5	-4.0	-74.4	94.6	Column1
141	1.2D + 1.6Ssliding + 0.5Wz (Min.)	-1.6	-0.2	-0.6	15.4	88.3	56.9	Column3
142	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC	-0.2	-0.3	0.1	-0.4	-12.5	-56.3	Column2
143	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (	-1.8	-0.1	0.6	-5.2	-87.1	108.5	Column1
144	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC	-1.6	0.0	0.3	-2.8	-47.6	69.3	Column1
145	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (	-2.6	0.0	0.9	-7.6	-137.4	163.5	Column1
146	1.2D + 1.6Ssliding + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))	-2.0	-0.1	-0.4	11.0	62.6	119.5	Column2
147	1.2D + 1.6Sdrift + 0.5Wx (LC A; y = 0°)	-0.9	-0.1	0.0	1.0	7.8	25.1	Column3
148	1.2D + 1.6Sdrift + 0.5Wx (LC B; y = 0°)	-1.0	-0.1	0.0	-0.3	-7.2	-32.0	Column2
149	1.2D + 1.6Sdrift + 0.5Wx (LC A; y = 180°)	-3.8	-0.1	-0.5	4.8	81.7	279.1	Column2
150	1.2D + 1.6Sdrift + 0.5Wx (LC B; y = 180°)	-2.3	0.0	0.7	-6.1	-110.3	135.5	Column1
151	1.2D + 1.6Sdrift + 0.5Wz (LC A; y = 90°)	-1.0	-0.1	-0.1	0.9	8.0	26.0	Column3
152	1.2D + 1.6Sdrift + 0.5Wz (LC B; y = 90°)	-2.1	0.0	0.7	-6.5	-112.1	135.6	Column1
153	1.2D + 1.6Sdrift + 0.5Wx (Min.)	-1.6	0.0	0.5	-4.0	-74.4	94.6	Column1
154	1.2D + 1.6Sdrift + 0.5Wz (Min.)	-1.6	-0.2	-0.6	15.4	88.3	56.9	Column3
155	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A	-0.2	-0.3	0.1	-0.4	-12.5	-56.3	Column2
156	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC	-1.8	-0.1	0.6	-5.2	-87.1	108.5	Column1
157	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B	-1.6	0.0	0.3	-2.8	-47.6	69.3	Column1

Strength Design Reactions (Factored)

		N	Vx	Vy	Mz	Mx	*strong axis* My	Column*
158	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC	-2.6	0.0	0.9	-7.6	-137.4	163.5	Column1
159	1.2D + 1.6Sdrift + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))	-2.0	-0.1	-0.4	11.0	62.6	119.5	Column2
160	1.2D + 1.0Wx (LC A; y = 0°) + 0.5Lr	-1.3	-0.3	0.2	-2.7	-29.1	40.1	Column1
161	1.2D + 1.0Wx (LC B; y = 0°) + 0.5Lr	-2.1	-0.3	0.0	0.1	-4.5	-32.1	Column2
162	1.2D + 1.0Wx (LC A; y = 180°) + 0.5Lr	-7.5	-0.2	-1.1	10.3	176.0	604.2	Column2
163	1.2D + 1.0Wx (LC B; y = 180°) + 0.5Lr	-7.0	-0.1	-0.8	7.5	131.5	454.3	Column2
164	1.2D + 1.0Wz (LC A; y = 90°) + 0.5Lr	-1.4	-0.2	-0.2	2.7	29.5	41.5	Column3
165	1.2D + 1.0Wz (LC B; y = 90°) + 0.5Lr	-6.3	-0.2	-0.8	7.9	133.3	452.7	Column2
166	1.2D + 1.0Wx (Min.) + 0.5Lr	-4.0	0.1	-0.6	5.0	91.3	316.5	Column2
167	1.2D + 1.0Wz (Min.) + 0.5Lr	-4.0	-0.6	-1.0	28.3	139.2	207.2	Column2
168	1.2D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°)) +	-0.4	-0.5	0.1	-0.1	-14.9	-79.6	Column2
169	1.2D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°)	-4.9	-0.4	-0.7	6.5	104.9	347.9	Column2
170	1.2D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°)) +	-2.7	-0.1	0.7	-6.4	-109.0	128.9	Column1
171	1.2D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°)	-4.6	0.0	1.9	-16.1	-291.9	319.0	Column1
172	1.2D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.)) +0.5Lr	-4.0	-0.2	-0.9	22.6	136.2	274.4	Column2
173	1.2D + 1.0Wx (LC A; y = 0°) + 0.5S	0.5	-0.3	0.2	-1.1	-26.9	-108.7	Column2
174	1.2D + 1.0Wx (LC B; y = 0°) + 0.5S	-0.1	-0.1	0.3	-2.6	-45.5	-163.4	Column2
175	1.2D + 1.0Wx (LC A; y = 180°) + 0.5S	-5.5	0.0	-0.8	7.6	132.6	461.0	Column2
176	1.2D + 1.0Wx (LC B; y = 180°) + 0.5S	-5.1	0.1	-0.6	4.9	88.6	313.5	Column2
177	1.2D + 1.0Wz (LC A; y = 90°) + 0.5S	0.2	-0.3	0.2	-1.2	-26.8	-105.9	Column2
178	1.2D + 1.0Wz (LC B; y = 90°) + 0.5S	-4.3	-0.1	-0.6	5.2	90.5	312.3	Column2
179	1.2D + 1.0Wx (Min.) + 0.5S	-2.0	0.3	0.3	-2.5	-49.4	180.4	Column4
180	1.2D + 1.0Wz (Min.) + 0.5S	-2.0	-0.4	-0.7	25.6	96.7	71.1	Column2
181	1.2D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°)) +	1.6	-0.3	0.4	-2.7	-55.6	-209.4	Column2
182	1.2D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°)	-2.0	0.0	0.7	-6.8	-115.1	137.3	Column1
183	1.2D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°)) +	-2.3	-0.1	0.0	0.0	0.0	54.0	Column5
184	1.2D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°)	-6.0	0.1	-0.8	6.6	119.0	421.0	Column2
185	1.2D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.)) +0.5S	-2.0	0.0	-0.7	19.9	93.8	138.2	Column2
186	0.9D + 1.0Wx (LC A; y = 0°)	1.0	-0.3	0.2	-1.6	-34.6	-133.2	Column2
187	0.9D + 1.0Wx (LC B; y = 0°)	0.4	0.0	0.3	-3.1	-53.2	-187.9	Column2
188	0.9D + 1.0Wx (LC A; y = 180°)	-5.0	0.0	-0.8	7.1	124.4	434.1	Column2
189	0.9D + 1.0Wx (LC B; y = 180°)	-4.6	0.1	-0.5	4.3	80.6	287.1	Column2
190	0.9D + 1.0Wz (LC A; y = 90°)	0.7	-0.2	0.2	-1.7	-34.5	-130.5	Column2
191	0.9D + 1.0Wz (LC B; y = 90°)	-3.8	0.0	-0.5	4.7	82.4	286.0	Column2
192	0.9D + 1.0Wx (Min.)	-1.5	0.3	0.3	-2.0	-41.5	154.9	Column4
193	0.9D + 1.0Wz (Min.)	-1.5	-0.4	-0.7	25.1	88.7	45.8	Column2
194	0.9D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))	0.6	-0.2	0.7	-5.4	-109.3	-102.8	Column3
195	0.9D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°)	-1.6	0.0	0.6	-5.8	-99.9	116.9	Column1
196	0.9D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))	-1.3	0.0	0.1	-1.0	-19.8	37.4	Column1
197	0.9D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°)	-5.5	0.2	-0.7	6.0	110.8	394.2	Column2
198	0.9D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.))	-1.2	0.3	0.1	14.3	-24.0	116.2	Column1
199	1.2D+Ev+Ehx+0.2S	-2.2	0.7	-0.4	2.8	63.3	241.0	Column2
200	0.9D-Ev+Ehx	-1.3	0.8	-0.4	1.9	50.0	198.0	Column2
201	1.2D+Ev+Ehz+0.2S	-2.2	0.2	-0.5	42.5	75.1	163.3	Column4
202	0.9D-Ev+Ehz	-1.3	0.2	-0.6	43.3	88.0	120.4	Column4
203	1.2D+Ev+Ehx+0.3Ehz+0.2S	-2.2	0.6	-0.7	16.0	96.1	224.9	Column2
204	0.9D-Ev+Ehx+0.3Ehz	-1.3	0.7	-0.6	15.2	82.6	181.9	Column2
205	1.2D+Ev+Ehz+0.3Ehx+0.2S	-2.2	-0.3	-1.0	46.9	152.1	95.2	Column2
206	0.9D-Ev+Ehz+0.3Ehx	-1.3	0.5	-0.6	43.0	79.2	159.7	Column4

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

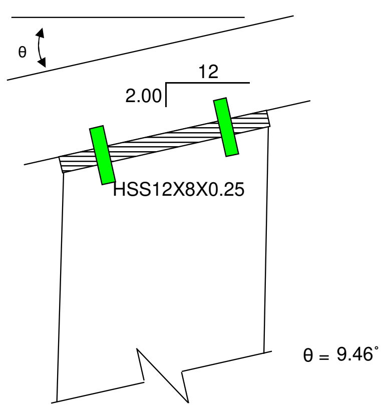
FLYOVER TRUSS

4 BOLTS

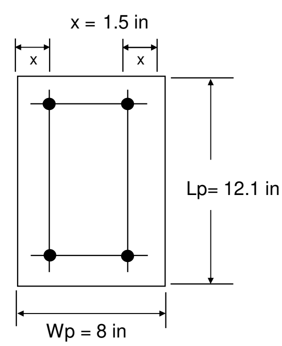
Bolt Check: (4) 1" Diameter, A325 Bolts			Allowable	Actual	Load Combination / Member	
1	Shear	AISC (J3-1)	R_N/Ω 21.2 kip	1.8 kip	84 / Column3	**OK**
2	Tension	AISC (J3-1)	R_N/Ω 35.3 kip	24.7 kip	38 / Column4	**OK**
3	Bearing	AISC (J3-6b,d)	R_N/Ω 53.0 kip	1.8 kip	84 / Column3	**OK**

End Plate Check: 1" Thick			Allowable	Actual	Load Combination / Member	
4	Shear Yielding	AISC (J4-3)	R_N/Ω 115.2 kip	1.5 kip	38 / Column1	**OK**
5	Shear Rupture	AISC (J4-4)	R_N/Ω 102.2 kip	1.5 kip	38 / Column1	**OK**
6	Weld Check *w = 0.25"*	AISC (J2-3)	R_N/Ω 3.7 kip/in	3.5 kip/in	38 / Column4	**OK**
7	Plate Thickness (t_P)		$\sqrt{\frac{4M_{PL}}{22W_P}}$ 0.87 in	1.00 in	38 / Column2	**OK**

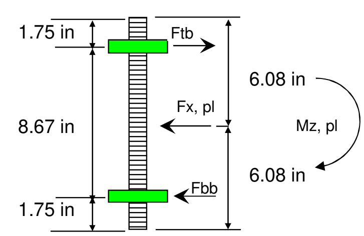
Design Forces / Moments								
Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	84	Column3	0.9	-0.2	-0.7	34.6	5.8	78.7
2	38	Column4	5.8	-0.4	0.9	-8.2	-1.4	510.0
3	84	Column3	0.9	-0.2	-0.7	34.6	5.8	78.7
4	38	Column1	3.2	-0.1	1.5	-14.2	-2.4	278.2
5	38	Column1	3.2	-0.1	1.5	-14.2	-2.4	278.2
6	38	Column4	5.8	-0.4	0.9	-8.2	-1.4	510.0
7	38	Column2	5.8	-0.4	-0.9	8.2	1.4	510.0



Connection Elevation



End Plate Elevation



End Plate Section

Member Height (in):	12	Number of Bolts:	4
Member Width (in):	8	Bolt Diameter (in):	1.000
Member Thickness (in):	0.250	End Plate Thickness (in):	1.000
End Plate Weld Size (in):	0.250	Flange Plate Thickness (in):	1.000

 OK

PURLIN/EAVE CONNECTION
ONE-SIDED

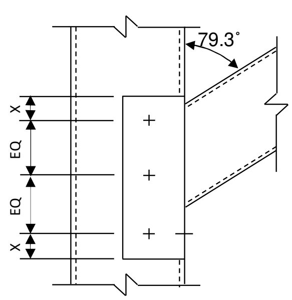
Top Flange Checks: (3) 12-24 Screws				Allowable	Actual	Load Combination / Member	
1	Shear (3 of the screws)			2420 lb	2089 lb	38 / Eave3	OK
2	Tension (none of the screws)			0 lb	0 lb	n/a	OK
3	Shear Yielding (plate)	AISC (J4-3)	R_N/Ω	11756 lb	2089 lb	38 / Eave3	OK
4	Shear Rupture (plate)	AISC (J4-4)	R_N/Ω	12450 lb	2089 lb	38 / Eave3	OK

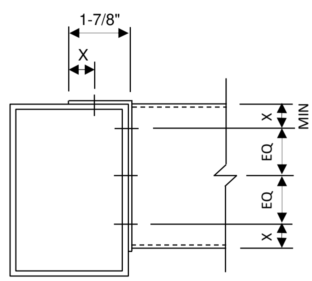
Side Flange Checks: (3) 12-24 Screws				Allowable	Actual	Load Combination / Member	
5	Shear (3 of the screws)			2420 lb	1226 lb	47 / Purlin3	OK
6	Tension (none of the screws)			0 lb	0 lb	n/a	OK
7	Shear Yielding (plate)	AISC (J4-3)	R_N/Ω	7747 lb	1226 lb	47 / Purlin3	OK
8	Shear Rupture (plate)	AISC (J4-4)	R_N/Ω	7606 lb	1226 lb	47 / Purlin3	OK

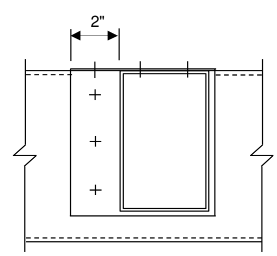
Weld Check: 0.125" Fillet Weld				Allowable	Actual	Load Combination / Member	
9	Weld Check	AISC (J2-3)	R_N/Ω	1.94 kip/in	0.19 kip/in	38 / Eave3	OK

Design Forces / Moments

Check	Load Combination	Member	Fx (Axial) [k]	Fy [k]	Fz [k]	Mx [k-in]	My [k-in]	Mz [k-in]
1	38	Eave3	2.1	0.5	-0.1	0.0	0.0	0.0
2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
3	38	Eave3	2.1	0.5	-0.1	0.0	0.0	0.0
4	38	Eave3	2.1	0.5	-0.1	0.0	0.0	0.0
5	47	Purlin3	0.2	1.1	-0.1	0.0	0.0	0.0
6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
7	47	Purlin3	0.2	1.1	-0.1	0.0	0.0	0.0
8	47	Purlin3	0.2	1.1	-0.1	0.0	0.0	0.0
9	38	Eave3	2.1	0.5	-0.1	0.0	0.0	0.0







x = 3/4"

** Purlin on opposite side of truss not shown for clarity*
** Screw quantity in sketches above may not reflect actual requirements*

Plan View | Connection Elevation | End Plate Elevation

Member Height (in):	4	Sheet Metal Thickness:	10 gage	*0.1345 in*
Member Width (in):	4	Screw Size:	12-24	*# 1P2905*
Member Thickness (in):	0.125	Screw Quantity (Top):	3	
End Plate Weld Size (in):	1/8	Screw Quantity (Side):	3	

 OK

RISA ANALYSIS REPORT

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Distributed	Area(Member)
1	FRAMEWEIGHT	DL		-1			
2	DL	DL					4
3	LL	LL					4
4	SL	SL					
5	SLU	SL					
6	SLsliding	SL					
7	SLdrift	SL					
8	UPPER SURFACE	WL					12
9	LOWER SURFACE	WL					12
10	NA	WL					
11	NA	WL					
12	NA	WL					
13	NA	WL					
14	X10MINWIND	WL					4
15	NA	WL					
16	NA	WL					
17	SIDE WIND	WL					12
18	NA	WL					
19	NA	WL					
20	NA	WL					
21	Z10MINWIND	WL					1
22	EX FRAME	EL	-1				
23	EX ROOF	EL					4
24	EZ FRAME	EL			-1		
25	EZ ROOF	EL					4
26	BLC 2 Transient Area Loads	None				112	
27	BLC 3 Transient Area Loads	None				112	
28	BLC 8 Transient Area Loads	None				144	
29	BLC 9 Transient Area Loads	None				192	
30	BLC 14 Transient Area Loads	None				112	
31	BLC 17 Transient Area Loads	None				336	
32	BLC 21 Transient Area Loads	None				26	
33	BLC 23 Transient Area Loads	None				112	
34	BLC 25 Transient Area Loads	None				112	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	SERVICE D			1	1	2	2						
2	SERVICE Lr			3	20								
3	SERVICE S			4									
4	SERVICE Su			5									
5	SERVICE Ssliding			6									
6	SERVICE Sdrift			7									
7	SERVICE Wx (LC A; y = 0°)			8	-5.776	9	-9.181						
8	SERVICE Wx (LC B; y = 0°)			8	-13.03	9							
9	SERVICE Wx (LC A; y = 180°)			8	12.993	9	8.553						
10	SERVICE Wx (LC B; y = 180°)			8	3.222	9	14.067						
11	SERVICE Wz (LC A; y = 90°)			17	-6.811								
12	SERVICE Wz (LC B; y = 90°)			17	6.811								
13	SERVICE Ex			22	0.534	23	1.067						
14	SERVICE Ez			24	0.534	25	1.067						
15	SERVICE Ev			1	0.103	2	0.205						
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; y = 0°)	Yes	Y	L1	1	L7	1						
24	D + 0.6Wx (LC B; y = 0°)	Yes	Y	L1	1	L8	1						
25	D + 0.6Wx (LC A; y = 180°)	Yes	Y	L1	1	L9	1						
26	D + 0.6Wx (LC B; y = 180°)	Yes	Y	L1	1	L10	1						
27	D + 0.6Wz (LC A; y = 90°)	Yes	Y	L1	1	L11	1						
28	D + 0.6Wz (LC B; y = 90°)	Yes	Y	L1	1	L12	1						
29	D + 0.6Wx (Min.)	Yes	Y	L1	1	14	9.6						
30	D + 0.6Wz (Min.)	Yes	Y	L1	1	21	9.6						

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
31	D + 0.6(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))	Yes	Y	L1	1	L7	0.75	L11	0.75				
32	D + 0.6(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))	Yes	Y	L1	1	L9	0.75	L11	0.75				
33	D + 0.6(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))	Yes	Y	L1	1	L8	0.75	L12	0.75				
34	D + 0.6(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	Yes	Y	L1	1	L10	0.75	L12	0.75				
35	D + 0.6(0.75Wx (Min.) + 0.75Wx (Min.))	Yes	Y	L1	1	14	7.2	21	7.2				
36	D + 0.75(0.6Wx (LC A; y = 0°)) + 0.75Lr	Yes	Y	L1	1	L7	0.75	L2	0.75				
37	D + 0.75(0.6Wx (LC B; y = 0°)) + 0.75Lr	Yes	Y	L1	1	L8	0.75	L2	0.75				
38	D + 0.75(0.6Wx (LC A; y = 180°)) + 0.75Lr	Yes	Y	L1	1	L9	0.75	L2	0.75				
39	D + 0.75(0.6Wx (LC B; y = 180°)) + 0.75Lr	Yes	Y	L1	1	L10	0.75	L2	0.75				
40	D + 0.75(0.6Wz (LC A; y = 90°)) + 0.75Lr	Yes	Y	L1	1	L11	0.75	L2	0.75				
41	D + 0.75(0.6Wz (LC B; y = 90°)) + 0.75Lr	Yes	Y	L1	1	L12	0.75	L2	0.75				
42	D + 0.75(0.6Wx (Min.)) + 0.75Lr	Yes	Y	L1	1	14	7.2	L2	0.75				
43	D + 0.75(0.6Wz (Min.)) + 0.75Lr	Yes	Y	L1	1	21	7.2	L2	0.75				
44	D + 0.75(0.6(0.75Wx (LC A; y=0°) + 0.75Wz (LC A; y=90°))) + 0.75Lr	Yes	Y	L1	1	L7	0.563	L11	0.563	L2	0.75		
45	D + 0.75(0.6(0.75Wx (LC A; y=180°) + 0.75Wz (LC A; y=90°))) + 0.75Lr	Yes	Y	L1	1	L9	0.563	L11	0.563	L2	0.75		
46	D + 0.75(0.6(0.75Wx (LC B; y=0°) + 0.75Wz (LC B; y=90°))) + 0.75Lr	Yes	Y	L1	1	L8	0.563	L12	0.563	L2	0.75		
47	D + 0.75(0.6(0.75Wx (LC B; y=180°) + 0.75Wz (LC B; y=90°))) + 0.75Lr	Yes	Y	L1	1	L10	0.563	L12	0.563	L2	0.75		
48	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		
49	D + 0.75(0.6Wx (LC A; y = 0°)) + 0.75S	Yes	Y	L1	1	L7	0.75	L3	0.75				
50	D + 0.75(0.6Wx (LC B; y = 0°)) + 0.75S	Yes	Y	L1	1	L8	0.75	L3	0.75				
51	D + 0.75(0.6Wx (LC A; y = 180°)) + 0.75S	Yes	Y	L1	1	L9	0.75	L3	0.75				
52	D + 0.75(0.6Wx (LC B; y = 180°)) + 0.75S	Yes	Y	L1	1	L10	0.75	L3	0.75				
53	D + 0.75(0.6Wz (LC A; y = 90°)) + 0.75S	Yes	Y	L1	1	L11	0.75	L3	0.75				
54	D + 0.75(0.6Wz (LC B; y = 90°)) + 0.75S	Yes	Y	L1	1	L12	0.75	L3	0.75				
55	D + 0.75(0.6Wx (Min.)) + 0.75S	Yes	Y	L1	1	14	7.2	L3	0.75				
56	D + 0.75(0.6Wz (Min.)) + 0.75S	Yes	Y	L1	1	21	7.2	L3	0.75				
57	D + 0.75(0.6(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))) + 0.75S	Yes	Y	L1	1	L7	0.563	L11	0.563	L3	0.75		
58	D + 0.75(0.6(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))) + 0.75S	Yes	Y	L1	1	L9	0.563	L11	0.563	L3	0.75		
59	D + 0.75(0.6(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))) + 0.75S	Yes	Y	L1	1	L8	0.563	L12	0.563	L3	0.75		
60	D + 0.75(0.6(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))) + 0.75S	Yes	Y	L1	1	L10	0.563	L12	0.563	L3	0.75		
61	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		
62	0.6D + 0.6Wx (LC A; y = 0°)	Yes	Y	L1	0.6	L7	1						
63	0.6D + 0.6Wx (LC B; y = 0°)	Yes	Y	L1	0.6	L8	1						
64	0.6D + 0.6Wx (LC A; y = 180°)	Yes	Y	L1	0.6	L9	1						
65	0.6D + 0.6Wx (LC B; y = 180°)	Yes	Y	L1	0.6	L10	1						
66	0.6D + 0.6Wz (LC A; y = 90°)	Yes	Y	L1	0.6	L11	1						
67	0.6D + 0.6Wz (LC B; y = 90°)	Yes	Y	L1	0.6	L12	1						
68	0.6D + 0.6Wx (Min.)	Yes	Y	L1	0.6	14	9.6						
69	0.6D + 0.6Wz (Min.)	Yes	Y	L1	0.6	21	9.6						
70	0.6 + 0.6(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))	Yes	Y	L1	0.6	L7	0.75	L11	0.75				
71	0.6D + 0.6(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))	Yes	Y	L1	0.6	L9	0.75	L11	0.75				
72	0.6D + 0.6(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))	Yes	Y	L1	0.6	L8	0.75	L12	0.75				
73	0.6D + 0.6(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))	Yes	Y	L1	0.6	L10	0.75	L12	0.75				
74	0.6D + 0.6(0.75Wx (Min.) + 0.75Wz (Min.))	Yes	Y	L1	0.6	14	7.2	21	7.2				
75	1.0D+0.7Ev+0.7Ehx	Yes	Y	L1	1	L15	0.7	L13	0.7				
76	1.0D+0.525Ev+0.525Ehx+0.75S	Yes	Y	L1	1	L15	0.525	L13	0.525	L3	0.75		
77	0.6D-0.7Ev+0.7Ehx	Yes	Y	L1	0.6	L15	-0.7	L13	0.7				
78	1.0D+0.7Ev+0.7Ehz	Yes	Y	L1	1	L15	0.7	L14	0.7				
79	1.0D+0.525Ev+0.525Ehz+0.75S	Yes	Y	L1	1	L15	0.525	L14	0.525	L3	0.75		
80	0.6D-0.7Ev+0.7Ehz	Yes	Y	L1	0.6	L15	-0.7	L14	0.7				
81	1.0D+0.7Ev+0.7Ehx+0.21Ehz	Yes	Y	L1	1	L15	0.7	L13	0.7	L14	0.21		
82	1.0D+0.525Ev+0.525Ehx+0.1575Ehz+0.75S	Yes	Y	L1	1	L15	0.525	L13	0.525	L14	0.16	L3	0.75
83	0.6D-0.7Ev+0.7Ehx+0.21Ehz	Yes	Y	L1	0.6	L15	-0.7	L13	0.7	L14	0.21		
84	1.0D+0.7Ev+0.7Ehz+0.21Ehx	Yes	Y	L1	1	L15	0.7	L14	0.7	L13	0.21		
85	1.0D+0.525Ev+0.525Ehz+0.1575Ehx+0.75S	Yes	Y	L1	1	L15	0.525	L14	0.525	L13	0.16	L3	0.75
86	0.6D-0.7Ev+0.7Ehz+0.21Ehx	Yes	Y	L1	0.6	L15	-0.7	L14	0.7	L13	0.21		
87													
88													
89													
90													
91													
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; y = 0°)			L1	1.2	L2	1.6	L7	0.833				
96	1.2D + 1.6Lr + 0.5Wx (LC B; y = 0°)			L1	1.2	L2	1.6	L8	0.833				
97	1.2D + 1.6Lr + 0.5Wx (LC A; y = 180°)			L1	1.2	L2	1.6	L9	0.833				
98	1.2D + 1.6Lr + 0.5Wx (LC B; y = 180°)			L1	1.2	L2	1.6	L10	0.833				

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
99	1.2D + 1.6Lr + 0.5Wz (LC A; y = 90°)			L1	1.2	L2	1.6	L11	0.833				
100	1.2D + 1.6Lr + 0.5Wz (LC B; y = 90°)			L1	1.2	L2	1.6	L12	0.833				
101	1.2D + 1.6Lr + 0.5Wx (Min.)			L1	1.2	L2	1.6	14	8				
102	1.2D + 1.6Lr + 0.5Wz (Min.)			L1	1.2	L2	1.6	21	8				
103	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L2	1.6	L7	0.625	L11	0.63		
104	1.2D + 1.6Lr + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L2	1.6	L9	0.625	L11	0.63		
105	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L2	1.6	L8	0.625	L12	0.63		
106	1.2D + 1.6Lr + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L2	1.6	L10	0.625	L12	0.63		
107	1.2D + 1.6Lr + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))			L1	1.2	L2	1.6	14	6	21	6		
108	1.2D + 1.6S + 0.5Wx (LC A; y = 0°)			L1	1.2	L3	1.6	L7	0.833				
109	1.2D + 1.6S + 0.5Wx (LC B; y = 0°)			L1	1.2	L3	1.6	L8	0.833				
110	1.2D + 1.6S + 0.5Wx (LC A; y = 180°)			L1	1.2	L3	1.6	L9	0.833				
111	1.2D + 1.6S + 0.5Wx (LC B; y = 180°)			L1	1.2	L3	1.6	L10	0.833				
112	1.2D + 1.6S + 0.5Wz (LC A; y = 90°)			L1	1.2	L3	1.6	L11	0.833				
113	1.2D + 1.6S + 0.5Wz (LC B; y = 90°)			L1	1.2	L3	1.6	L12	0.833				
114	1.2D + 1.6S + 0.5Wx (Min.)			L1	1.2	L3	1.6	14	8				
115	1.2D + 1.6S + 0.5Wz (Min.)			L1	1.2	L3	1.6	21	8				
116	1.2D + 1.6S + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L3	1.6	L7	0.625	L11	0.63		
117	1.2D + 1.6S + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L3	1.6	L9	0.625	L11	0.63		
118	1.2D + 1.6S + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L3	1.6	L8	0.625	L12	0.63		
119	1.2D + 1.6S + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L3	1.6	L10	0.625	L12	0.63		
120	1.2D + 1.6S + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))			L1	1.2	L3	1.6	14	6	21	6		
121	1.2D + 1.6Su + 0.5Wx (LC A; y = 0°)			L1	1.2	L4	1.6	L7	0.833				
122	1.2D + 1.6Su + 0.5Wx (LC B; y = 0°)			L1	1.2	L4	1.6	L8	0.833				
123	1.2D + 1.6Su + 0.5Wx (LC A; y = 180°)			L1	1.2	L4	1.6	L9	0.833				
124	1.2D + 1.6Su + 0.5Wx (LC B; y = 180°)			L1	1.2	L4	1.6	L10	0.833				
125	1.2D + 1.6Su + 0.5Wz (LC A; y = 90°)			L1	1.2	L4	1.6	L11	0.833				
126	1.2D + 1.6Su + 0.5Wz (LC B; y = 90°)			L1	1.2	L4	1.6	L12	0.833				
127	1.2D + 1.6Su + 0.5Wx (Min.)			L1	1.2	L4	1.6	14	8				
128	1.2D + 1.6Su + 0.5Wz (Min.)			L1	1.2	L4	1.6	21	8				
129	1.2D + 1.6Su + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L4	1.6	L7	0.625	L11	0.63		
130	1.2D + 1.6Su + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L4	1.6	L9	0.625	L11	0.63		
131	1.2D + 1.6Su + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L4	1.6	L8	0.625	L12	0.63		
132	1.2D + 1.6Su + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L4	1.6	L10	0.625	L12	0.63		
133	1.2D + 1.6Su + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))			L1	1.2	L4	1.6	14	6	21	6		
134	1.2D + 1.6Ssliding + 0.5Wx (LC A; y = 0°)			L1	1.2	L5	1.6	L7	0.833				
135	1.2D + 1.6Ssliding + 0.5Wx (LC B; y = 0°)			L1	1.2	L5	1.6	L8	0.833				
136	1.2D + 1.6Ssliding + 0.5Wx (LC A; y = 180°)			L1	1.2	L5	1.6	L9	0.833				
137	1.2D + 1.6Ssliding + 0.5Wx (LC B; y = 180°)			L1	1.2	L5	1.6	L10	0.833				
138	1.2D + 1.6Ssliding + 0.5Wz (LC A; y = 90°)			L1	1.2	L5	1.6	L11	0.833				
139	1.2D + 1.6Ssliding + 0.5Wz (LC B; y = 90°)			L1	1.2	L5	1.6	L12	0.833				
140	1.2D + 1.6Ssliding + 0.5Wx (Min.)			L1	1.2	L5	1.6	14	8				
141	1.2D + 1.6Ssliding + 0.5Wz (Min.)			L1	1.2	L5	1.6	21	8				
142	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L5	1.6	L7	0.625	L11	0.63		
143	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L5	1.6	L9	0.625	L11	0.63		
144	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L5	1.6	L8	0.625	L12	0.63		
145	1.2D + 1.6Ssliding + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L5	1.6	L10	0.625	L12	0.63		
146	1.2D + 1.6Ssliding + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))			L1	1.2	L5	1.6	14	6	21	6		
147	1.2D + 1.6Sdrift + 0.5Wx (LC A; y = 0°)			L1	1.2	L6	1.6	L7	0.833				
148	1.2D + 1.6Sdrift + 0.5Wx (LC B; y = 0°)			L1	1.2	L6	1.6	L8	0.833				
149	1.2D + 1.6Sdrift + 0.5Wx (LC A; y = 180°)			L1	1.2	L6	1.6	L9	0.833				
150	1.2D + 1.6Sdrift + 0.5Wx (LC B; y = 180°)			L1	1.2	L6	1.6	L10	0.833				
151	1.2D + 1.6Sdrift + 0.5Wz (LC A; y = 90°)			L1	1.2	L6	1.6	L11	0.833				
152	1.2D + 1.6Sdrift + 0.5Wz (LC B; y = 90°)			L1	1.2	L6	1.6	L12	0.833				
153	1.2D + 1.6Sdrift + 0.5Wx (Min.)			L1	1.2	L6	1.6	14	8				
154	1.2D + 1.6Sdrift + 0.5Wz (Min.)			L1	1.2	L6	1.6	21	8				
155	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L6	1.6	L7	0.625	L11	0.63		
156	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))			L1	1.2	L6	1.6	L9	0.625	L11	0.63		
157	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L6	1.6	L8	0.625	L12	0.63		
158	1.2D + 1.6Sdrift + 0.5(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))			L1	1.2	L6	1.6	L10	0.625	L12	0.63		
159	1.2D + 1.6Sdrift + 0.5(0.75Wx (Min.) + 0.75Wz (Min.))			L1	1.2	L6	1.6	14	6	21	6		
160	1.2D + 1.0Wx (LC A; y = 0°) + 0.5Lr			L1	1.2	L7	1.667	L2	0.5				
161	1.2D + 1.0Wx (LC B; y = 0°) + 0.5Lr			L1	1.2	L8	1.667	L2	0.5				
162	1.2D + 1.0Wx (LC A; y = 180°) + 0.5Lr			L1	1.2	L9	1.667	L2	0.5				
163	1.2D + 1.0Wx (LC B; y = 180°) + 0.5Lr			L1	1.2	L10	1.667	L2	0.5				
164	1.2D + 1.0Wz (LC A; y = 90°) + 0.5Lr			L1	1.2	L11	1.667	L2	0.5				
165	1.2D + 1.0Wz (LC B; y = 90°) + 0.5Lr			L1	1.2	L12	1.667	L2	0.5				
166	1.2D + 1.0Wx (Min.) + 0.5Lr			L1	1.2	14	16	L2	0.5				

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
167	1.2D + 1.0Wz (Min.) + 0.5Lr			L1	1.2	21	16	L2	0.5				
168	1.2D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°)) + 0.5Lr			L1	1.2	L7	1.25	L11	1.25	L2	0.5		
169	1.2D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°)) + 0.5Lr			L1	1.2	L9	1.25	L11	1.25	L2	0.5		
170	1.2D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°)) + 0.5Lr			L1	1.2	L8	1.25	L12	1.25	L2	0.5		
171	1.2D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°)) + 0.5Lr			L1	1.2	L10	1.25	L12	1.25	L2	0.5		
172	1.2D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.)) +0.5Lr			L1	1.2	14	12	21	12	L2	0.5		
173	1.2D + 1.0Wx (LC A; y = 0°) + 0.5S			L1	1.2	L7	1.667	L3	0.5				
174	1.2D + 1.0Wx (LC B; y = 0°) + 0.5S			L1	1.2	L8	1.667	L3	0.5				
175	1.2D + 1.0Wx (LC A; y = 180°) + 0.5S			L1	1.2	L9	1.667	L3	0.5				
176	1.2D + 1.0Wx (LC B; y = 180°) + 0.5S			L1	1.2	L10	1.667	L3	0.5				
177	1.2D + 1.0Wz (LC A; y = 90°) + 0.5S			L1	1.2	L11	1.667	L3	0.5				
178	1.2D + 1.0Wz (LC B; y = 90°) + 0.5S			L1	1.2	L12	1.667	L3	0.5				
179	1.2D + 1.0Wx (Min.) + 0.5S			L1	1.2	14	16	L3	0.5				
180	1.2D + 1.0Wz (Min.) + 0.5S			L1	1.2	21	16	L3	0.5				
181	1.2D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°)) + 0.5S			L1	1.2	L7	1.25	L11	1.25	L3	0.5		
182	1.2D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°)) + 0.5S			L1	1.2	L9	1.25	L11	1.25	L3	0.5		
183	1.2D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°)) + 0.5S			L1	1.2	L8	1.25	L12	1.25	L3	0.5		
184	1.2D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°)) + 0.5S			L1	1.2	L10	1.25	L12	1.25	L3	0.5		
185	1.2D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.)) +0.5S			L1	1.2	14	12	21	12	L3	0.5		
186	0.9D + 1.0Wx (LC A; y = 0°)			L1	0.9	L7	1.667						
187	0.9D + 1.0Wx (LC B; y = 0°)			L1	0.9	L8	1.667						
188	0.9D + 1.0Wx (LC A; y = 180°)			L1	0.9	L9	1.667						
189	0.9D + 1.0Wx (LC B; y = 180°)			L1	0.9	L10	1.667						
190	0.9D + 1.0Wz (LC A; y = 90°)			L1	0.9	L11	1.667						
191	0.9D + 1.0Wz (LC B; y = 90°)			L1	0.9	L12	1.667						
192	0.9D + 1.0Wx (Min.)			L1	0.9	14	16						
193	0.9D + 1.0Wz (Min.)			L1	0.9	21	16						
194	0.9D + 1.0(0.75Wx (LC A; y = 0°) + 0.75Wz (LC A; y = 90°))			L1	0.9	L7	1.25	L11	1.25				
195	0.9D + 1.0(0.75Wx (LC A; y = 180°) + 0.75Wz (LC A; y = 90°))			L1	0.9	L9	1.25	L11	1.25				
196	0.9D + 1.0(0.75Wx (LC B; y = 0°) + 0.75Wz (LC B; y = 90°))			L1	0.9	L8	1.25	L12	1.25				
197	0.9D + 1.0(0.75Wx (LC B; y = 180°) + 0.75Wz (LC B; y = 90°))			L1	0.9	L10	1.25	L12	1.25				
198	0.9D + 1.0(0.75Wx (Min.) + 0.75Wz (Min.))			L1	0.9	14	12	21	12				
199	1.2D+Ev+Ehx+0.2S			L1	1.2	L15	1	L13	1	L3	0.2		
200	0.9D-Ev+Ehx			L1	0.9	L15	-1	L13	1				
201	1.2D+Ev+Ehz+0.2S			L1	1.2	L15	1	L14	1	L3	0.2		
202	0.9D-Ev+Ehz			L1	0.9	L15	-1	L14	1				
203	1.2D+Ev+Ehx+0.3Ehz+0.2S			L1	1.2	L15	1	L13	1	L14	0.3	L3	0.2
204	0.9D-Ev+Ehx+0.3Ehz			L1	0.9	L15	-1	L13	1	L14	0.3		
205	1.2D+Ev+Ehz+0.3Ehx+0.2S			L1	1.2	L15	1	L14	1	L13	0.3	L3	0.2
206	0.9D-Ev+Ehz+0.3Ehx			L1	0.9	L15	-1	L14	1	L13	0.3		
207													
208	SERVICE Emx			22	0.513	23	1.026						
209	SERVICE Emz			24	0.513	25	1.026						
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				
225													
226													
227													
228													
229													
230													
231													
232													
233													
234													

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
235													
236													
237													
238													
239													
240													
241													
242													
243													
244													
245													
246													
247													
248													
249													
250													

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	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N7	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N10	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N13	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N16	Reaction	Reaction	Reaction	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	HSS12X8X4	Column	Tube	A500 Gr.C RECT	Typical	8.96	98.8	184	202
2	Truss	HSS12X8X4	Beam	Tube	A500 Gr.C RECT	Typical	8.96	98.8	184	202
3	Eave	HSS4X4X2	Beam	Tube	A500 Gr.C RECT	Typical	1.77	4.4	4.4	6.91
4	Purlin	HSS4X4X2	Beam	Tube	A500 Gr.C RECT	Typical	1.77	4.4	4.4	6.91

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	Column1	N2	N3	137.46	Column	Column	Tube	A500 Gr.C RECT	Typical
2	Column2	N13	N12	201.27	Column	Column	Tube	A500 Gr.C RECT	Typical
3	Column3	N16	N15	222.54	Column	Column	Tube	A500 Gr.C RECT	Typical
4	Column4	N7	N6	158.73	Column	Column	Tube	A500 Gr.C RECT	Typical
5	Column5	N10	N9	180	Column	Column	Tube	A500 Gr.C RECT	Typical
6	Eave1	N12	N15	9.46	Eave	Beam	Tube	A500 Gr.C RECT	Typical
7	Eave2	N9	N12	9.46	Eave	Beam	Tube	A500 Gr.C RECT	Typical
8	Eave3	N6	N9	9.46	Eave	Beam	Tube	A500 Gr.C RECT	Typical
9	Eave4	N3	N6	9.46	Eave	Beam	Tube	A500 Gr.C RECT	Typical
10	Eave5	N11	N14	9.46	Eave	Beam	Tube	A500 Gr.C RECT	Typical
11	Eave6	N8	N11	9.46	Eave	Beam	Tube	A500 Gr.C RECT	Typical
12	Eave7	N5	N8	9.46	Eave	Beam	Tube	A500 Gr.C RECT	Typical
13	Eave8	N4	N5	9.46	Eave	Beam	Tube	A500 Gr.C RECT	Typical
14	Purlin1	N24	N25	9.46	Purlin	Beam	Tube	A500 Gr.C RECT	Typical
15	Purlin2	N17	N18	9.46	Purlin	Beam	Tube	A500 Gr.C RECT	Typical
16	Purlin3	N18	N19	9.46	Purlin	Beam	Tube	A500 Gr.C RECT	Typical
17	Purlin4	N19	N20	9.46	Purlin	Beam	Tube	A500 Gr.C RECT	Typical
18	Purlin5	N20	N21	9.46	Purlin	Beam	Tube	A500 Gr.C RECT	Typical
19	Purlin6	N22	N23	9.46	Purlin	Beam	Tube	A500 Gr.C RECT	Typical
20	Purlin7	N23	N24	9.46	Purlin	Beam	Tube	A500 Gr.C RECT	Typical
21	Purlin8	N25	N26	9.46	Purlin	Beam	Tube	A500 Gr.C RECT	Typical
22	Truss1	N6	N5		Truss	Beam	Tube	A500 Gr.C RECT	Typical
23	Truss2	N15	N14		Truss	Beam	Tube	A500 Gr.C RECT	Typical
24	Truss3	N3	N4		Truss	Beam	Tube	A500 Gr.C RECT	Typical
25	Truss4	N12	N11		Truss	Beam	Tube	A500 Gr.C RECT	Typical
26	Truss5	N9	N8		Truss	Beam	Tube	A500 Gr.C RECT	Typical

Member Advanced Data

	Label	I Release	J 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	Eave1	AllPIN	BenPIN	Yes	Default	None
7	Eave2	AllPIN	BenPIN	Yes	Default	None
8	Eave3	AllPIN	BenPIN	Yes	Default	None
9	Eave4	AllPIN	BenPIN	Yes	Default	None
10	Eave5	AllPIN	BenPIN	Yes	Default	None
11	Eave6	AllPIN	BenPIN	Yes	Default	None
12	Eave7	AllPIN	BenPIN	Yes	Default	None
13	Eave8	AllPIN	BenPIN	Yes	Default	None
14	Purlin1	AllPIN	BenPIN	Yes	Default	None
15	Purlin2	AllPIN	BenPIN	Yes	Default	None
16	Purlin3	AllPIN	BenPIN	Yes	Default	None
17	Purlin4	AllPIN	BenPIN	Yes	Default	None
18	Purlin5	AllPIN	BenPIN	Yes	Default	None
19	Purlin6	AllPIN	BenPIN	Yes	Default	None
20	Purlin7	AllPIN	BenPIN	Yes	Default	None
21	Purlin8	AllPIN	BenPIN	Yes	Default	None
22	Truss1			Yes	Default	None
23	Truss2			Yes	Default	None
24	Truss3			Yes	Default	None
25	Truss4			Yes	Default	None
26	Truss5			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	13		2	2	N/A	N/A	Lateral
2	Column2	Column	13		2	2	N/A	N/A	Lateral
3	Column3	Column	13		2	2	N/A	N/A	Lateral
4	Column4	Column	13		2	2	N/A	N/A	Lateral
5	Column5	Column	13		2	2	N/A	N/A	Lateral
6	Eave1	Eave	16.241		1	1	N/A	N/A	Lateral
7	Eave2	Eave	16.241		1	1	N/A	N/A	Lateral
8	Eave3	Eave	16.241		1	1	N/A	N/A	Lateral
9	Eave4	Eave	16.241		1	1	N/A	N/A	Lateral
10	Eave5	Eave	10.704		1	1	N/A	N/A	Lateral
11	Eave6	Eave	10.704		1	1	N/A	N/A	Lateral
12	Eave7	Eave	10.704		1	1	N/A	N/A	Lateral
13	Eave8	Eave	10.704		1	1	N/A	N/A	Lateral
14	Purlin1	Purlin	12.55		1	1	N/A	N/A	Lateral
15	Purlin2	Purlin	14.395		1	1	N/A	N/A	Lateral
16	Purlin3	Purlin	14.395		1	1	N/A	N/A	Lateral
17	Purlin4	Purlin	14.395		1	1	N/A	N/A	Lateral
18	Purlin5	Purlin	14.395		1	1	N/A	N/A	Lateral
19	Purlin6	Purlin	12.55		1	1	N/A	N/A	Lateral
20	Purlin7	Purlin	12.55		1	1	N/A	N/A	Lateral
21	Purlin8	Purlin	12.55		1	1	N/A	N/A	Lateral
22	Truss1	Truss	15.207	Segment	0.65	0.65	N/A	N/A	Lateral
23	Truss2	Truss	15.207	Segment	0.65	0.65	N/A	N/A	Lateral
24	Truss3	Truss	15.207	Segment	0.65	0.65	N/A	N/A	Lateral
25	Truss4	Truss	15.207	Segment	0.65	0.65	N/A	N/A	Lateral
26	Truss5	Truss	15.207	Segment	0.65	0.65	N/A	N/A	Lateral

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [lb/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	490	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	490	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	490	50	1.1	65	1.1
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	A500 Gr.C RND	29000	11154	0.3	0.65	527	46	1.4	62	1.3
7	A500 Gr.C RECT	29000	11154	0.3	0.65	527	50	1.4	62	1.3

Hot Rolled Steel Properties (Continued)

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e^{5}°F^{-1}]	Density [lb/ft^{3}]	Yield [ksi]	Ry	Fu [ksi]	Rt
8	A53 Gr.B	29000	11154	0.3	0.65	490	35	1.6	60	1.2
9	A1085	29000	11154	0.3	0.65	490	50	1.4	65	1.3
10	A913 Gr.65	29000	11154	0.3	0.65	490	65	1.1	80	1.1

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
0	Column1	HSS12X8X4	0.663	0	38	0.044	13	z	38	138.583	268.263	628.638	981.237	1.029	H1-1b
1	Column2	HSS12X8X4	0.7	0	38	0.056	0	z	84	138.583	268.263	628.638	981.237	1.047	H1-1b
2	Column3	HSS12X8X4	0.66	0	38	0.06	0	z	84	138.583	268.263	628.638	981.237	1.03	H1-1b
3	Column4	HSS12X8X4	0.7	0	38	0.047	0	z	80	138.583	268.263	628.638	981.237	1.047	H1-1b
4	Column5	HSS12X8X4	0.54	13	38	0.05	0	z	78	138.583	268.263	628.638	981.237	1.071	H1-1b
5	Eave1	HSS4X4X2	0.494	8.12	47	0.039	0	y	47	17.413	52.994	69.459	69.459	1.131	H1-1b
6	Eave2	HSS4X4X2	0.514	8.12	47	0.039	0	y	47	17.413	52.994	69.459	69.459	1.131	H1-1b
7	Eave3	HSS4X4X2	0.514	8.12	47	0.039	0	y	47	17.413	52.994	69.459	69.459	1.131	H1-1b
8	Eave4	HSS4X4X2	0.494	8.12	47	0.039	0	y	47	17.413	52.994	69.459	69.459	1.131	H1-1b
9	Eave5	HSS4X4X2	0.213	5.352	38	0.027	0	y	38	32.619	52.994	69.459	69.459	1.139	H1-1b
10	Eave6	HSS4X4X2	0.214	5.352	38	0.027	0	y	38	32.619	52.994	69.459	69.459	1.139	H1-1b
11	Eave7	HSS4X4X2	0.214	5.352	38	0.027	0	y	38	32.619	52.994	69.459	69.459	1.139	H1-1b
12	Eave8	HSS4X4X2	0.213	5.352	38	0.027	0	y	38	32.619	52.994	69.459	69.459	1.139	H1-1b
13	Purlin1	HSS4X4X2	0.507	6.275	38	0.056	0	y	38	27.198	52.994	69.459	69.459	1.134	H1-1b
14	Purlin2	HSS4X4X2	0.748	7.198	47	0.071	0	y	47	22.032	52.994	69.459	69.459	1.14	H1-1b
15	Purlin3	HSS4X4X2	0.75	7.198	47	0.071	0	y	47	22.032	52.994	69.459	69.459	1.14	H1-1b
16	Purlin4	HSS4X4X2	0.75	7.198	47	0.071	0	y	47	22.032	52.994	69.459	69.459	1.14	H1-1b
17	Purlin5	HSS4X4X2	0.748	7.198	47	0.071	0	y	47	22.032	52.994	69.459	69.459	1.14	H1-1b
18	Purlin6	HSS4X4X2	0.507	6.275	38	0.056	0	y	38	27.198	52.994	69.459	69.459	1.134	H1-1b
19	Purlin7	HSS4X4X2	0.507	6.275	38	0.056	0	y	38	27.198	52.994	69.459	69.459	1.134	H1-1b
20	Purlin8	HSS4X4X2	0.507	6.275	38	0.056	0	y	38	27.198	52.994	69.459	69.459	1.134	H1-1b
21	Truss1	HSS12X8X4	0.534	0	38	0.051	0	y	47	223.81	268.263	628.638	981.237	2.24	H1-1b
22	Truss2	HSS12X8X4	0.304	0	38	0.028	0	y	47	223.81	268.263	628.638	981.237	2.249	H1-1b
23	Truss3	HSS12X8X4	0.307	0	38	0.028	0	y	47	223.81	268.263	628.638	981.237	2.245	H1-1b
24	Truss4	HSS12X8X4	0.534	0	38	0.051	0	y	47	223.81	268.263	628.638	981.237	2.24	H1-1b
25	Truss5	HSS12X8X4	0.521	0	38	0.051	0	y	47	223.81	268.263	628.638	981.237	2.241	H1-1b

Material Take-Off

	Material	Size	Pieces	Length[ft]	Weight[LB]
0	Hot Rolled Steel				
1	A500 Gr.C RECT	HSS12X8X4	10	141	4624.681
2	A500 Gr.C RECT	HSS4X4X2	16	215.6	1396.313
3	Total HR Steel		26	356.6	6020.994

PANEL DATA

Multi-Rib

Bare Galvalume & Painted Galvalume

a product of McElroy Metal

Section Properties						Top in Compression			Bottom in Compression		
Gauge	F_y (ksi)	Weight (psf)	Va (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	63.7	1.10	0.7727	235.0	280.7	0.05	0.055	1.375	0.029	0.046	1.148

1. Yield strength measured per ASTM A370.
2. Remainder of section properties are calculated in accordance with AISI S100-16.
3. V_a is the allowable shear
4. P_a is the allowable load for web crippling on end & interior supports.
5. I_x is for deflection determination.
6. S_e is for bending.
7. M_a is the allowable bending moment.
8. All values are for one foot of panel width.

Allowable Uniform Loads (PSF)													
	Span Length (ft)												
Load Type	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
+	355.1	288.9	222.8	156.6	90.5	86.3	82.1	58.2	34.4	21	18	16	14
-	246	162	148.5	134.9	121.4	94.6	67.9	50.7	33.5	18	15	13	11

Notes:

1. Allowable uniform loads are based upon equal span lengths.
2. Highlighted values measured per ASTM A1592 and include a factor of safety of 2.0.
3. Remaining values calculated from section properties or straight-line interpolation.
4. Calculated values are limited to combined shear & bending using Eq. H2-1 of AISI S100-16.
5. Calculated values are limited by web crippling using a bearing length of 2".
6. Web crippling values are determined using a ratio of the uniform load **actually** supported by the top flanges of the section.
7. The weight of the panel has **NOT** been deducted from the allowable loads.

PORTER CORP™
A PLAYCORE Company