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Structural Engineering Calculations

THE MANTEL OF LEADERSHIP

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1501 E. HIGHLAND AVE
MUNCIE, INDIANA 47303

PROJECT NUMBER 2562

Permit Set 2025, August 25

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PROJECT DESCRIPTION

'The Mantel of Leadership' is a public art sculpture located in Muncie, Indiana. The artwork consists of a steel framed wall standing approximately 12 feet tall by 10 feet wide. The wall is fully clad. The scope of this work includes the structural framing of the wall, and the footing and anchorage into the ground. The rocking chair and table are anchored to an architectural concrete slab with minimum weight of 200 lbs to prevent theft.

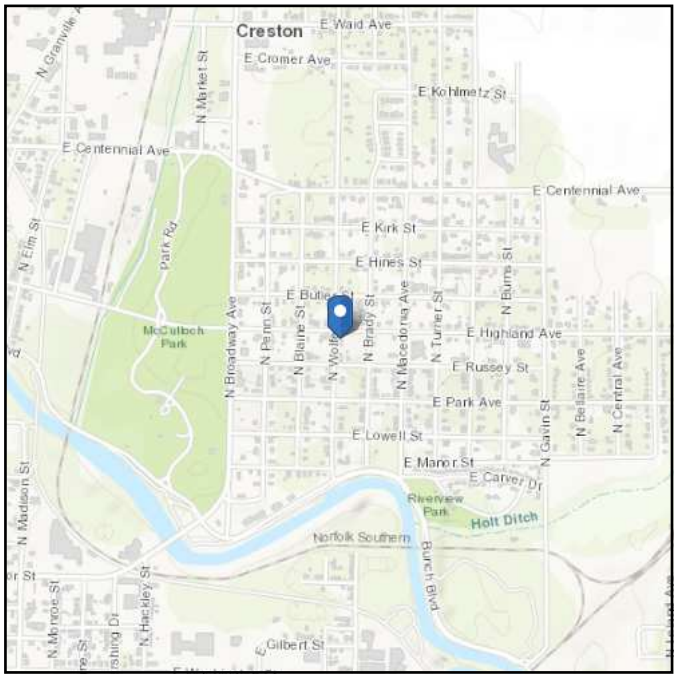
Fig 1: Sculpture Rendering

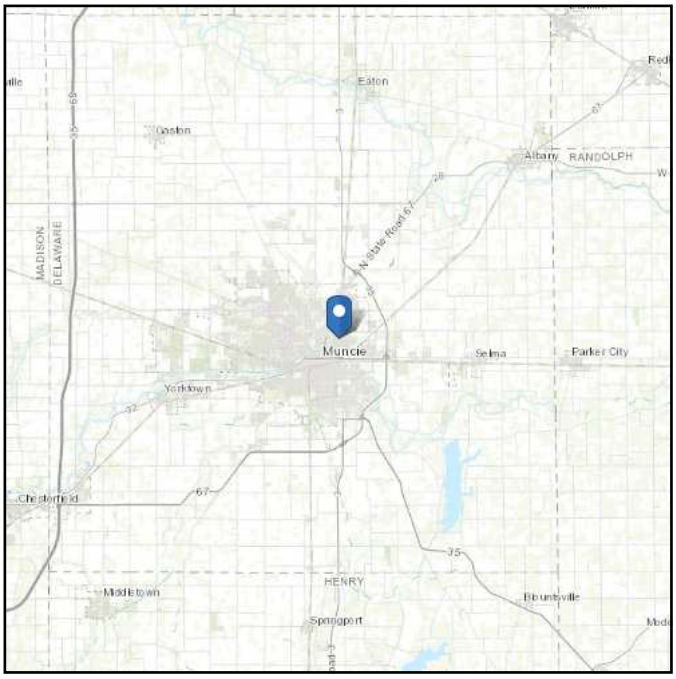
DESIGN LOAD CRITERIA

ASCE Hazards Report

Address:
1501 E Highland Ave
Muncie, Indiana
47303

Standard:	ASCE/SEI 7-10	**Latitude:**	40.203433
Risk Category:	II	**Longitude:**	-85.370326
Soil Class:	D - Stiff Soil	**Elevation:**	971.1732949883057 ft (NAVD 88)





Wind

Results:

Wind Speed	115 Vmph
10-year MRI	76 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	96 Vmph

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014
Date Accessed: Thu Aug 21 2025

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2.

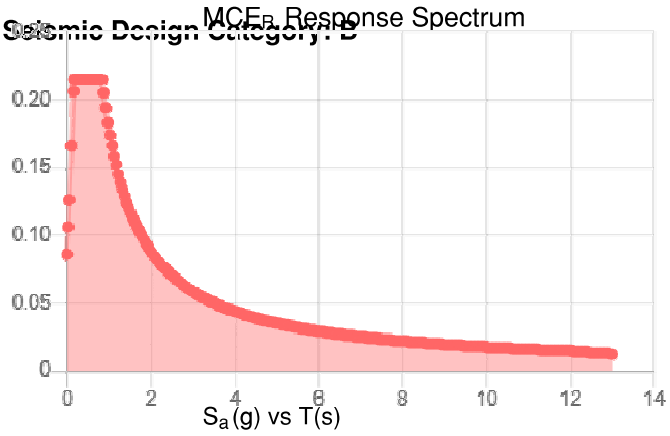
Seismic

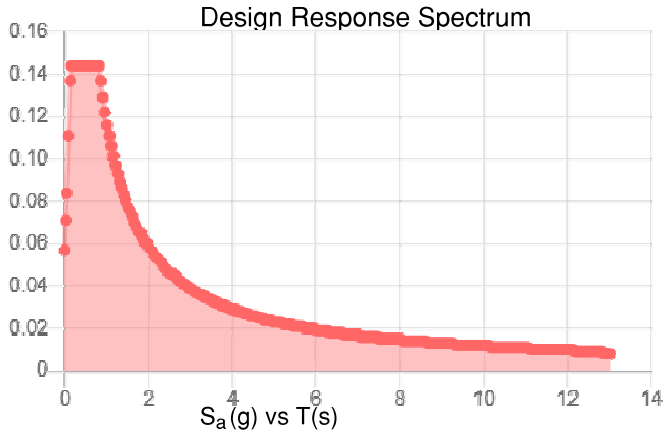
Site Soil Class: D - Stiff Soil

Results:

S_S :	0.135	S_{D1} :	0.116
S_1 :	0.073	T_L :	12
F_a :	1.6	PGA :	0.063
F_v :	2.4	PGA_M :	0.101
S_{MS} :	0.215	F_{PGA} :	1.6
S_{M1} :	0.174	I_e :	1
S_{DS} :	0.144		

Seismic Design Category: B





Data Accessed: Thu Aug 21 2025

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	5 F
Gust Speed	40 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Thu Aug 21 2025

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Snow

Results:

Ground Snow Load, p_g :	20 lb/ft^2
Mapped Elevation:	971.2 ft
Data Source:	ASCE/SEI 7-10, Fig. 7-1.
Date Accessed:	Thu Aug 21 2025

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported ‘elevation’ and ‘mapped elevation’ differ significantly from each other.

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Project: Mantel of Leadership Date: 8/21/2025

Job No: 2562 Engineer: CRC

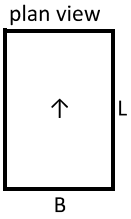
Wind MWFRS - Other Structures and Building Appurtenances

Structure Type:	Solid Freestanding Walls and Solid Freestanding Signs	
Risk Category:	2	ASCE 7-16 Table 1.5-1
Basic Wind Speed, V:	115	ASCE 7-16 Fig 26.5-1B
Exposure Category:	C	ASCE 7-16 Sec 26.7.3
Height to the highest point, z (ft):	15	
Length Perpendicular to Direction 1, B (ft):	7.5	
Length Parallel to Direction 1, L (ft):	0.5	
Kd:	0.85	ASCE 7-16 Table 26.6-1
Kzt:	1.00	ASCE 7-16 Sec 26.8.2
Kz:	0.85	ASCE 7-16 Table 26.10-1
Velocity Pressure, q (psf):	24.5	ASCE 7-16 Eq 26.10-1

Direction 1

Gust Factor, Gf:	0.85	ASCE 7-16 Sec 26.11.1
Force Coefficient, Cf:	1.5	ASCE 7-16 Fig 29.3-1
Design Wind Load, p (psf):	31.2	ASCE 7-16 Eq 29.3-1
Direction 1 Surface Area (ft2):	100	

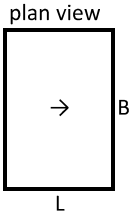
plan view



Direction 2

Gust Factor, Gf:	0.85	ASCE 7-16 Sec 26.11.1
Force Coefficient, Cf:	1.8	ASCE 7-16 Fig 29.3-1
Design Wind Load, p (psf):	37.4	ASCE 7-16 Eq 29.3-1
Direction 2 Surface Area (ft2):	10	

plan view



Direction 1 Wind Base Shear (lbs):	**3,119**
Direction 2 Wind Base Shear (lbs:)	**374**

Project: Mantel of Leadership Date: 8/21/2025

Job No: 2562 Engineer: CRC

Seismic Demands on Nonbuilding Sturctures (ASCE 7-16, CHAPTER 15)
Equivalent Lateral Force Procedure:

Lateral System:	Amusement Structures	
Importance Factor, Ie:	1	ASCE 7-16 Sec 15.4.1.1
Response Modification Factor, R:	2	ASCE 7-16 Table 15.4-2
Overstrength Factor, Ω:	2	ASCE 7-16 Table 15.4-2
Deflection Amplification Factor, Cd:	2	ASCE 7-16 Table 15.4-2
Site Class:	D	Per Soils Report
Ss:	0.135	Per Soils Report or USGS
Fa:	1.60	ASCE Table 11.4-1
SMS:	0.216	ASCE 7-16 Eq 11.4-1
SDS:	0.144	ASCE 7-16 Eq 11.4-3
S1:	0.073	Per Soils Report or USGS
Fv:	2.40	ASCE 7-16 Table 11.4-2
SM1:	0.175	ASCE 7-16 Eq 11.4-2
SD1:	0.117	ASCE 7-16 Eq 11.4-4
Seismic Design Category:	A	
hn (ft):	10	max height above grade
Approximate Fundamental period, Ta (s):	0.11	ASCE 7-16 Eq 12.8-7 & Table 12.8-2
Fundamental period of structure, T (s):	0.11	
Long-period transition periods, TL (s):	12	
ρ:	1	ASCE 7-16 Sec 12.3.4
Seismic Effective Weight, W(lb):	1400	ASCE 7-16 Sec 12.7.2
Governing Seismic Response Coefficient Cs:	**0.072**	ASCE 7-16 Eq 12.8-2
min Cs:	0.030	ASCE 7-16 Eq 15.4-1
max Cs:	0.52	ASCE 7-16 Eq 12.8-3
Seismic Base Shear, V (lb):	**100.8**	ASCE 7-16 Eq 12.8-1
Vertical Seismic Load Coefficient 0.2*SDS:	0.0288	
Vertical Seismic Load, Ev (lb):	40.32	ASCE 7-16 Eq 12.4-4a

Wind loading governs lateral design

Project: Mantel of Leadership Date: 8/21/2025

Job No: 2562 Engineer: crc

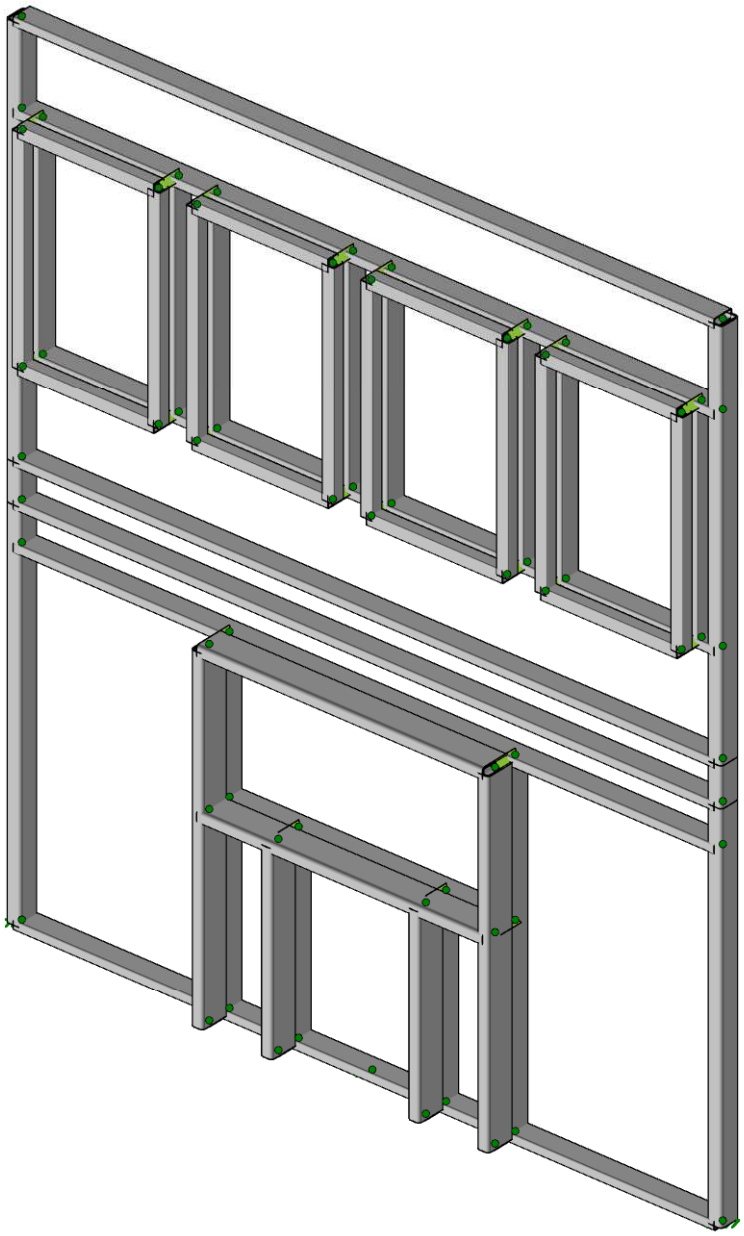
Snow Loads on Flat or Sloped Surfaces:

Ground Snow Load, pg (psf):	20	Per ASCE 7-16 Figure 7.2 / USGS
Risk Category:	II	Per ASCE 7-16 Table 1.5-1
Exposure Factor, Ce:	0.9	ASCE 7-16 Table 7.3-1
Thermal Factor, Ct:	1.20	ASCE 7-16 Table 7.3-2
Importance Factor, Is:	1.00	ASCE 7-16 Table 1.5-2
Flat Surface Snow Load, pf (psf):	15.1	ASCE 7-16 Eq 7.3-1
Roof Slope Factor:	0.0	ASCE 7-16 Sec 7.4.1-7.4.4
Sloped Surface Snow Load, ps (psf):	0.0	ASCE 7-16 Eq 7.4-1
Rain on Snow Surcharge, pr (psf):	NA	ASCE 7-16 Sec 7.10

Ice Loads on Individual Elements from Freezing Rain:

Equivalent Radial Ice Thickness, t (in):	0.75	ASCE 7-16, Figure 10.4-2 to 10.4-6
Importance Factor, Ii:	1.00	ASCE 7-16 Table 1.5-2
Dc (in):	12.0	ASCE 7-16, Figure 10.4-1
Height to the highest point, z (ft):	11.0	
Height Factor, fz:	0.90	ASCE 7-16 Eq 10.4-4
Ice Density (pcf):	56	ASCE 7-16 Sec 10.4.1
Topographic Factor (from Wind Analysis) Kzt:	1.00	ASCE 7-16 Chapter 26
Design Ice Thickness, td (in):	0.67	ASCE 7-16 Eq 10.4-5
Cross Sectional Area of Ice on Structure, Ai (in^2):	26.8	ASCE 7-16 Eq 10.4-1
Ice Weight (plf):	**10.4**	

STRUCTURAL DESIGN



Node Boundary Conditions

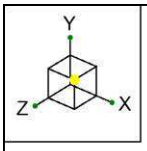
	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N2	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N69	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

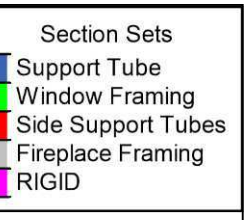
Hot Rolled Steel Properties

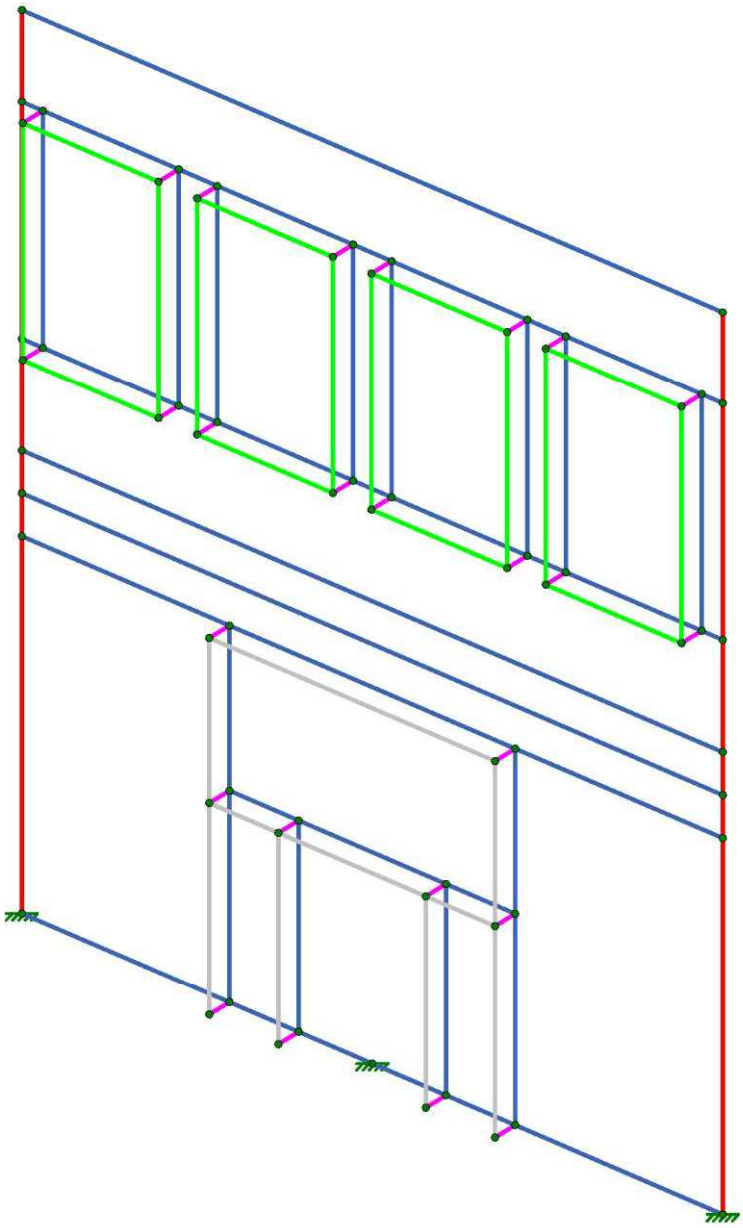
	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e^{5}°F^{-1}]	Density [k/ft^{3}]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
7	A1085	29000	11154	0.3	0.65	0.49	50	1.4	65	1.3
8	A847	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
9	A316	28000	11154	0.3	0.65	0.49	42.1	1.5	84.1	1.2
10	Guy Wire Mat	29000	11154	0.3	0.65	0	36	1.5	58	1.2
11	A500 Gr.C RND	29000	11154	0.3	0.65	0.527	46	1.4	62	1.3
12	A500 Gr.C RECT	29000	11154	0.3	0.65	0.527	50	1.4	62	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in^{2}]	Iyy [in^{4}]	Izz [in^{4}]	J [in^{4}]
1	Support Tube	HSS3.5X1.5X2	None	None	A500 Gr.C RECT	Typical	1.07	0.411	1.57	1.09
2	Window Framing	HSS2X2X0.083	None	None	A500 Gr.C RECT	Typical	0.636	0.391	0.391	0.585
3	Side Support Tubes	HSS3.5X2.5X4	None	None	A500 Gr.C RECT	Typical	2.44	2.23	3.79	4.75
4	Fireplace Framing	HSS5X2X4	None	None	A500 Gr.C RECT	Typical	2.91	1.84	8.08	5.17


Y
Z
X


Section Sets
Support Tube
Window Framing
Side Support Tubes
Fireplace Framing
RIGID



Node Loads and Enforced Displacements (BLC 4 : LLS (Interactive))

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N3	L	Z	0.2
2	N7	L	Z	0.2

Member Distributed Loads (BLC 5 : Wx)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M16	X	12.4	12.4	0	%100
2	M27	X	12.4	12.4	0	%100
3	M9	X	12.4	12.4	0	%100

Member Distributed Loads (BLC 15 : Snow Load)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M14	Y	-5	-5	0	%100

Member Distributed Loads (BLC 16 : BLC 7 Transient Area Loads)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M2	Z	31.322	27.69	0	1.942
2	M2	Z	27.69	30.944	1.942	3.883
3	M2	Z	30.944	30.265	3.883	5.825
4	M2	Z	30.265	27.011	5.825	7.767
5	M2	Z	27.011	32	7.767	9.708
6	M3	Z	10.665	23.215	0	0.792
7	M3	Z	23.215	47.418	0.792	1.583
8	M3	Z	47.418	44.75	1.583	2.375
9	M3	Z	44.75	21.446	2.375	3.167
10	M3	Z	21.446	16.029	3.167	3.958
11	M4	Z	4.423	49.195	0	0.933
12	M4	Z	49.195	63.908	0.933	1.867
13	M4	Z	63.908	63.363	1.867	2.8
14	M4	Z	63.363	49.825	2.8	3.733
15	M4	Z	49.825	8.492	3.733	4.667
16	M5	Z	4.124	48.898	0	0.933
17	M5	Z	48.898	63.615	0.933	1.867
18	M5	Z	63.615	60.856	1.867	2.8
19	M5	Z	60.856	48.1	2.8	3.733
20	M5	Z	48.1	12.763	3.733	4.667
21	M6	Z	22.209	39.325	0	0.656
22	M6	Z	39.325	47.88	0.656	1.312
23	M6	Z	47.88	39.316	1.312	1.969
24	M6	Z	39.316	22.195	1.969	2.625
25	M7	Z	22.202	39.309	0	0.656
26	M7	Z	39.309	47.859	0.656	1.312
27	M7	Z	47.859	39.303	1.312	1.969
28	M7	Z	39.303	22.198	1.969	2.625
29	M8	Z	7.76	8.349	0	1.942
30	M8	Z	8.349	8.49	1.942	3.883
31	M8	Z	8.49	8.489	3.883	5.825
32	M8	Z	8.489	8.349	5.825	7.767
33	M8	Z	8.349	7.76	7.767	9.708
34	M9	Z	7.365	44.74	0	1.04
35	M9	Z	44.74	61.171	1.04	2.079
36	M9	Z	61.171	45.415	2.079	3.119

Member Distributed Loads (BLC 16 : BLC 7 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
37	M9	Z	45.415	20.204	3.119	4.158
38	M9	Z	20.204	2.471	4.158	5.198
39	M10	Z	7.361	44.702	0	1.04
40	M10	Z	44.702	61.176	1.04	2.079
41	M10	Z	61.176	45.479	2.079	3.119
42	M10	Z	45.479	20.233	3.119	4.158
43	M10	Z	20.233	2.469	4.158	5.198
44	M76	Z	11.695	8.776	0	3.236
45	M76	Z	8.776	8.778	3.236	6.472
46	M76	Z	8.778	11.7	6.472	9.708
47	M11	Z	20.057	22.149	0	1.942
48	M11	Z	22.149	25.524	1.942	3.883
49	M11	Z	25.524	25.515	3.883	5.825
50	M11	Z	25.515	22.136	5.825	7.767
51	M11	Z	22.136	20.054	7.767	9.708
52	M12	Z	34.911	28.706	0	1.942
53	M12	Z	28.706	27.748	1.942	3.883
54	M12	Z	27.748	27.762	3.883	5.825
55	M12	Z	27.762	28.723	5.825	7.767
56	M12	Z	28.723	34.908	7.767	9.708
57	M13	Z	27.846	26.421	0	1.942
58	M13	Z	26.421	24.855	1.942	3.883
59	M13	Z	24.855	25.341	3.883	5.825
60	M13	Z	25.341	26.905	5.825	7.767
61	M13	Z	26.905	27.356	7.767	9.708
62	M14	Z	14.67	18.284	0	1.942
63	M14	Z	18.284	19.591	1.942	3.883
64	M14	Z	19.591	19.795	3.883	5.825
65	M14	Z	19.795	18.487	5.825	7.767
66	M14	Z	18.487	14.466	7.767	9.708
67	M15	Z	13.967	7.238	0	1.09
68	M15	Z	7.238	3.625	1.09	2.179
69	M15	Z	3.625	3.663	2.179	3.269
70	M15	Z	3.663	7.953	3.269	4.358
71	M15	Z	7.953	15.961	4.358	5.448
72	M16	Z	14.09	7.282	0	1.09
73	M16	Z	7.282	3.626	1.09	2.179
74	M16	Z	3.626	3.66	2.179	3.269
75	M16	Z	3.66	7.943	3.269	4.358
76	M16	Z	7.943	15.935	4.358	5.448
77	M17	Z	13.254	20.814	0	0.586
78	M17	Z	20.814	32.694	0.586	1.172
79	M17	Z	32.694	32.689	1.172	1.757
80	M17	Z	32.689	20.81	1.757	2.343
81	M17	Z	20.81	13.261	2.343	2.929
82	M19	Z	16.501	17.619	0	0.586
83	M19	Z	17.619	39.062	0.586	1.172
84	M19	Z	39.062	39.061	1.172	1.757
85	M19	Z	39.061	17.616	1.757	2.343
86	M19	Z	17.616	16.497	2.343	2.929
87	M20	Z	11.81	22.271	0	0.586
88	M20	Z	22.271	42.603	0.586	1.172
89	M20	Z	42.603	42.603	1.172	1.757
90	M20	Z	42.603	22.271	1.757	2.343
91	M20	Z	22.271	11.811	2.343	2.929

Member Distributed Loads (BLC 16 : BLC 7 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
92	M21	Z	11.815	22.282	0	0.586
93	M21	Z	22.282	42.631	0.586	1.172
94	M21	Z	42.631	42.63	1.172	1.757
95	M21	Z	42.63	22.279	1.757	2.343
96	M21	Z	22.279	11.81	2.343	2.929
97	M22	Z	11.657	22.119	0	0.586
98	M22	Z	22.119	42.451	0.586	1.172
99	M22	Z	42.451	42.45	1.172	1.757
100	M22	Z	42.45	23.642	1.757	2.343
101	M22	Z	23.642	16.229	2.343	2.929
102	M23	Z	11.815	22.282	0	0.586
103	M23	Z	22.282	42.631	0.586	1.172
104	M23	Z	42.631	42.63	1.172	1.757
105	M23	Z	42.63	22.279	1.757	2.343
106	M23	Z	22.279	11.81	2.343	2.929
107	M24	Z	16.497	17.616	0	0.586
108	M24	Z	17.616	39.061	0.586	1.172
109	M24	Z	39.061	39.062	1.172	1.757
110	M24	Z	39.062	17.619	1.757	2.343
111	M24	Z	17.619	16.501	2.343	2.929
112	M25	Z	13.261	20.81	0	0.586
113	M25	Z	20.81	32.689	0.586	1.172
114	M25	Z	32.689	32.694	1.172	1.757
115	M25	Z	32.694	20.814	1.757	2.343
116	M25	Z	20.814	13.254	2.343	2.929

Member Distributed Loads (BLC 17 : BLC 12 Transient Area Loads)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M2	Y	-5.12	-4.526	0	1.942
2	M2	Y	-4.526	-5.058	1.942	3.883
3	M2	Y	-5.058	-4.947	3.883	5.825
4	M2	Y	-4.947	-4.415	5.825	7.767
5	M2	Y	-4.415	-5.231	7.767	9.708
6	M3	Y	-1.743	-3.795	0	0.792
7	M3	Y	-3.795	-7.751	0.792	1.583
8	M3	Y	-7.751	-7.315	1.583	2.375
9	M3	Y	-7.315	-3.506	2.375	3.167
10	M3	Y	-3.506	-2.62	3.167	3.958
11	M4	Y	-0.723	-8.041	0	0.933
12	M4	Y	-8.041	-10.446	0.933	1.867
13	M4	Y	-10.446	-10.357	1.867	2.8
14	M4	Y	-10.357	-8.145	2.8	3.733
15	M4	Y	-8.145	-1.388	3.733	4.667
16	M5	Y	-0.674	-7.993	0	0.933
17	M5	Y	-7.993	-10.399	0.933	1.867
18	M5	Y	-10.399	-9.948	1.867	2.8
19	M5	Y	-9.948	-7.862	2.8	3.733
20	M5	Y	-7.862	-2.086	3.733	4.667
21	M6	Y	-3.63	-6.428	0	0.656
22	M6	Y	-6.428	-7.827	0.656	1.312
23	M6	Y	-7.827	-6.427	1.312	1.969
24	M6	Y	-6.427	-3.628	1.969	2.625
25	M7	Y	-3.629	-6.426	0	0.656
26	M7	Y	-6.426	-7.823	0.656	1.312
27	M7	Y	-7.823	-6.425	1.312	1.969

Member Distributed Loads (BLC 17 : BLC 12 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
28	M7	Y	-6.425	-3.628	1.969	2.625
29	M8	Y	-1.268	-1.365	0	1.942
30	M8	Y	-1.365	-1.388	1.942	3.883
31	M8	Y	-1.388	-1.388	3.883	5.825
32	M8	Y	-1.388	-1.365	5.825	7.767
33	M8	Y	-1.365	-1.268	7.767	9.708
34	M9	Y	-1.204	-7.313	0	1.04
35	M9	Y	-7.313	-9.999	1.04	2.079
36	M9	Y	-9.999	-7.424	2.079	3.119
37	M9	Y	-7.424	-3.303	3.119	4.158
38	M9	Y	-3.303	-0.404	4.158	5.198
39	M10	Y	-1.203	-7.307	0	1.04
40	M10	Y	-7.307	-10	1.04	2.079
41	M10	Y	-10	-7.434	2.079	3.119
42	M10	Y	-7.434	-3.307	3.119	4.158
43	M10	Y	-3.307	-0.404	4.158	5.198
44	M76	Y	-1.912	-1.435	0	3.236
45	M76	Y	-1.435	-1.435	3.236	6.472
46	M76	Y	-1.435	-1.912	6.472	9.708
47	M13	Y	-3.223	-2.866	0	1.942
48	M13	Y	-2.866	-2.727	1.942	3.883
49	M13	Y	-2.727	-2.727	3.883	5.825
50	M13	Y	-2.727	-2.866	5.825	7.767
51	M13	Y	-2.866	-3.223	7.767	9.708
52	M14	Y	-3.223	-2.866	0	1.942
53	M14	Y	-2.866	-2.727	1.942	3.883
54	M14	Y	-2.727	-2.727	3.883	5.825
55	M14	Y	-2.727	-2.866	5.825	7.767
56	M14	Y	-2.866	-3.223	7.767	9.708
57	M11	Y	-2.973	-3.533	0	1.942
58	M11	Y	-3.533	-3.834	1.942	3.883
59	M11	Y	-3.834	-3.834	3.883	5.825
60	M11	Y	-3.834	-3.533	5.825	7.767
61	M11	Y	-3.533	-2.973	7.767	9.708
62	M12	Y	-2.973	-3.533	0	1.942
63	M12	Y	-3.533	-3.834	1.942	3.883
64	M12	Y	-3.834	-3.834	3.883	5.825
65	M12	Y	-3.834	-3.533	5.825	7.767
66	M12	Y	-3.533	-2.973	7.767	9.708
67	M19	Y	-1.023	-1.408	0	0.732
68	M19	Y	-1.408	-1.601	0.732	1.465
69	M19	Y	-1.601	-1.408	1.465	2.197
70	M19	Y	-1.408	-1.023	2.197	2.929
71	M20	Y	-1.023	-1.408	0	0.732
72	M20	Y	-1.408	-1.601	0.732	1.465
73	M20	Y	-1.601	-1.408	1.465	2.197
74	M20	Y	-1.408	-1.023	2.197	2.929
75	M16	Y	-0.018	-0.369	0.545	1.416
76	M16	Y	-0.369	-0.789	1.416	2.288
77	M16	Y	-0.789	-0.769	2.288	3.16
78	M16	Y	-0.769	-0.497	3.16	4.031
79	M16	Y	-0.497	-0.132	4.031	4.903
80	M17	Y	-0.722	-0.711	0	0.586
81	M17	Y	-0.711	-0.787	0.586	1.172
82	M17	Y	-0.787	-0.787	1.172	1.757

Member Distributed Loads (BLC 17 : BLC 12 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
83	M17	Y	-0.787	-0.711	1.757	2.343
84	M17	Y	-0.711	-0.722	2.343	2.929
85	M21	Y	-1.023	-1.408	0	0.732
86	M21	Y	-1.408	-1.601	0.732	1.465
87	M21	Y	-1.601	-1.408	1.465	2.197
88	M21	Y	-1.408	-1.023	2.197	2.929
89	M22	Y	-1.023	-1.408	0	0.732
90	M22	Y	-1.408	-1.601	0.732	1.465
91	M22	Y	-1.601	-1.408	1.465	2.197
92	M22	Y	-1.408	-1.023	2.197	2.929
93	M23	Y	-1.023	-1.408	0	0.732
94	M23	Y	-1.408	-1.601	0.732	1.465
95	M23	Y	-1.601	-1.408	1.465	2.197
96	M23	Y	-1.408	-1.023	2.197	2.929
97	M24	Y	-1.023	-1.408	0	0.732
98	M24	Y	-1.408	-1.601	0.732	1.465
99	M24	Y	-1.601	-1.408	1.465	2.197
100	M24	Y	-1.408	-1.023	2.197	2.929
101	M15	Y	-0.018	-0.369	0.545	1.416
102	M15	Y	-0.369	-0.789	1.416	2.288
103	M15	Y	-0.789	-0.769	2.288	3.16
104	M15	Y	-0.769	-0.497	3.16	4.031
105	M15	Y	-0.497	-0.132	4.031	4.903
106	M25	Y	-0.722	-0.711	0	0.586
107	M25	Y	-0.711	-0.787	0.586	1.172
108	M25	Y	-0.787	-0.787	1.172	1.757
109	M25	Y	-0.787	-0.711	1.757	2.343
110	M25	Y	-0.711	-0.722	2.343	2.929
111	M28	Y	-5.206	-5.206	0.99	2.969
112	M29	Y	-5.047	-5.047	2.625	4.667
113	M30	Y	-5.047	-5.047	2.625	4.667
114	M75	Y	-5.206	-5.206	0.99	2.969
115	M30	Y	-1.963	-1.964	0	3.267
116	M31	Y	-2.444	-2.443	0	2.625
117	M29	Y	-1.963	-1.964	0	3.267
118	M32	Y	-2.444	-2.443	0	2.625

Member Distributed Loads (BLC 18 : BLC 13 Transient Area Loads)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M53	Y	-1.451	-1.451	0	1.881
2	M57	Y	-1.45	-1.45	0	1.881
3	M49	Y	-1.881	-1.881	0.725	2.204
4	M50	Y	-1.881	-1.881	0.725	2.204
5	M54	Y	-1.451	-1.451	0	1.881
6	M58	Y	-1.45	-1.45	0	1.881
7	M43	Y	-1.881	-1.881	0.725	2.204
8	M44	Y	-1.881	-1.881	0.725	2.204
9	M51	Y	-1.451	-1.451	0	1.881
10	M55	Y	-1.45	-1.45	0	1.881
11	M45	Y	-1.881	-1.881	0.725	2.204
12	M46	Y	-1.881	-1.881	0.725	2.204
13	M52	Y	-1.451	-1.451	0	1.881
14	M56	Y	-1.45	-1.45	0	1.881
15	M47	Y	-1.881	-1.881	0.725	2.204
16	M48	Y	-1.881	-1.881	0.725	2.204

Member Distributed Loads (BLC 19 : BLC 14 Transient Area Loads)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M6	Y	-7.876	-4.446	1.969	2.625
2	M7	Y	-4.447	-7.874	0	0.656
3	M7	Y	-7.874	-9.587	0.656	1.312
4	M7	Y	-9.587	-7.873	1.312	1.969
5	M7	Y	-7.873	-4.447	1.969	2.625
6	M8	Y	-3.207	-3.221	0	1.942
7	M8	Y	-3.221	-3.288	1.942	3.883
8	M8	Y	-3.288	-3.288	3.883	5.825
9	M8	Y	-3.288	-3.22	5.825	7.767
10	M8	Y	-3.22	-3.207	7.767	9.708
11	M9	Y	-1.475	-8.962	0	1.04
12	M9	Y	-8.962	-12.254	1.04	2.079
13	M9	Y	-12.254	-9.098	2.079	3.119
14	M9	Y	-9.098	-4.047	3.119	4.158
15	M9	Y	-4.047	-0.495	4.158	5.198
16	M10	Y	-1.475	-8.955	0	1.04
17	M10	Y	-8.955	-12.255	1.04	2.079
18	M10	Y	-12.255	-9.11	2.079	3.119
19	M10	Y	-9.11	-4.053	3.119	4.158
20	M10	Y	-4.053	-0.495	4.158	5.198
21	M11	Y	-4.651	-6.277	0	1.942
22	M11	Y	-6.277	-7.019	1.942	3.883
23	M11	Y	-7.019	-7.012	3.883	5.825
24	M11	Y	-7.012	-6.262	5.825	7.767
25	M11	Y	-6.262	-4.636	7.767	9.708
26	M12	Y	-6.807	-6.05	0	1.942
27	M12	Y	-6.05	-5.798	1.942	3.883
28	M12	Y	-5.798	-5.801	3.883	5.825
29	M12	Y	-5.801	-6.063	5.825	7.767
30	M12	Y	-6.063	-6.832	7.767	9.708
31	M13	Y	-5.578	-5.293	0	1.942
32	M13	Y	-5.293	-4.979	1.942	3.883
33	M13	Y	-4.979	-5.076	3.883	5.825
34	M13	Y	-5.076	-5.39	5.825	7.767
35	M13	Y	-5.39	-5.48	7.767	9.708
36	M14	Y	-2.939	-3.663	0	1.942
37	M14	Y	-3.663	-3.925	1.942	3.883
38	M14	Y	-3.925	-3.965	3.883	5.825
39	M14	Y	-3.965	-3.703	5.825	7.767
40	M14	Y	-3.703	-2.898	7.767	9.708
41	M15	Y	-2.138	-1.259	0	1.09
42	M15	Y	-1.259	-0.76	1.09	2.179
43	M15	Y	-0.76	-0.757	2.179	3.269
44	M15	Y	-0.757	-1.617	3.269	4.358
45	M15	Y	-1.617	-3.221	4.358	5.448
46	M16	Y	-2.135	-1.258	0	1.09
47	M16	Y	-1.258	-0.76	1.09	2.179
48	M16	Y	-0.76	-0.758	2.179	3.269
49	M16	Y	-0.758	-1.615	3.269	4.358
50	M16	Y	-1.615	-3.217	4.358	5.448
51	M17	Y	-3.029	-4.285	0	0.586
52	M17	Y	-4.285	-6.536	0.586	1.172
53	M17	Y	-6.536	-6.535	1.172	1.757
54	M17	Y	-6.535	-4.156	1.757	2.343
55	M17	Y	-4.156	-2.644	2.343	2.929

Member Distributed Loads (BLC 19 : BLC 14 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
56	M19	Y	-3.306	-3.529	0	0.586
57	M19	Y	-3.529	-7.825	0.586	1.172
58	M19	Y	-7.825	-7.825	1.172	1.757
59	M19	Y	-7.825	-3.529	1.757	2.343
60	M19	Y	-3.529	-3.305	2.343	2.929
61	M20	Y	-2.366	-4.463	0	0.586
62	M20	Y	-4.463	-8.54	0.586	1.172
63	M20	Y	-8.54	-8.54	1.172	1.757
64	M20	Y	-8.54	-4.464	1.757	2.343
65	M20	Y	-4.464	-2.367	2.343	2.929
66	M21	Y	-2.366	-4.461	0	0.586
67	M21	Y	-4.461	-8.534	0.586	1.172
68	M21	Y	-8.534	-8.534	1.172	1.757
69	M21	Y	-8.534	-4.461	1.757	2.343
70	M21	Y	-4.461	-2.366	2.343	2.929
71	M22	Y	-2.335	-4.432	0	0.586
72	M22	Y	-4.432	-8.509	0.586	1.172
73	M22	Y	-8.509	-8.509	1.172	1.757
74	M22	Y	-8.509	-4.738	1.757	2.343
75	M22	Y	-4.738	-3.252	2.343	2.929
76	M23	Y	-2.366	-4.461	0	0.586
77	M23	Y	-4.461	-8.534	0.586	1.172
78	M23	Y	-8.534	-8.534	1.172	1.757
79	M23	Y	-8.534	-4.461	1.757	2.343
80	M23	Y	-4.461	-2.366	2.343	2.929
81	M24	Y	-3.305	-3.529	0	0.586
82	M24	Y	-3.529	-7.826	0.586	1.172
83	M24	Y	-7.826	-7.826	1.172	1.757
84	M24	Y	-7.826	-3.53	1.757	2.343
85	M24	Y	-3.53	-3.306	2.343	2.929
86	M25	Y	-3.032	-4.285	0	0.586
87	M25	Y	-4.285	-6.534	0.586	1.172
88	M25	Y	-6.534	-6.535	1.172	1.757
89	M25	Y	-6.535	-4.156	1.757	2.343
90	M25	Y	-4.156	-2.642	2.343	2.929
91	M76	Y	-2.343	-1.758	0	3.236
92	M76	Y	-1.758	-1.758	3.236	6.472
93	M76	Y	-1.758	-2.344	6.472	9.708
94	M2	Y	-6.274	-5.547	0	1.942
95	M2	Y	-5.547	-6.199	1.942	3.883
96	M2	Y	-6.199	-6.063	3.883	5.825
97	M2	Y	-6.063	-5.411	5.825	7.767
98	M2	Y	-5.411	-6.41	7.767	9.708
99	M3	Y	-2.136	-4.651	0	0.792
100	M3	Y	-4.651	-9.499	0.792	1.583
101	M3	Y	-9.499	-8.964	1.583	2.375
102	M3	Y	-8.964	-4.296	2.375	3.167
103	M3	Y	-4.296	-3.211	3.167	3.958
104	M4	Y	-0.886	-9.855	0	0.933
105	M4	Y	-9.855	-12.802	0.933	1.867
106	M4	Y	-12.802	-12.693	1.867	2.8
107	M4	Y	-12.693	-9.981	2.8	3.733
108	M4	Y	-9.981	-1.701	3.733	4.667
109	M5	Y	-0.826	-9.795	0	0.933
110	M5	Y	-9.795	-12.743	0.933	1.867

Member Distributed Loads (BLC 19 : BLC 14 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, k-ft/ft]	End Magnitude [lb/ft, F, psf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
111	M5	Y	-12.743	-12.191	1.867	2.8
112	M5	Y	-12.191	-9.635	2.8	3.733
113	M5	Y	-9.635	-2.557	3.733	4.667
114	M6	Y	-4.449	-7.878	0	0.656
115	M6	Y	-7.878	-9.591	0.656	1.312
116	M6	Y	-9.591	-7.876	1.312	1.969

Member Area Loads (BLC 7 : Wz)

	Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces
1	N15	N16	N2	N1	Z	Two Way	31.2	31.2	31.2	31.2	Yes
2	N23	N24	N18	N17	Z	Two Way	31.2	31.2	31.2	31.2	Yes

Member Area Loads (BLC 12 : Plate DL)

	Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces
1	N15	N16	N2	N1	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
2	N23	N24	N22	N21	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
3	N19	N20	N18	N17	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
4	N30	N32	N31	N29	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
5	N21	N26	N25	N19	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
6	N34	N36	N35	N33	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
7	N38	N40	N39	N37	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
8	N42	N22	N20	N41	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
9	N50	N48	N44	N43	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
10	N43	N45	N51	N49	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes
11	N46	N44	N47	N52	Y	Two Way	-5.1	-5.1	-5.1	-5.1	Yes

Member Area Loads (BLC 13 : Glass DL)

	Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces
1	N54	N56	N55	N53	Y	Two Way	-2	-2	-2	-2	Yes
2	N58	N60	N59	N57	Y	Two Way	-2	-2	-2	-2	Yes
3	N62	N64	N63	N61	Y	Two Way	-2	-2	-2	-2	Yes
4	N66	N68	N67	N65	Y	Two Way	-2	-2	-2	-2	Yes

Member Area Loads (BLC 14 : Ice Load)

	Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces
1	N23	N24	N2	N1	Y	Two Way	-6.25	-6.25	-6.25	-6.25	Yes

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Distributed	Area(Member)
1	Self Wt	DL		-1				
2	SI Dead	DL						
3	L (Occupancy)	LL						
4	LLS (Interactive)	LLS				2		
5	Wx	WLX					3	
6	Wy	WLY						
7	Wz	WLZ						2
8	Ex	ELX	-0.5					
9	Ey	ELY		-0.2				
10	Ez	ELZ			-0.5			

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Distributed	Area(Member)
11	Lr	RLL						
12	Plate DL	DL						11
13	Glass DL	DL						4
14	Ice Load	None						1
15	Snow Load	SL					1	
16	BLC 7 Transient Area Loads	None					116	
17	BLC 12 Transient Area Loads	None					118	
18	BLC 13 Transient Area Loads	None					16	
19	BLC 14 Transient Area Loads	None					116	

Load Combinations

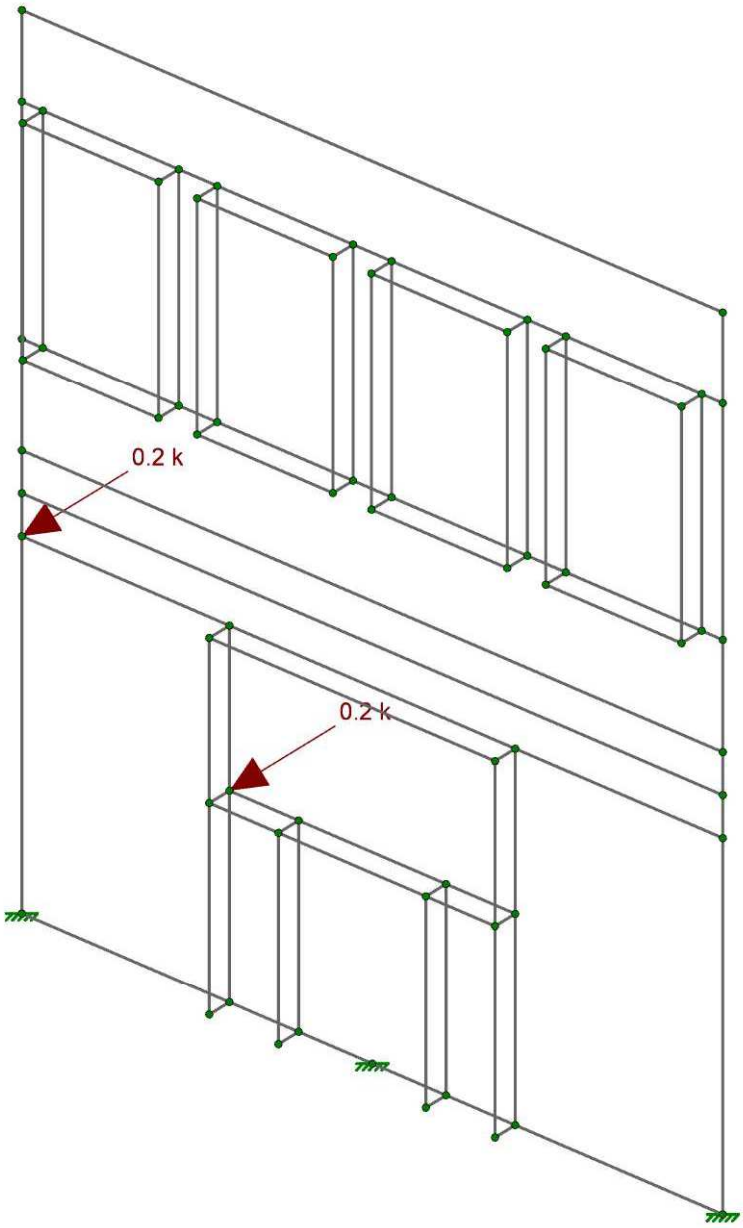
	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	**********LRFD GRAVITY**********																
2	1.4D	Yes	Y	DL	1.4												
3	1.2D+1.6L+0.5S+0.2Di	Yes	Y	DL	1.2	LL	1.6	SL	0.5	14	0.2						
4	1.2D+1.6LL/S+0.5S+0.2Di	Yes	Y	DL	1.2	LLS	1.6	LL	1.6	SL	0.5	14	0.2				
5	****LRFD CUSTOM WIND LIVE INTERACTION***																
6	1.2D+1.0LL/S+0.5Wx+0.5Wy+1.6S	Yes	Y	DL	1.2	LLS	1	LL	1	WLX	0.5	WLY	0.5			SL	1.6
7	1.2D+1.0LL/S-0.5Wx+0.5Wy+1.6S	Yes	Y	DL	1.2	LLS	1	LL	1	WLX	-0.5	WLY	0.5			SL	1.6
8	1.2D+1.0LL/S+0.5Wz+0.5Wy+1.6S	Yes	Y	DL	1.2	LLS	1	LL	1			WLY	0.5	WLZ	0.5	SL	1.6
9	1.2D+1.0LL/S-0.5Wz+0.5Wy+1.6S	Yes	Y	DL	1.2	LLS	1	LL	1			WLY	0.5	WLZ	-0.5	SL	1.6
10	1.2D+1.0LL/S+0.5*0.75(Wz+Wx)+0.5Wy+1.6S	Yes	Y	DL	1.2	LLS	1	LL	1	WLX	0.375	WLY	0.5	WLZ	0.375	SL	1.6
11	1.2D+1.0LL/S+0.5*0.75(Wz-Wx)+0.5Wy+1.6S	Yes	Y	DL	1.2	LLS	1	LL	1	WLX	-0.375	WLY	0.5	WLZ	0.375	SL	1.6
12	1.2D+1.0LL/S+0.5*0.75(-Wz+Wx)+0.5Wy+1.6S	Yes	Y	DL	1.2	LLS	1	LL	1	WLX	0.375	WLY	0.5	WLZ	-0.375	SL	1.6
13	1.2D+1.0LL/S+0.5*0.75(-Wz-Wx)+0.5Wy+1.6S	Yes	Y	DL	1.2	LLS	1	LL	1	WLX	-0.375	WLY	0.5	WLZ	-0.375	SL	1.6
14	**********LRFD WIND PER ASCE**********																
15	1.2D+1.0L+1.0Wx+1.0Wy+0.5S+Di	Yes	Y	DL	1.2	LL	1	WLX	1	WLY	1			SL	0.5	14	1
16	1.2D+1.0L-1.0Wx+1.0Wy+0.5S+Di	Yes	Y	DL	1.2	LL	1	WLX	-1	WLY	1			SL	0.5	14	1
17	1.2D+1.0L+1.0Wz+1.0Wy+0.5S+Di	Yes	Y	DL	1.2	LL	1			WLY	1	WLZ	1	SL	0.5	14	1
18	1.2D+1.0L-1.0Wz+1.0Wy+0.5S+Di	Yes	Y	DL	1.2	LL	1			WLY	1	WLZ	-1	SL	0.5	14	1
19	1.2D+1.0L+0.75(Wz+Wx)+1.0Wy+0.5S+Di	Yes	Y	DL	1.2	LL	1	WLX	0.75	WLY	1	WLZ	0.75	SL	0.5	14	1
20	1.2D+1.0L+0.75(Wz-Wx)+1.0Wy+0.5S+Di	Yes	Y	DL	1.2	LL	1	WLX	-0.75	WLY	1	WLZ	0.75	SL	0.5	14	1
21	1.2D+1.0L+0.75(-Wz+Wx)+1.0Wy+0.5S+Di	Yes	Y	DL	1.2	LL	1	WLX	0.75	WLY	1	WLZ	-0.75	SL	0.5	14	1
22	1.2D+1.0L+.75(-Wz-Wx)+1.0Wy+0.5S+Di	Yes	Y	DL	1.2	LL	1	WLX	-0.75	WLY	1	WLZ	-0.75	SL	0.5	14	1
23	0.9D+1.0Wx+1.0Wy+Di	Yes	Y	DL	0.9			WLX	1	WLY	1	14	1				
24	0.9D-1.0Wx+1.0Wy+Di	Yes	Y	DL	0.9			WLX	-1	WLY	1	14	1				
25	0.9D+1.0Wx+1.0Wy+Di	Yes	Y	DL	0.9					WLY	1	WLZ	1	14	1		
26	0.9D-1.0Wz+1.0Wy+Di	Yes	Y	DL	0.9					WLY	1	WLZ	-1	14	1		
27	0.9D+0.75(Wz+Wx)+1.0Wy+Di	Yes	Y	DL	0.9			WLX	0.75	WLY	1	WLZ	0.75	14	1		
28	0.9D+0.75(Wz-Wx)+1.0Wy+Di	Yes	Y	DL	0.9			WLX	-0.75	WLY	1	WLZ	0.75	14	1		
29	0.9D+0.75(-Wz+Wx)+1.0Wy+Di	Yes	Y	DL	0.9			WLX	0.75	WLY	1	WLZ	-0.75	14	1		
30	0.9D+0.75(-Wz-Wx)+1.0Wy+Di	Yes	Y	DL	0.9			WLX	-0.75	WLY	1	WLZ	-0.75	14	1		
31	**********LRFD SEISMIC**********																
32	1.2D+L+Ex+Ey(1)+0.2S		Y	DL	1.2	LL	1	Rho*ELX	1			Sds*DL	0.2	SL	0.2		
33	1.2D+L-Ex+Ey(1)+0.2S		Y	DL	1.2	LL	1	Rho*ELX	-1			Sds*DL	0.2	SL	0.2		
34	1.2D+L+Ez+Ey(1)+0.2S		Y	DL	1.2	LL	1	Rho*ELZ	1			Sds*DL	0.2	SL	0.2		
35	1.2D+L-Ez+Ey(1)+0.2S		Y	DL	1.2	LL	1	Rho*ELZ	-1			Sds*DL	0.2	SL	0.2		
36	1.2D+L+.75(Ex+Ez)+Ey(1)+0.2S		Y	DL	1.2	LL	1	Rho*ELX	0.75	Rho*ELZ	0.75	Sds*DL	0.2	SL	0.2		
37	1.2D+L+.75(Ex-Ez)+Ey(1)+0.2S		Y	DL	1.2	LL	1	Rho*ELX	0.75	Rho*ELZ	-0.75	Sds*DL	0.2	SL	0.2		
38	1.2D+L+.75(-Ex+Ez)+Ey(1)+0.2S		Y	DL	1.2	LL	1	Rho*ELX	-0.75	Rho*ELZ	0.75	Sds*DL	0.2	SL	0.2		
39	1.2D+L+.75(-Ex-Ez)+Ey(1)+0.2S		Y	DL	1.2	LL	1	Rho*ELX	-0.75	Rho*ELZ	-0.75	Sds*DL	0.2	SL	0.2		
40	0.9D+Ex-Ey(1)		Y	DL	0.9			Rho*ELX	1			Sds*DL	-0.2				
41	0.9D-Ex-Ey(1)		Y	DL	0.9			Rho*ELX	-1			Sds*DL	-0.2				
42	0.9D+Ez-Ey(1)		Y	DL	0.9			Rho*ELZ	1			Sds*DL	-0.2				
43	0.9D-Ez-Ey(1)		Y	DL	0.9			Rho*ELZ	-1			Sds*DL	-0.2				

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
44	0.9D+.75(Ex+Ez)-Ey(1)		Y	DL	0.9			Rho*ELX	0.75	Rho*ELZ	0.75	Sds*DL	-0.2				
45	0.9D+.75(-Ex+Ez)-Ey(1)		Y	DL	0.9			Rho*ELX	-0.75	Rho*ELZ	0.75	Sds*DL	-0.2				
46	0.9D+.75(Ex+-Ez)-Ey(1)		Y	DL	0.9			Rho*ELX	0.75	Rho*ELZ	-0.75	Sds*DL	-0.2				
47	0.9D+.75(-Ex-Ez)-Ey(1)		Y	DL	0.9			Rho*ELX	-0.75	Rho*ELZ	-0.75	Sds*DL	-0.2				
48	**********LRFD OVERSTRENGTH SEISMIC**********																
49	1.2D+L+Ex+Ey		Y	DL	1.2	LL	1	Om*ELX	1			Sds*DL	0.2				
50	1.2D+L-Ex+Ey		Y	DL	1.2	LL	1	Om*ELX	-1			Sds*DL	0.2				
51	1.2D+L+Ez+Ey		Y	DL	1.2	LL	1	Om*ELZ	1			Sds*DL	0.2				
52	1.2D+L-Ez+Ey		Y	DL	1.2	LL	1	Om*ELZ	-1			Sds*DL	0.2				
53	1.2D+L+.75(Ex+Ez)+Ey		Y	DL	1.2	LL	1	Om*ELX	0.75	Om*ELZ	0.75	Sds*DL	0.2				
54	1.2D+L+.75(Ex-Ez)+Ey		Y	DL	1.2	LL	1	Om*ELX	0.75	Om*ELZ	-0.75	Sds*DL	0.2				
55	1.2D+L+.75(-Ex+Ez)+Ey		Y	DL	1.2	LL	1	Om*ELX	-0.75	Om*ELZ	0.75	Sds*DL	0.2				
56	1.2D+L+.75(-Ex-Ez)+Ey		Y	DL	1.2	LL	1	Om*ELX	-0.75	Om*ELZ	-0.75	Sds*DL	0.2				
57	0.9D+Ex-Ey		Y	DL	0.9			Om*ELX	1			Sds*DL	-0.2				
58	0.9D-Ex-Ey		Y	DL	0.9			Om*ELX	-1			Sds*DL	-0.2				
59	0.9D+Ez-Ey		Y	DL	0.9			Om*ELZ	1			Sds*DL	-0.2				
60	0.9D-Ez-Ey		Y	DL	0.9			Om*ELZ	-1			Sds*DL	-0.2				
61	0.9D+.75(Ex+Ez)-Ey		Y	DL	0.9			Om*ELX	0.75	Om*ELZ	0.75	Sds*DL	-0.2				
62	0.9D+.75(-Ex+Ez)-Ey		Y	DL	0.9			Om*ELX	-0.75	Om*ELZ	0.75	Sds*DL	-0.2				
63	0.9D+.75(Ex+-Ez)-Ey		Y	DL	0.9			Om*ELX	0.75	Om*ELZ	-0.75	Sds*DL	-0.2				
64	0.9D+.75(-Ex-Ez)-Ey		Y	DL	0.9			Om*ELX	-0.75	Om*ELZ	-0.75	Sds*DL	-0.2				
65	**********ASD GRAVITY**********		Y														
66	D+L+0.7Di	Yes	Y	DL	1	LL	1	14	0.7								
67	D+.75L+0.75S	Yes	Y	DL	1	LL	0.75	SL	0.75								
68	D+S+0.7Di	Yes	Y	DL	1	SL	1	14	0.7								
69	***ASD CUSTOM WIND LIVE+S INTERACTION***																
70	D+0.75LL/S+0.75(0.3Wx+0.3Wy)+0.75S		Y	DL	1	LLS	0.75	LL	0.75	WLX	0.225	WLY	0.225			SL	1
71	D+0.75LL/S+0.75(-0.3Wx+0.3Wy)+0.75S		Y	DL	1	LLS	0.75	LL	0.75	WLX	-0.225	WLY	0.225			SL	1
72	D+0.75LL/S+0.75(0.3Wz+0.3Wy)+0.75S		Y	DL	1	LLS	0.75	LL	0.75			WLY	0.225	WLZ	0.225	SL	1
73	D+0.75LL/S+0.75(-0.3Wz+0.3Wy)+0.75S		Y	DL	1	LLS	0.75	LL	0.75			WLY	0.225	WLZ	-0.225	SL	1
74	D+0.75LL/S+0.75(0.75(0.3Wx+.3Wz))+0.75(0.3Wy)+0.75S		Y	DL	1	LLS	0.75	LL	0.75	WLX	0.17	WLY	0.225	WLZ	0.17	SL	1
75	D+0.75LL/S+0.75(0.75(0.3Wx-.3Wz))+0.75(0.3Wy)+0.75S		Y	DL	1	LLS	0.75	LL	0.75	WLX	-0.17	WLY	0.225	WLZ	0.17	SL	1
76	D+0.75LL/S+0.75(0.75(-0.3Wx+.3Wz))+0.75(0.3Wy)+0.75S		Y	DL	1	LLS	0.75	LL	0.75	WLX	0.17	WLY	0.225	WLZ	-0.17	SL	1
77	D+0.75LL/S+0.75(0.75(-0.3Wx-.3Wz))+0.75(0.3Wy)+0.75S		Y	DL	1	LLS	0.75	LL	0.75	WLX	-0.17	WLY	0.225	WLZ	-0.17	SL	1
78	**********ASD WIND PER ASCE**********																
79	D+0.6Wx+0.6Wy	Yes	Y	DL	1			WLX	0.6	WLY	0.6						
80	D-0.6Wx+0.6Wy	Yes	Y	DL	1			WLX	-0.6	WLY	0.6						
81	D+0.6Wz+0.6Wy	Yes	Y	DL	1					WLY	0.6	WLZ	0.6				
82	D-0.6Wz+0.6Wy	Yes	Y	DL	1					WLY	0.6	WLZ	-0.6				
83	D+0.6(.75(Wz+Wx))+0.6Wy	Yes	Y	DL	1			WLX	0.45	WLY	0.6	WLZ	0.45				
84	D+0.6(.75(Wz-Wx))+0.6Wy	Yes	Y	DL	1			WLX	-0.45	WLY	0.6	WLZ	0.45				
85	D+0.6(.75(-Wz+Wx))+0.6Wy	Yes	Y	DL	1			WLX	0.45	WLY	0.6	WLZ	-0.45				
86	D+0.6(.75(-Wz-Wx))+0.6Wy	Yes	Y	DL	1			WLX	-0.45	WLY	0.6	WLZ	-0.45				
87	D+0.75L+0.75(0.6Wz)+0.75S+0.75(0.6Wy)	Yes	Y	DL	1	LL	0.75			WLY	0.45	WLZ	0.45	SL	0.75		
88	D+0.75L+0.75(-0.6Wz)+0.75S+0.75(0.6Wy)	Yes	Y	DL	1	LL	0.75			WLY	0.45	WLZ	-0.45	SL	0.75		
89	D+0.75L+0.75(0.6Wx)+0.75S+0.75(0.6Wy)	Yes	Y	DL	1	LL	0.75	WLX	0.45	WLY	0.45			SL	0.75		
90	D+0.75L+0.75(-0.6Wx)+0.75S+0.75(0.6Wy)	Yes	Y	DL	1	LL	0.75	WLX	-0.45	WLY	0.45			SL	0.75		
91	D+0.75L+0.75(0.75(0.6Wx+.6Wz))+0.75S+0.75(0.6Wy)	Yes	Y	DL	1	LL	0.75	WLX	0.34	WLY	0.45	WLZ	0.34	SL	0.75		
92	D+0.75L+0.75(0.75(0.6Wx-.6Wz))+0.75S+0.75(0.6Wy)	Yes	Y	DL	1	LL	0.75	WLX	0.34	WLY	0.45	WLZ	-0.34	SL	0.75		
93	D+0.75L+0.75(0.75(-0.6Wx+.6Wz))+0.75S+0.75(0.6Wy)	Yes	Y	DL	1	LL	0.75	WLX	-0.34	WLY	0.45	WLZ	0.34	SL	0.75		
94	D+0.75L+0.75(0.75(-0.6Wx-.6Wz))+0.75S+0.75(0.6Wy)	Yes	Y	DL	1	LL	0.75	WLX	-0.34	WLY	0.45	WLZ	-0.34	SL	0.75		
95	0.6D+0.6Wx+0.6Wy+0.7Di	Yes	Y	DL	0.6			WLX	0.6	WLY	0.6	14	0.7				
96	0.6D-0.6Wx+0.6Wy+0.7Di	Yes	Y	DL	0.6			WLX	-0.6	WLY	0.6	14	0.7				
97	0.6D+0.6Wz+0.6Wy+0.7Di	Yes	Y	DL	0.6					WLY	0.6	WLZ	0.6	14	0.7		
98	0.6D-0.6Wz+0.6Wy+0.7Di	Yes	Y	DL	0.6					WLY	0.6	WLZ	-0.6	14	0.7		

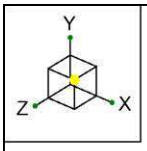
Load Combinations (Continued)

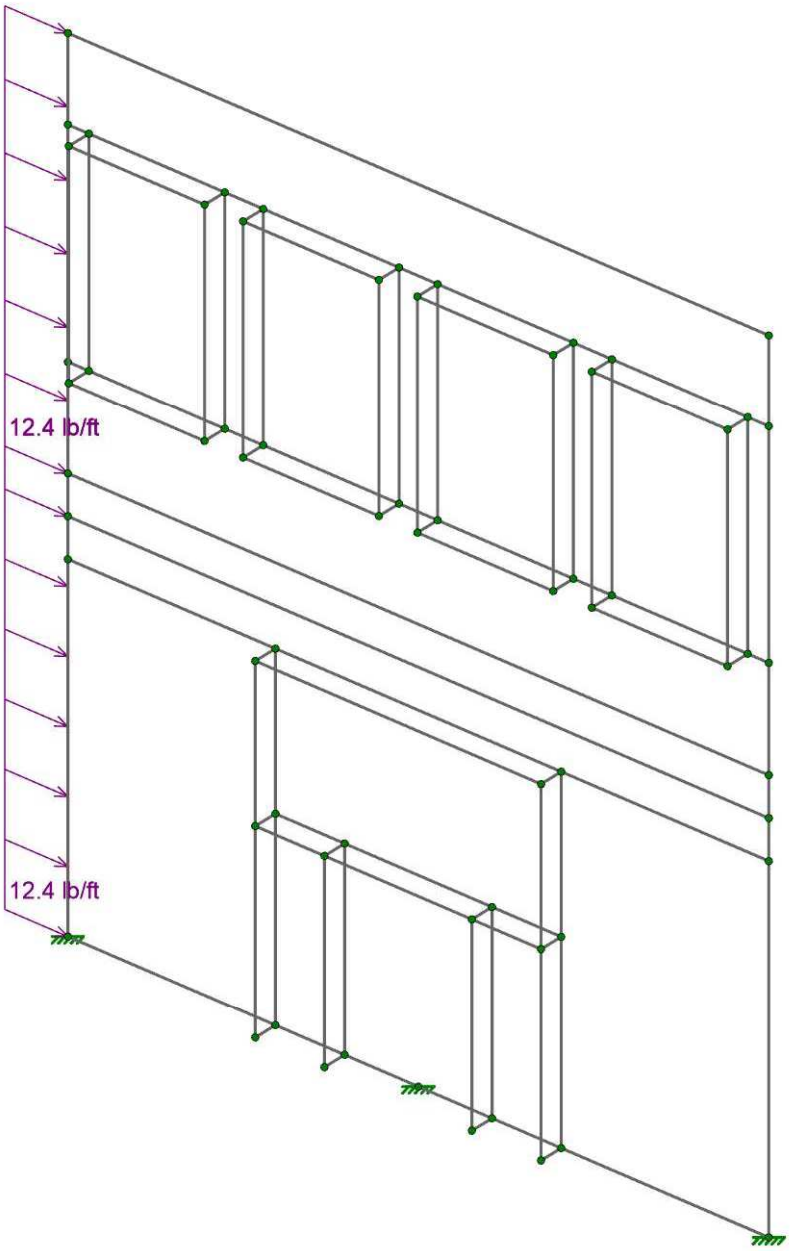
	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
99	0.6D+.75(0.6Wz+0.6Wx)+0.6Wy+0.7Di	Yes	Y	DL	0.6			WLX	0.45	WLY	0.6	WLZ	0.45	14	0.7		
100	0.6D+.75(0.6Wz-0.6Wx)+0.6Wy+0.7Di	Yes	Y	DL	0.6			WLX	-0.45	WLY	0.6	WLZ	0.45	14	0.7		
101	0.6D+.75(-0.6Wz+0.6Wx)+0.6Wy+0.7Di	Yes	Y	DL	0.6			WLX	0.45	WLY	0.6	WLZ	-0.45	14	0.7		
102	0.6D+.75(-0.6Wz-0.6Wx)+0.6Wy+0.7Di	Yes	Y	DL	0.6			WLX	-0.45	WLY	0.6	WLZ	-0.45	14	0.7		
103	**********ASD SEISMIC**********																
104	D+0.75L+0.75(0.7Ex+Ey)		Y	DL	1	LL	0.75	Rho*ELX	0.525			Sds*DL	0.105				
105	D+0.75L+0.75(-0.7Ex+Ey)		Y	DL	1	LL	0.75	Rho*ELX	-0.525			Sds*DL	0.105				
106	D+0.75L+0.75(0.7Ez+Ey)		Y	DL	1	LL	0.75	Rho*ELZ	0.525			Sds*DL	0.105				
107	D+0.75L+0.75(-0.7Ez+Ey)		Y	DL	1	LL	0.75	Rho*ELZ	-0.525			Sds*DL	0.105				
108	D+0.75L+0.75(0.7(.75Ex+.75Ez+Ey))		Y	DL	1	LL	0.75	Rho*ELX	0.4	Rho*ELZ	0.4	Sds*DL	0.105				
109	D+0.75L+0.75(0.7(.75Ex-.75Ez+Ey))		Y	DL	1	LL	0.75	Rho*ELX	0.4	Rho*ELZ	-0.4	Sds*DL	0.105				
110	D+0.75L+0.75(0.7(-.75Ex+.75Ez+Ey)		Y	DL	1	LL	0.75	Rho*ELX	-0.4	Rho*ELZ	0.4	Sds*DL	0.105				
111	D+0.75L+0.75(0.7(-.75Ex-.75Ez+Ey)		Y	DL	1	LL	0.75	Rho*ELX	-0.4	Rho*ELZ	-0.4	Sds*DL	0.105				
112	0.6D+0.7Ex-0.7Ey		Y	DL	0.6			Rho*ELX	0.7			Sds*DL	-0.14				
113	0.6D-0.7Ex-0.7Ey		Y	DL	0.6			Rho*ELX	-0.7			Sds*DL	-0.14				
114	0.6D+0.7Ez-0.7Ey		Y	DL	0.6			Rho*ELZ	0.7			Sds*DL	-0.14				
115	0.6D-0.7Ez-0.7Ey		Y	DL	0.6			Rho*ELZ	-0.7			Sds*DL	-0.14				
116	0.6D+0.7(.75Ex+.75Ez)-0.7Ey		Y	DL	0.6			Rho*ELX	0.525	Rho*ELZ	0.525	Sds*DL	-0.14				
117	0.6D+0.7(.75Ex-.75Ez)-0.7Ey		Y	DL	0.6			Rho*ELX	0.525	Rho*ELZ	-0.525	Sds*DL	-0.14				
118	0.6D+0.7(-.75Ex+.75Ez)-0.7Ey		Y	DL	0.6			Rho*ELX	-0.525	Rho*ELZ	0.525	Sds*DL	-0.14				
119	0.6D+0.7(-.75Ex-.75Ez)-0.7Ey		Y	DL	0.6			Rho*ELX	-0.525	Rho*ELZ	-0.525	Sds*DL	-0.14				
120	D+0.7Ex-0.7Ey		Y	DL	1			Rho*ELX	0.7			Sds*DL	0.14				
121	D-0.7Ex-0.7Ey		Y	DL	1			Rho*ELX	-0.7			Sds*DL	0.14				
122	D+0.7Ez-0.7Ey		Y	DL	1			Rho*ELZ	0.7			Sds*DL	0.14				
123	D-0.7Ez-0.7Ey		Y	DL	1			Rho*ELZ	-0.7			Sds*DL	0.14				
124	D+0.7(.75Ex+.75Ez)-0.7Ey		Y	DL	1			Rho*ELX	0.525	Rho*ELZ	0.525	Sds*DL	0.14				
125	D+0.7(.75Ex-.75Ez)-0.7Ey		Y	DL	1			Rho*ELX	0.525	Rho*ELZ	-0.525	Sds*DL	0.14				
126	D+0.7(-.75Ex+.75Ez)-0.7Ey		Y	DL	1			Rho*ELX	-0.525	Rho*ELZ	0.525	Sds*DL	0.14				
127	D+0.7(-.75Ex-.75Ez)-0.7Ey		Y	DL	1			Rho*ELX	-0.525	Rho*ELZ	-0.525	Sds*DL	0.14				
128	**********SINGLE**********																
129	D (TOTAL)	Yes	Y	DL	1												
130	D (Self Wt only)		Y	1	1												
131	D (SI Dead only)		Y	2	1												
132	Live Loads (Occupancy Type)		Y	LL	1												
133	Live Loads (Interactive - Climbing, Pushing, etc.)	Yes	Y	LLS	1												
134	Wx		Y	WLX	1												
135	Wz	Yes	Y	WLZ	1												
136	Wy		Y	WLY	1												
137	Ex		Y	ELX	1												
138	Ez		Y	ELZ	1												
139	Ey		Y	ELY	1												
140	Lr		Y	RLL	1												
141	Cladding		Y	12	1	13	1										
142	Snow Load	Yes	Y	SL	1												
143	Ice Load		Y	14	1												



Loads: BLC 4, LLS (Interactive)

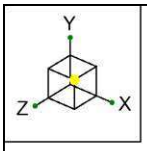
RISA A NEMETSCHEK COMPANY	Rbhu		SK-3
			Aug 21, 2025 at 10:23 AM
	20XX		2025.07.07 - 2562 - Mantel o…

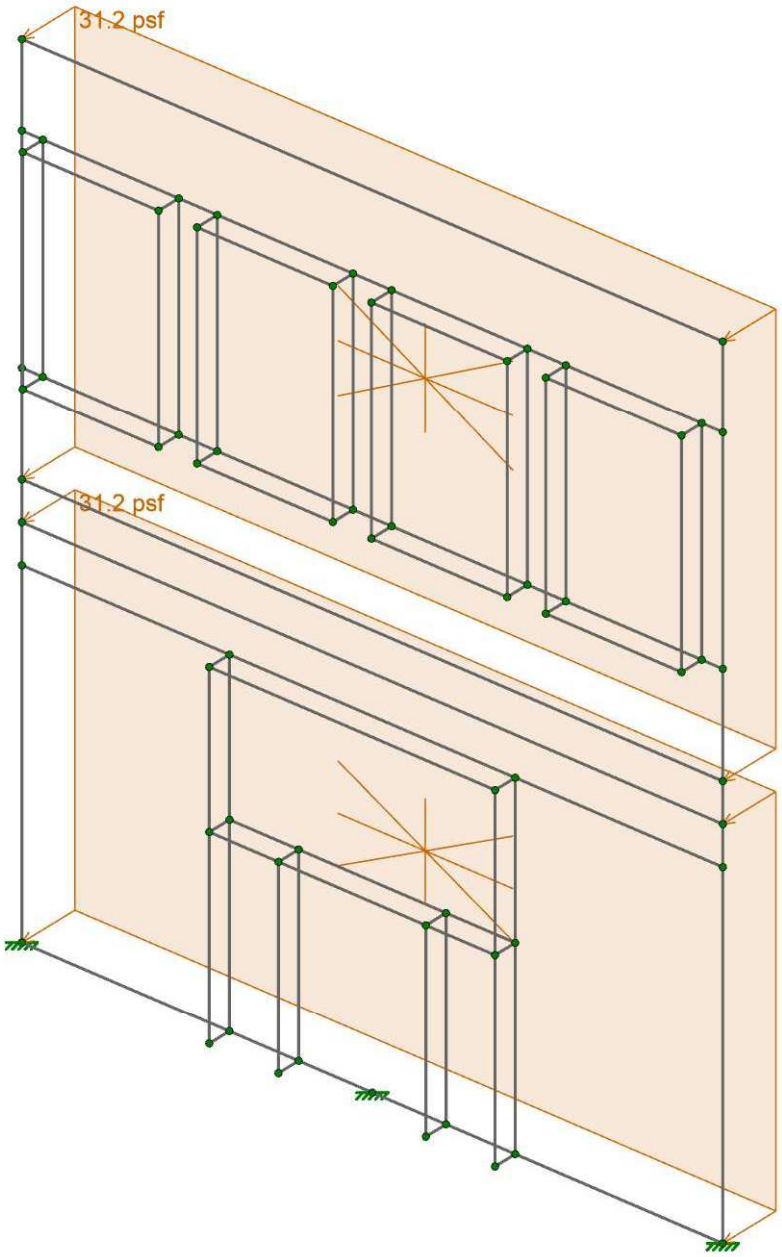




Loads: BLC 5, Wx

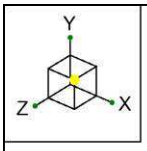
RISA A NEMETSCHEK COMPANY	Rbhu		SK-4
			Aug 21, 2025 at 10:23 AM
	20XX		2025.07.07 - 2562 - Mantel o…

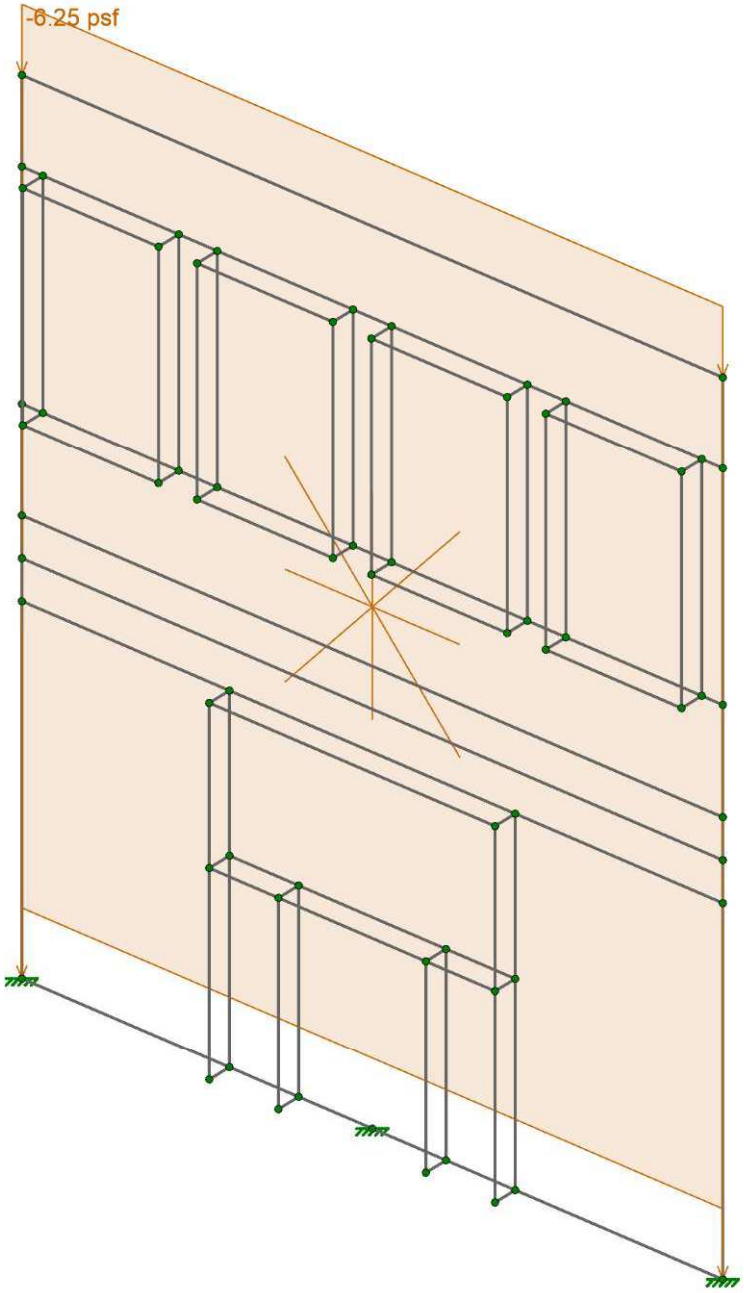




Loads: BLC 7, Wz

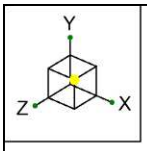
RISA A NEMETSCHEK COMPANY	Rbhu		SK-5
			Aug 21, 2025 at 10:23 AM
	20XX		2025.07.07 - 2562 - Mantel o…

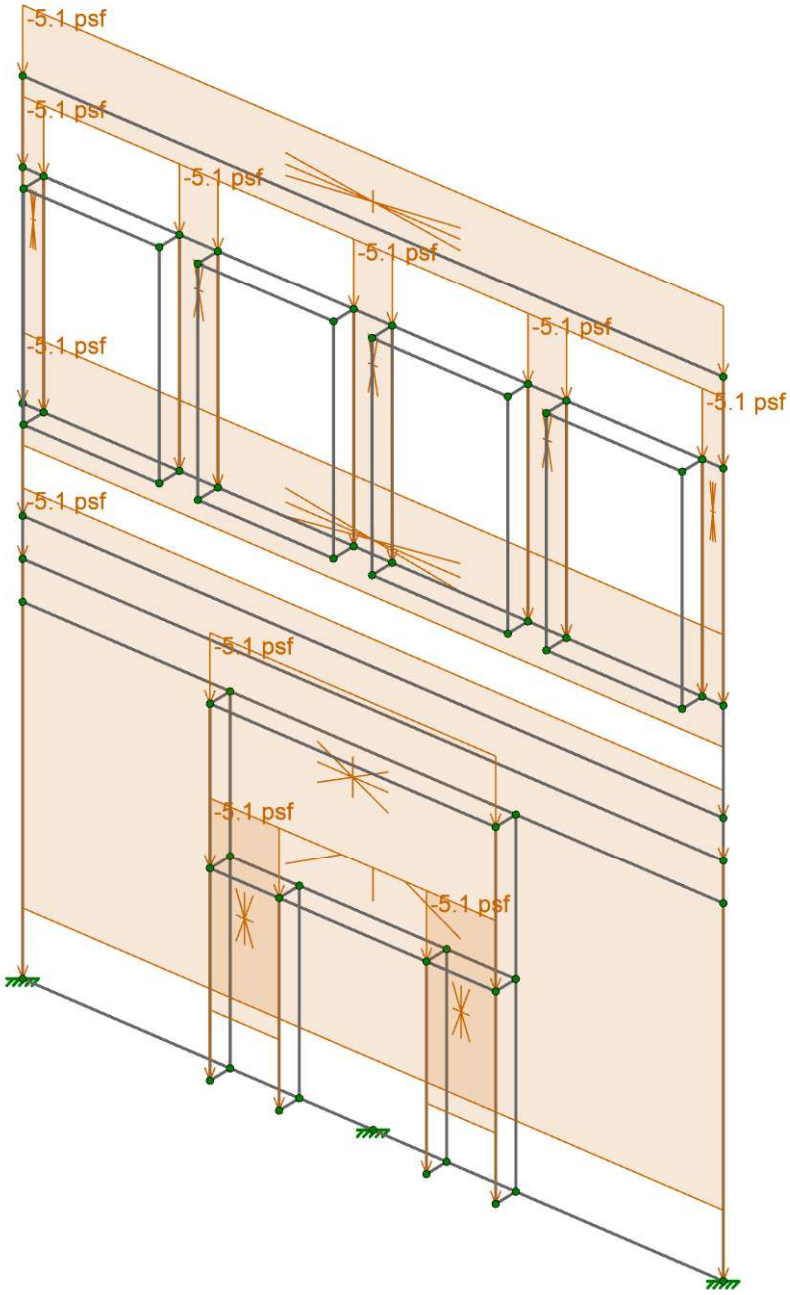




Loads: BLC 14, Ice Load

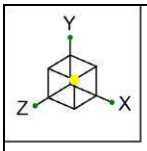
RISA A NEMETSCHEK COMPANY	Rbhu		SK-6
			Aug 21, 2025 at 10:24 AM
	20XX		2025.07.07 - 2562 - Mantel o…

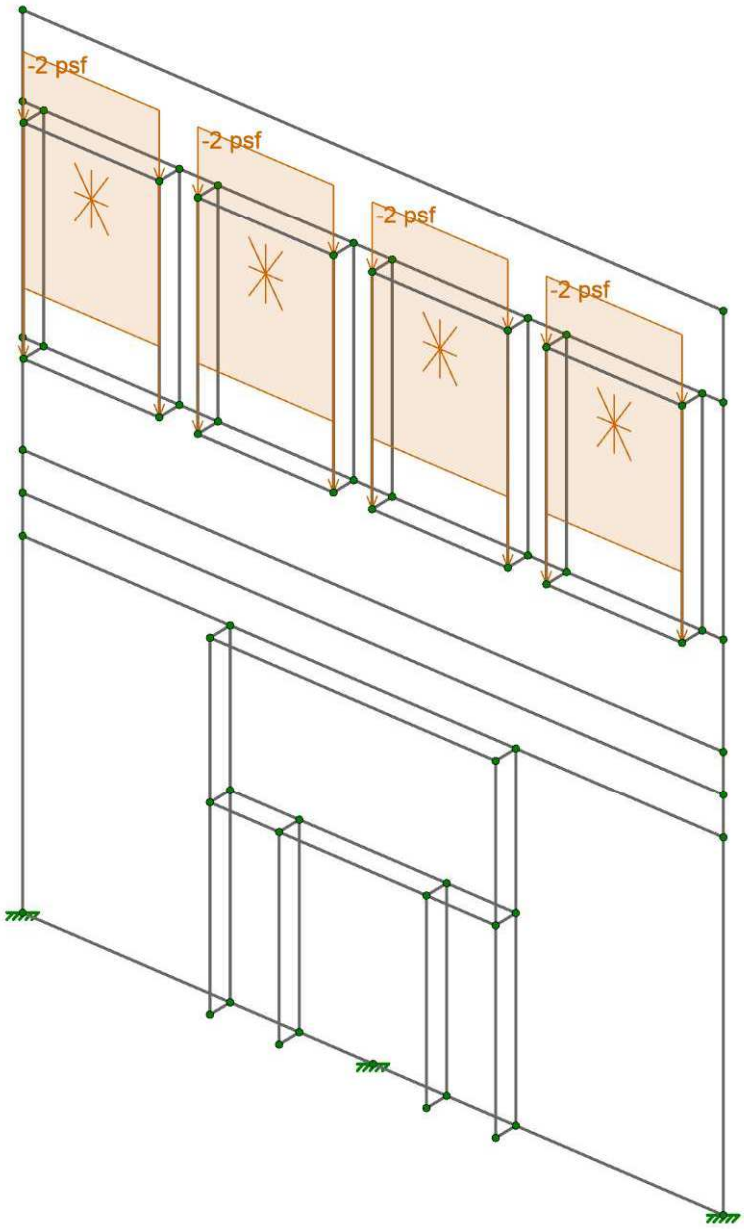




Loads: BLC 12, Plate DL

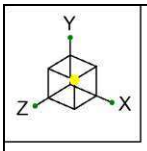
RISA A NEMETSCHEK COMPANY	Rbhu		SK-10
			Aug 21, 2025 at 10:36 AM
	20XX		2025.07.07 - 2562 - Mantel …

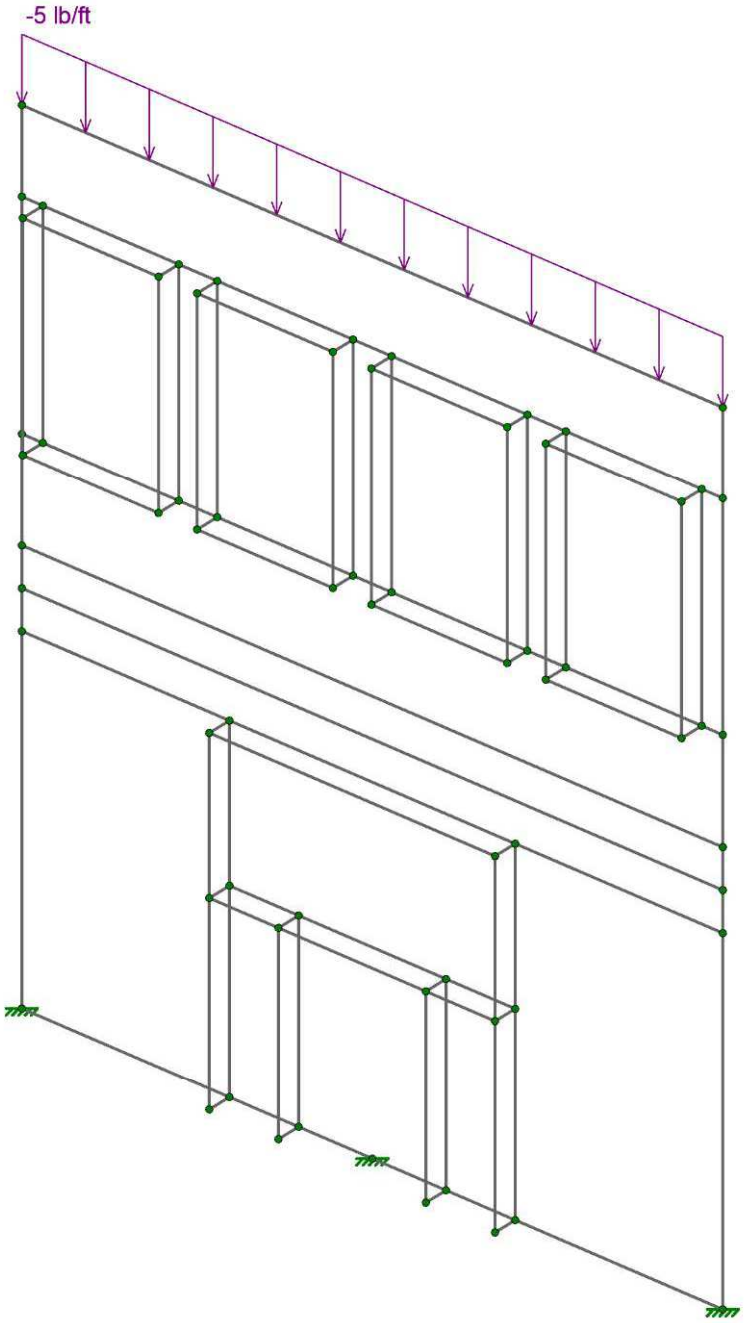




Loads: BLC 13, Glass DL

RISA A NEMETSCHEK COMPANY	Rbhu		SK-11
			Aug 21, 2025 at 10:36 AM
	20XX		2025.07.07 - 2562 - Mantel …





Loads: BLC 15, Snow Load

RISA A NEMETSCHEK COMPANY	Rbhu		SK-7
			Aug 21, 2025 at 10:24 AM
	20XX		2025.07.07 - 2562 - Mantel o…

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	0.042	24	0.901	16	1.051	26	7.51	18	0.188	17	0.113	15
2		min	-0.084	15	-0.009	135	-1.076	17	-7.649	17	-0.168	26	-0.036	24
3	N2	max	0.053	16	0.902	15	1.052	26	7.513	18	0.168	26	0.01	23
4		min	-0.011	23	-0.009	135	-1.078	17	-7.652	17	-0.189	17	-0.087	16
5	N69	max	0.048	16	0.83	17	1.13	18	3.298	18	0.004	16	0.029	15
6		min	-0.048	15	0	133	-1.093	135	-3.38	17	-0.142	4	-0.029	24
7	Totals:	max	0.139	16	2.484	18	3.225	18						
8		min	-0.139	15	0	135	-3.225	17						

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

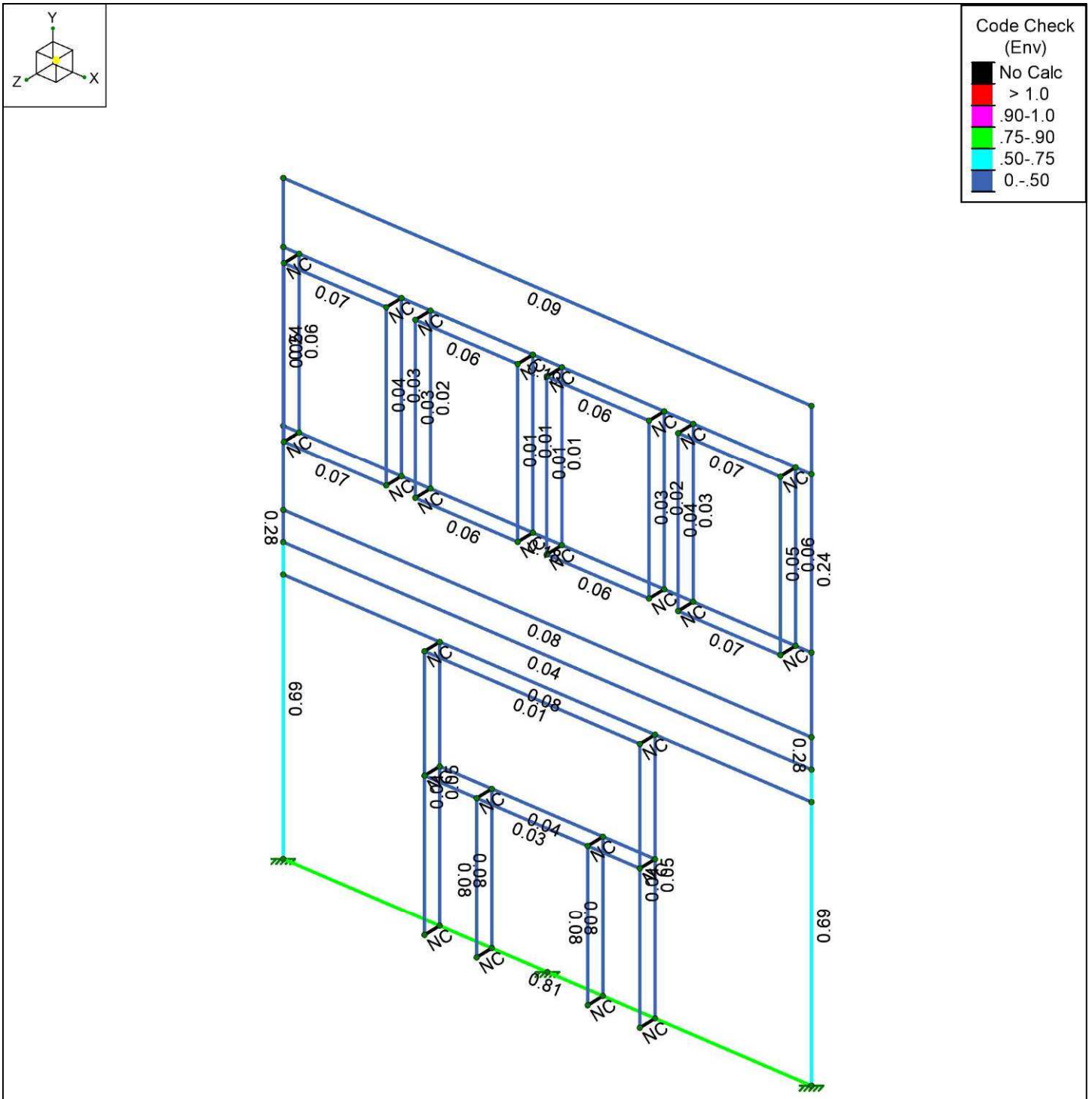
	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
1	M2	HSS3.5X1.5X2	0.08	9.708	18	0.192	6.877	y	17	35.508	48.15	2.354	4.313	1	H1-1b
2	M3	HSS3.5X1.5X2	0.037	3.01	18	0.021	3.01	z	18	31.338	48.15	2.354	4.313	1.439	H1-1b
3	M4	HSS3.5X1.5X2	0.045	2.625	18	0.008	2.625	y	9	41.475	48.15	2.354	4.313	1	H1-1b
4	M5	HSS3.5X1.5X2	0.045	2.625	18	0.008	2.625	y	4	41.475	48.15	2.354	4.313	1	H1-1b
5	M6	HSS3.5X1.5X2	0.084	2.625	18	0.011	2.625	y	17	39.863	48.15	2.354	4.313	2.386	H1-1b
6	M7	HSS3.5X1.5X2	0.084	2.625	18	0.011	2.625	y	17	39.863	48.15	2.354	4.313	2.385	H1-1b
7	M8	HSS3.5X1.5X2	0.041	4.854	17	0.012	0	z	4	6.841	48.15	2.354	4.313	1.133	H1-1b
8	M9	HSS3.5X2.5X4	0.691	0	17	0.064	4.711	y	18	80.431	109.8	8.1	10.275	1.387	H1-1b
9	M10	HSS3.5X2.5X4	0.692	0	17	0.064	4.711	y	18	80.431	109.8	8.1	10.275	1.387	H1-1b
10	M11	HSS3.5X1.5X2	0.082	9.708	17	0.013	0	z	4	6.841	48.15	2.354	4.313	1.235	H1-1b
11	M12	HSS3.5X1.5X2	0.182	6.978	135	0.179	0	z	17	6.841	48.15	2.354	4.313	1.169	H1-1b*
12	M13	HSS3.5X1.5X2	0.191	6.978	25	0.091	9.708	z	18	6.841	48.15	2.354	4.313	1.151	H1-1b*
13	M14	HSS3.5X1.5X2	0.087	4.854	17	0.013	0	z	7	6.841	48.15	2.354	4.313	1.146	H1-1b
14	M15	HSS3.5X2.5X4	0.238	0	18	0.046	0	y	18	78.002	109.8	8.1	10.275	2.454	H1-1b
15	M16	HSS3.5X2.5X4	0.238	0	18	0.046	0	y	18	78.002	109.8	8.1	10.275	2.453	H1-1b
16	M17	HSS3.5X1.5X2	0.056	0	18	0.008	2.929	z	4	38.059	48.15	2.354	4.313	2.48	H1-1b
17	M19	HSS3.5X1.5X2	0.034	0	20	0.009	2.929	z	4	38.059	48.15	2.354	4.313	2.347	H1-1b
18	M20	HSS3.5X1.5X2	0.024	0	22	0.007	2.929	z	4	38.059	48.15	2.354	4.313	1.953	H1-1b
19	M21	HSS3.5X1.5X2	0.012	0	20	0.005	2.929	z	4	38.059	48.15	2.354	4.313	1.625	H1-1b
20	M22	HSS3.5X1.5X2	0.012	0	19	0.004	2.929	z	4	38.059	48.15	2.354	4.313	1.617	H1-1b
21	M23	HSS3.5X1.5X2	0.024	0	21	0.006	2.929	z	4	38.059	48.15	2.354	4.313	1.961	H1-1b
22	M24	HSS3.5X1.5X2	0.034	0	19	0.008	2.929	z	21	38.059	48.15	2.354	4.313	2.347	H1-1b
23	M25	HSS3.5X1.5X2	0.056	0	18	0.007	2.929	z	18	38.059	48.15	2.354	4.313	2.482	H1-1b
24	M26	HSS3.5X2.5X4	0.277	0.531	17	0.062	0.531	y	18	109.444	109.8	8.1	10.275	1.069	H1-1b
25	M27	HSS3.5X2.5X4	0.277	0.531	17	0.062	0.531	y	18	109.444	109.8	8.1	10.275	1.069	H1-1b
26	M28	HSS5X2X4	0.031	3.01	17	0.025	3.01	z	17	100.878	130.95	8.25	16.012	1.376	H1-1b
27	M29	HSS5X2X4	0.039	2.625	17	0.009	2.625	z	4	119.6	130.95	8.25	16.012	1	H1-1b
28	M30	HSS5X2X4	0.039	2.625	17	0.01	2.625	y	4	119.6	130.95	8.25	16.012	1	H1-1b
29	M31	HSS5X2X4	0.084	2.625	18	0.014	2.625	y	17	116.755	130.95	8.25	16.012	2.139	H1-1b
30	M32	HSS5X2X4	0.084	2.625	18	0.014	2.625	y	17	116.755	130.95	8.25	16.012	2.14	H1-1b
31	M43	HSS2X2X0.083	0.052	0	17	0.007	2.929	z	4	24.72	28.64	1.717	1.717	1.864	H1-1b
32	M44	HSS2X2X0.083	0.038	2.929	20	0.008	2.929	z	4	24.72	28.64	1.717	1.717	2.247	H1-1b
33	M45	HSS2X2X0.083	0.026	2.929	22	0.006	2.929	z	4	24.72	28.64	1.717	1.717	2.148	H1-1b
34	M46	HSS2X2X0.083	0.011	2.929	20	0.004	2.929	z	4	24.72	28.64	1.717	1.717	1.409	H1-1b
35	M47	HSS2X2X0.083	0.011	2.929	19	0.004	2.929	z	4	24.72	28.64	1.717	1.717	1.404	H1-1b
36	M48	HSS2X2X0.083	0.026	2.929	21	0.006	2.929	z	4	24.72	28.64	1.717	1.717	2.149	H1-1b
37	M49	HSS2X2X0.083	0.038	2.929	19	0.007	2.929	z	21	24.72	28.64	1.717	1.717	2.247	H1-1b
38	M50	HSS2X2X0.083	0.052	0	17	0.006	2.929	z	18	24.72	28.64	1.717	1.717	1.866	H1-1b
39	M51	HSS2X2X0.083	0.072	1.881	18	0.012	0	y	20	26.953	28.64	1.717	1.717	2.305	H1-1b
40	M52	HSS2X2X0.083	0.063	1.881	18	0.006	0	y	4	26.953	28.64	1.717	1.717	2.073	H1-1b
41	M53	HSS2X2X0.083	0.063	0	18	0.006	1.881	y	4	26.953	28.64	1.717	1.717	2.074	H1-1b
42	M54	HSS2X2X0.083	0.072	0	18	0.012	1.881	y	19	26.953	28.64	1.717	1.717	2.305	H1-1b
43	M55	HSS2X2X0.083	0.074	1.881	17	0.017	0	y	18	26.953	28.64	1.717	1.717	2.307	H1-1b

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

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y-y [k-ft]	phi*Mn z-z [k-ft]	Cb	Eqn
44	M56	HSS2X2X0.083	0.062	1.881	17	0.006	0	y	4	26.953	28.64	1.717	1.717	2.077	H1-1b
45	M57	HSS2X2X0.083	0.062	0	17	0.006	1.881	y	4	26.953	28.64	1.717	1.717	2.076	H1-1b
46	M58	HSS2X2X0.083	0.074	0	17	0.017	1.881	y	18	26.953	28.64	1.717	1.717	2.307	H1-1b
47	M75	HSS5X2X4	0.006	1.979	18	0.009	3.958	z	4	100.878	130.95	8.25	16.012	1.006	H1-1b
48	M76	HSS3.5X1.5X2	0.806	4.854	17	0.749	4.854	z	17	6.841	48.15	2.354	4.313	1.623	H3-6

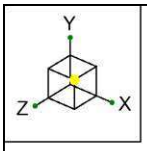
Material Take-Off

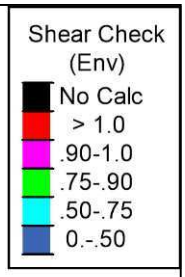
	Material	Size	Pieces	Length[ft]	Weight[K]
1	General Members				
2	RIGID		26	8.7	0
3	Total General		26	8.7	0
4					
5	Hot Rolled Steel				
6	A500 Gr.C RECT	HSS2X2X0.083	16	38.5	0.09
7	A500 Gr.C RECT	HSS3.5X1.5X2	20	109.9	0.43
8	A500 Gr.C RECT	HSS3.5X2.5X4	6	22.4	0.2
9	A500 Gr.C RECT	HSS5X2X4	6	22.5	0.24
10	Total HR Steel		48	193.3	0.959

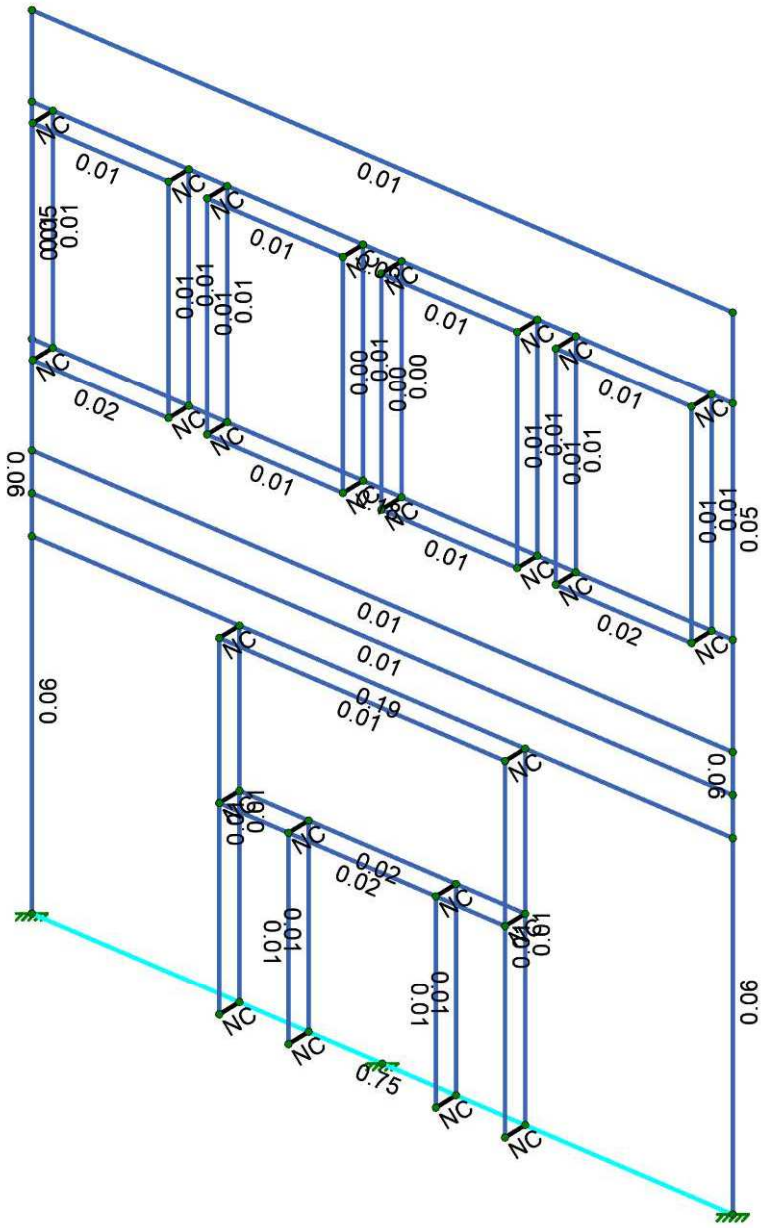


Member Code Checks Displayed (Enveloped)

RISA A NEMETSCHEK COMPANY	Rbhu		SK-8
			Aug 21, 2025 at 10:24 AM
	20XX		2025.07.07 - 2562 - Mantel o…







Member Shear Checks Displayed (Enveloped)

RISA A NEMETSCHEK COMPANY	Rbhu		SK-9
			Aug 21, 2025 at 10:24 AM
	20XX		2025.07.07 - 2562 - Mantel o…

FOUNDATION AND ANCHORAGE DESIGN

Company:	Rbhu Engineering	Page:	1
Address:	1329A Hopkins St, Berkeley CA	Specifier:	Selinda Martinez
Phone I Fax:	|	E-Mail:	Selinda@rbhu.org
Design:	Footing - Aug 11, 2025	Date:	8/25/2025
Fastening point:			

Specifier's comments:

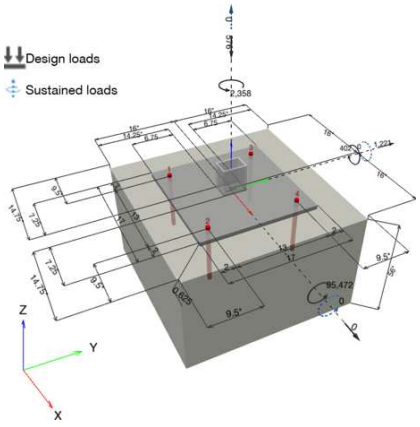
1 Anchor Design

1.1 Input data

Anchor type and diameter:	**HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 Gr.36) 5/8**
Item number:	2198026 HAS-V-36 5/8"x10" (element) / 2334276 HIT-HY 200-R V3 (adhesive)
Specification text:	Hilti ∅ 5/8 in HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 Gr.36) with 8 in nominal embedment depth per ICC-ES ESR-4868 , Hammer drill bit installation per MPII,
Effective embedment depth:	$h_{ef,act}$ = 8.000 in. ($h_{ef,limit}$ = - in.)
Material:	ASTM F1554 Grade 36
Evaluation Service Report:	ESR-4868
Issued I Valid:	11/1/2024 | 11/1/2026
Proof:	Design Method ACI 318-19 / Chem
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.625 in.
Anchor plate[CBFEM] :	l_x x l_y x t = 17.000 in. x 17.000 in. x 0.625 in.;
Profile:	Rectangular HSS (AISC), HSS3-1/2X2-1/2X.250; (L x W x T) = 3.500 in. x 2.500 in. x 0.250 in.
Base material:	cracked concrete, 2500, f_c' = 2,500 psi; h = 56.000 in., Temp. short/long: 32/32 °F
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: not present, shear: not present; no supplemental splitting reinforcement present edge reinforcement: > No. 4 bar with stirrups

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

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



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1.1.1 Unfactored loads

	Sustained load factor	Load factor f_1 or f_2	V_x [lb]	V_y [lb]	N [lb]	M_x [in.lb]	M_y [in.lb]	M_z [in.lb]
D (Dead)	-	-	-	13	-480	700	335	-
F (Fluid)	1.000	-	-	-	-	-	-	-
T (Temperature)	1.000	-	-	-	-	-	-	-
L (Live)	-	0.500	-	270	-	10,968	-	444
H (Lateral)	1.000	-	-	-	-	-	-	-
L_r (Roof live)	1.000	-	-	-	-	-	-	-
S (Snow)	-	0.200	-	-	-25	-	-	-
R (Rain)	-	-	-	-	-	-	-	-
W (Wind)	-	-	-	1,070	-	89,148	-	2,136
E (Earthquake)	-	-	-	-	-	-	-	-

1.1.2 Load combination and design results

1.1.2.1 Load combination

Load case	Load combination
Equation (16-2a)	1.2 (D + F) + 1.6 (L + H) + 0.5 (L_r)
Equation (16-4a)	1.2 (D + F) + 1.0 (W) + f_1L + 1.6 (H) + 0.5 (L_r)
Equation (16-6)	0.9 (D) + 1.0 (W) + 1.6 (H)

1.1.2.2 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
Equation (16-2a)	1.2 (D + F) + 1.6 (L + H) + 0.5 (L_r)	N = -576; V_x = 0; V_y = 448; M_x = 18,389; M_y = 402; M_z = 710; N_{sus} = 0; $M_{x,sus}$ = 0; $M_{y,sus}$ = 0;	no	20
Equation (16-4a)	1.2 (D + F) + 1.0 (W) + f_1L + 1.6 (H) + 0.5 (L_r)	N = -576; V_x = 0; V_y = 1,221; M_x = 95,472; M_y = 402; M_z = 2,358; N_{sus} = 0; $M_{x,sus}$ = 0; $M_{y,sus}$ = 0;	no	96
Equation (16-6)	0.9 (D) + 1.0 (W) + 1.6 (H)	N = -432; V_x = 0; V_y = 1,082; M_x = 89,778; M_y = 302; M_z = 2,136; N_{sus} = 0; $M_{x,sus}$ = 0; $M_{y,sus}$ = 0;	no	90

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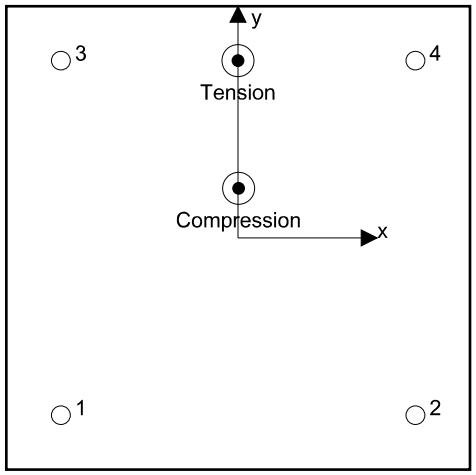
1.2 Load case/Resulting anchor forces

Controlling load case: Equation (16-4a) 1.2 (D + F) + 1.0 (W) + f_1L + 1.6 (H) + 0.5 (L_r)



Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0	269	47	265
2	0	358	44	355
3	7,051	255	-16	255
4	7,030	354	-75	346

Resulting tension force in (x/y)=(-0.009/6.500): 14,081 [lb]
Resulting compression force in (x/y)=(0.013/1.814): 15,989 [lb]

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

1.3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	7,051	9,832	72	OK
Bond Strength**	14,081	20,709	68	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	14,081	14,817	96	OK

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

1.3.1 Steel Strength

N_{sa} = ESR value refer to ICC-ES ESR-4868
ϕ $N_{sa} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.23	58,000

Calculations

N_{sa} [lb]
13,110

Results

N_{sa} [lb]	ϕ_{steel}	ϕ N_{sa} [lb]	N_{ua} [lb]
13,110	0.750	9,832	7,051

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1.3.2 Bond Strength

$N_{ag} = \left(\frac{A_{Na}}{A_{Na0}}\right) \psi_{ec1,Na} \psi_{ec2,Na} \psi_{ed,Na} \psi_{cp,Na} N_{ba}$ — ACI 318-19 Eq. (17.6.5.1b)

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

A_{Na} see ACI 318-19, Section 17.6.5.1, Fig. R 17.6.5.1(b)

$A_{Na0} = (2 c_{Na})^2$ — ACI 318-19 Eq. (17.6.5.1.2a)

$c_{Na} = 10 d_a \sqrt{\frac{\tau_{uncr}}{1100}}$ — ACI 318-19 Eq. (17.6.5.1.2b)

$\psi_{ec,Na} = \left(\frac{1}{1 + \frac{e'_N}{c_{Na}}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.5.3.1)

$\psi_{ed,Na} = 0.7 + 0.3 \left(\frac{c_{a,min}}{c_{Na}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.5.4.1b)

$\psi_{cp,Na} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.5.5.1b)

$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \pi \cdot d_a \cdot h_{ef}$ — ACI 318-19 Eq. (17.6.5.2.1)

Variables

$\tau_{k,c,uncr}$ [psi]	d_a [in.]	h_{ef} [in.]	$c_{a,min}$ [in.]	$\alpha_{overhead}$	$\tau_{k,c}$ [psi]
2,220	0.625	8.000	9.500	1.000	1,170

$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	c_{ac} [in.]	λ_a
0.009	0.000	13.138	1.000

Calculations

c_{Na} [in.]	A_{Na} [in.^{2}]	A_{Na0} [in.^{2}]	$\psi_{ed,Na}$
8.839	542.31	312.50	1.000

$\psi_{ec1,Na}$	$\psi_{ec2,Na}$	$\psi_{cp,Na}$	N_{ba} [lb]
0.999	1.000	1.000	18,378

Results

N_{ag} [lb]	ϕ_{bond}	ϕN_{ag} [lb]	N_{ua} [lb]
31,860	0.650	20,709	14,081

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1.3.3 Concrete Breakout Failure

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

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

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

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

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

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

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

$N_b = k_c\ \lambda_a\ \sqrt{f'_c}\ h_{ef}^{1.5}$ — ACI 318-19 Eq. (17.6.2.2.1)

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
6.333	0.009	0.000	9.500	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
13.138	17	1.000	2,500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
608.00	361.00	0.999	1.000	1.000	1.000	13,548

Results

N_{cbg} [lb]	$\phi_{concrete}$	$\phi\ N_{cbg}$ [lb]	N_{ua} [lb]
22,795	0.650	14,817	14,081

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1.4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	358	5,112	8	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Concrete Breakout Strength controls)**	1,220	44,708	3	OK
Concrete edge failure in direction y+**	1,224	11,391	11	OK

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

1.4.1 Steel Strength

V_{sa} = ESR value refer to ICC-ES ESR-4868
ϕ $V_{steel} \geq V_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
0.23	58,000

Calculations

V_{sa} [lb]
7,865

Results

V_{sa} [lb]	ϕ_{steel}	ϕ V_{sa} [lb]	V_{ua} [lb]
7,865	0.650	5,112	358

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1.4.2 Pryout Strength (Concrete Breakout Strength controls)

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

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

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

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

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

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

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

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ ACI 318-19 Eq. (17.6.2.2.1)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	6.333	1.932	0.000	9.500

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
1.000	13.138	17	1.000	2,500

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
1,024.00	361.00	0.831	1.000	1.000	1.000	13,548

Results

V_{cpg} [lb]	$\phi_{concrete}$	ϕV_{cpg} [lb]	V_{ua} [lb]
63,869	0.700	44,708	1,220

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1.4.3 Concrete edge failure in direction y+

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

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

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

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

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

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

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

$V_b = \left(7\left(\frac{l_e}{d_a}\right)^{0.2} \sqrt{d_a}\right) \lambda_a \sqrt{f'_c} c_{a1}^{1.5}$ — ACI 318-19 Eq. (17.7.2.2.1a)

Variables

c_{a1} [in.]	c_{a2} [in.]	e_{cV} [in.]	$\psi_{c,V}$	h_a [in.]
9.500	9.500	0.963	1.400	56.000

l_e [in.]	λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$
5.000	1.000	0.625	2,500	1.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ec,V}$	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [lb]
456.00	406.13	0.937	0.900	1.000	12,280

Results

V_{cbg} [lb]	$\phi_{concrete}$	ϕV_{cbg} [lb]	V_{ua} [lb]
16,273	0.700	11,391	1,224

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

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

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.950	0.107	1.000	89	OK

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

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1.6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates as per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- The equations presented in this report are based on imperial units. When inputs are displayed in metric units, the user should be aware that the equations remain in their imperial format.
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Design Strengths of adhesive anchor systems are influenced by the cleaning method. Refer to the INSTRUCTIONS FOR USE given in the Evaluation Service Report for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://viewer.joomag.com/profis-design-guide-us-en-summer-2021/0841849001625154758?short&/
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-19, Section 26.7.
- The anchor design methods in PROFIS Engineering require rigid anchor plates, as per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means that the anchor plate should be sufficiently rigid to prevent load re-distribution to the anchors due to elastic/plastic displacements. The user accepts that the anchor plate is considered close to rigid by engineering judgment."

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1.7 Installation data

Anchor type and diameter: HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 Gr.36) 5/8

Profile: Rectangular HSS (AISC), HSS3-1/2X2-1/2X.250; (L x W x T) = 3.500 in. x 2.500 in. x 0.250 in.

Item number: 2198026 HAS-V-36 5/8"x10" (element) / 2334276 HIT-HY 200-R V3 (adhesive)

Hole diameter in the fixture: d_f = 0.687 in.

Maximum installation torque: 720 in.lb

Plate thickness (input): 0.625 in.

Hole diameter in the base material: 0.750 in.

Hole depth in the base material: 8.000 in.

Drilling method: Hammer drilled

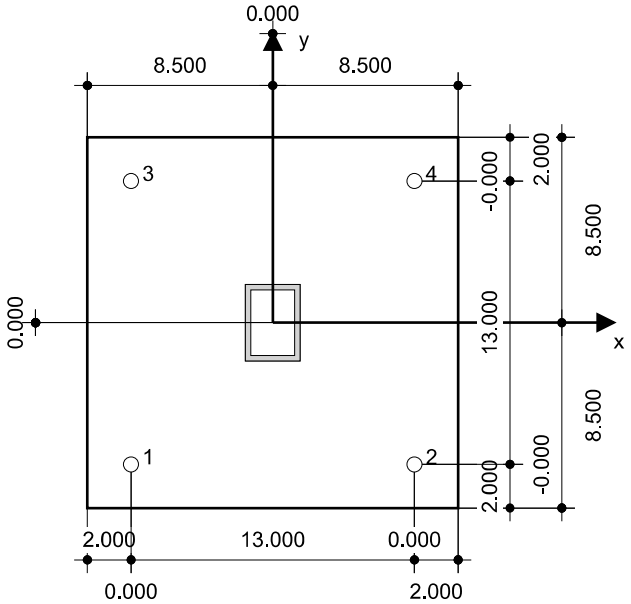
Minimum thickness of the base material: 9.500 in.

Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Hilti ∅ 5/8 in HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 Gr.36) with 8 in nominal embedment depth per ICC-ES ESR-4868 , Hammer drill bit installation per MPII

1.7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• Compressed air with required accessories to blow from the bottom of the hole • Proper diameter wire brush	• Dispenser including cassette and mixer • Torque wrench



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-6.500	-6.500	9.500	22.500	9.500	22.500
2	6.500	-6.500	22.500	9.500	9.500	22.500
3	-6.500	6.500	9.500	22.500	22.500	9.500
4	6.500	6.500	22.500	9.500	22.500	9.500

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2 Anchor plate design

2.1 Input data

Anchor plate:	Shape: Rectangular l_x x l_y x t = 17.000 in x 17.000 in x 0.625 in Calculation: CBFEM Material: ASTM A36; F_y = 36,000 psi; ε_{lim} = 5.00%
Anchor type and size:	HIT-HY 200 V3 + HAS-V-36 (ASTM F1554 Gr.36) 5/8, h_{ef} = 8.000 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 = 0.625 in
Profile:	HSS3-1/2X2-1/2X.250; (L x W x T x FT) = 3.500 in x 2.500 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; 2500; $f_{c,cyl}$ = 2,500 psi; h = 56.000 in
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			Concrete [%]
		σ_{Ed} [psi]	ε_{Pl} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Hole bearing [%]	
1	Equation (16-2a)	17,966	0.00	8,933	0.00	1	4
2	**Equation (16-4a)**	**50,124**	**0.43**	**36,030**	**0.10**	**1**	**19**
3	Equation (16-6)	50,103	0.35	36,022	0.08	1	18

2.3 Anchor plate classification

Results below are displayed for the decisive load combinations: Equation (16-4a)

Anchor tension forces	Equivalent rigid anchor plate (CBFEM)	Component-based Finite Element Method (CBFEM) anchor plate design
Anchor 1	-0 lb	0 lb
Anchor 2	-0 lb	0 lb
Anchor 3	3,482 lb	7,051 lb
Anchor 4	3,467 lb	7,030 lb

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

2.4 Profile/Stiffeners/Plate

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

2.4.1 Equivalent stress and plastic strain

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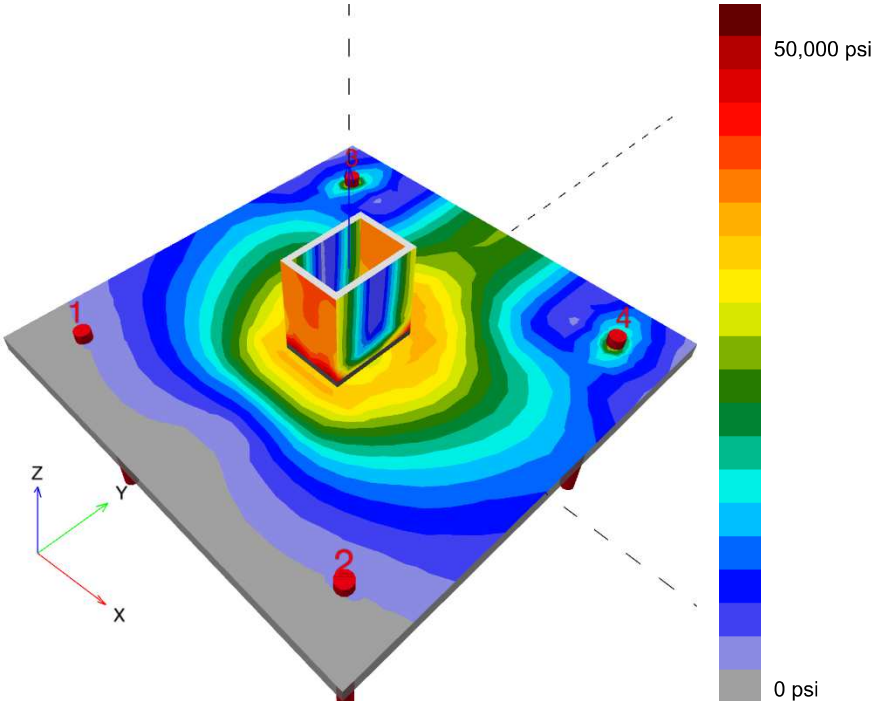
Part	Load combination	Material	f_y [psi]	ε_{lim} [%]	σ_{Ed} [psi]	ε_{Pl} [%]	Status
Plate	Equation (16-4a)	ASTM A36	36,000	5.00	36,030	0.10	OK
Profile	Equation (16-4a)	ASTM A500 Gr.C Rect	50,000	5.00	50,073	0.25	OK
Profile	Equation (16-4a)	ASTM A500 Gr.C Rect	50,000	5.00	50,124	0.43	OK
Profile	Equation (16-4a)	ASTM A500 Gr.C Rect	50,000	5.00	48,997	0.15	OK
Profile	Equation (16-4a)	ASTM A500 Gr.C Rect	50,000	5.00	49,263	0.15	OK

2.4.1.1 Equivalent stress

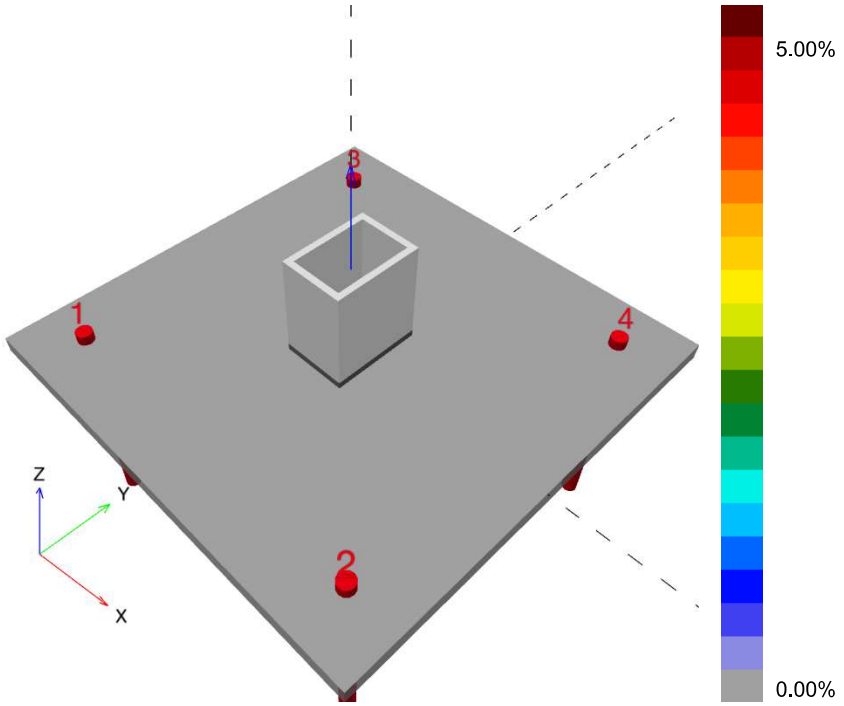
Results below are displayed for the decisive load combination: 2 - Equation (16-4a)



Company:	Rbhu Engineering	Page:	13
Address:	1329A Hopkins St, Berkeley CA	Specifier:	Selinda Martinez
Phone I Fax:	|	E-Mail:	Selinda@rbhu.org
Design:	Footing - Aug 11, 2025	Date:	8/25/2025
Fastening point:			

2.4.1.2 Plastic strain

Results below are displayed for the decisive load combination: 2 - Equation (16-4a)



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

Decisive load combination: 2 - Equation (16-4a)

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 [lb]
Anchor 1	1.687	0.625	58,000	0.625	54,392
Anchor 2	1.672	0.625	58,000	0.625	54,392
Anchor 3	14.686	0.625	58,000	0.625	54,392
Anchor 4	9.135	0.625	58,000	0.625	54,392

Results

	V [lb]	ΦR_n [lb]	Utilization [%]	Status
Anchor 1	269	40,794	1	OK
Anchor 2	358	40,794	1	OK
Anchor 3	255	40,794	1	OK

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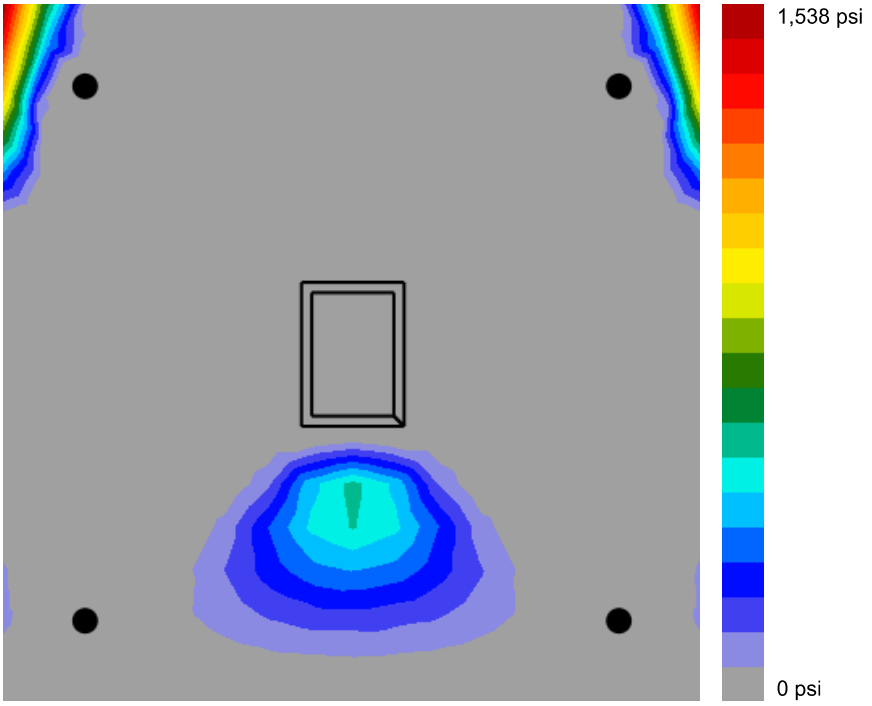
Fastening point:			

	V [lb]	ΦR_n [lb]	Utilization [%]	Status
Anchor 4	354	40,794	1	OK

2.5 Concrete

Decisive load combination: 2 - Equation (16-4a)

2.5.1 Compression in concrete under the anchor plate



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

Equations

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

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

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

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

Variables

N [lb]	f_c' [psi]	Φ	A_1 [in²]	A_2 [in²]
15,989	2,500	0.65	31.72	771.78

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Fastening point:			

Results

Load combination	F_p [psi]	σ [psi]	Utilization [%]	Status
Equation (16-4a)	2,762	504	19	OK

2.6 Symbol explanation

A_1	Loaded area of concrete
A_2	Supporting area
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_u	Specified minimum tensile strength of the connected 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
N	Resulting compression force
σ	Average stress in concrete
σ_{Ed}	Equivalent stress
Φ	Resistance factor
ΦR_n	Factored resistance
t	Thickness of the anchor plate
V	Resultant of shear forces Vy, Vz in bolt.

2.7 Warnings

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

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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	Equation (16-4a)	96%	OK
Anchor plate	Equation (16-4a)	100%	OK
Concrete	Equation (16-4a)	19%	OK
Profile	Equation (16-4a)	100%	OK

Fastening meets the design criteria!

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Design:	Footing - Aug 11, 2025	Date:	8/25/2025
Fastening point:			

4 Remarks; Your Cooperation Duties

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Pole Footing Embedded in Soil

Code References

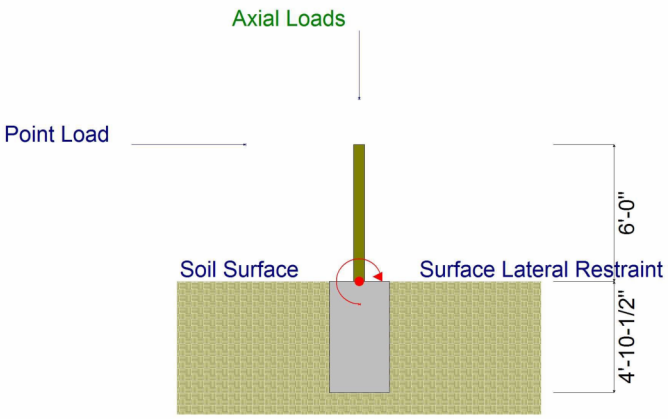
Calculations per IBC 2021 1807.3
Load Combinations Used : ASCE 7-10

General Information

Pole Footing Shape	Circular
Pole Footing Diameter	32.0 in
Calculate Min. Depth for Allowable Pressures	
Lateral Restraint at Ground Surface	
Allow Passive	150.0 pcf
Max Passive	1,500.0 psf

Controlling Values

Governing Load Combination	+D+0.60W
Lateral Load	1.050 k
Moment	10.80 k-ft
Restraint @ Ground Surface	
Pressure at Depth	
Actual	**724.26** psf
Allowable	**731.25** psf
Surface Restraint Force	5,757.69 lbs
Minimum Required Depth	**4.875 ft**
Footing Base Area	5.585 ft^2
Maximum Soil Pressure	0.05372 ksf



Applied Loads

Lateral Concentrated Load (k)		Lateral Distributed Loads (k		Applied Moment (kft)	Vertical Load (k)
D : Dead Load	k		k/ft	k-ft	0.30 k
Lr : Roof Live	k		k/ft	k-ft	k
L : Live	0.320 k		k/ft	0.9420 k-ft	k
S : Snow	k		k/ft	k-ft	k
W : Wind	1.750 k		k/ft	7.50 k-ft	k
E : Earthquake	k		k/ft	k-ft	k
H : Lateral Earth	k		k/ft	k-ft	k
Load distance above ground surface	6.0 ft	TOP of Load above ground surface	ft		
		BOTTOM of Load above ground surface	ft		

Load Combination Results

Load Combination	Forces @ Ground Surface Loads - (k)	Moments - (ft-k)	Required Depth - (ft)	Pressure at Depth Actual - (psf)	Allow - (psf)	Soil Increase Factor
D Only	0.000	0.000	0.13	0.0	18.8	1.000
+D+L	0.320	2.862	3.13	467.1	468.8	1.000
+D+0.750L	0.240	2.147	2.88	413.9	431.3	1.000
+D+0.60W	1.050	10.800	4.88	724.3	731.3	1.000
+D+0.750L+0.450W	1.028	10.247	4.88	687.1	731.3	1.000
+0.60D+0.60W	1.050	10.800	4.88	724.3	731.3	1.000
+0.60D	0.000	0.000	0.13	0.0	18.8	1.000

Project Title:
Engineer:
Project ID:
Project Descr:

ENERCALC Cloud Project ID: 270980

Concrete Column

Project File: 2562 - mantel of leadership_011135.EC6

DESCRIPTION: Concrete Footing - Reinforcement

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : ACI 318-19
Load Combinations Used : ASCE 7-16

General Information

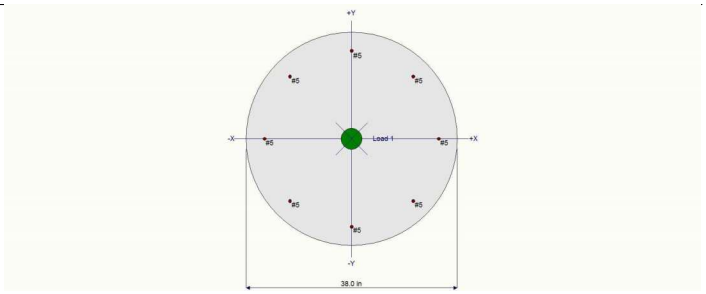
f'c : Concrete 28 day streng	=	2.50 ksi
E =	=	3,122.0 ksi
Density	=	150.0 pcf
β	=	0.850
fy - Main Rebar	=	60.0 ksi
E - Main Rebar	=	29,000.0 ksi
Allow. Reinforcing Limits		*ASTM A615 Bars Used*
Min. Reinf.	=	0.180 %
Max. Reinf.	=	8.0 %
Seismic Design Category	=	A

Overall Column Height = 4.670 ft
End Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along colun
X-X (width) axis :
Fully braced against buckling ABOUT Y-Y Axis
Y-Y (depth) axis :
Fully braced against buckling ABOUT Y-Y Axis

Column Cross Section

Column Dimensions : 38.0in Diameter, Column Edge to Rebar Edge Cover = 3.0in

Column Reinforcing : 8 - #5 bars



Applied Loads

Entered loads are factored per load combinations specified by user.

Column self weight included : 5,517.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 4.670 ft above base, D = 0.30 k
BENDING LOADS . . .
Lat. Point Load at 4.670 ft creating Mx-x, L = 0.320, W = 1.750 k
Moment acting about X-X axisat 4.670 ft, L = 0.9420, W = 7.50 k-ft

DESIGN SUMMARY

Load Combination	+1.20D+L+W
Location of max.above base	4.639 ft
Maximum Stress Ratio	**0.013 : 1**
Ratio = (Pu^2+Mu^2)^.5 / (PhiPn^2+PhiMn^2)^.5	
Pu = 6.980 k	φ * Pn = 523.55 k
Mu-x = 8.377 k-ft	φ * Mn-x = 628.81 k-ft
Mu-y = 1.012 k-ft	φ* Mn-y = 78.263 k-ft
Mu Angle = 7.0 deg	φ = 0.8347
Mu at Angle = 8.438 k-ft	φMn at Angle = 633.68 k-ft

Pn & Mn values located at Pu-Mu vector intersection with capacity curve

Column Capacities . .

Pnmax : Nominal Max. Compressive Axial Capaci	2,553.52 k
Pnmin : Nominal Min. Tension Axial Capacity	k
φ Pn, max : Usable Compressive Axial Capacity	1,327.83 k
φ Pn, min : Usable Tension Axial Capacity	k

Maximum SERVICE Load Reactions .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	1.750 k

Maximum SERVICE Load Deflections . .

Along Y-Y -0.000120 in at 4.670 ft above base
for load combination : W Only
Along X-X 0.0 in at 0.0 ft above base
for load combination :

General Section Informatio β = 0.850 θ = 0.80

ρ : % Reinforcing	0.2187 %	Rebar % Ok
Reinforcing Area	2.480 in^2	
Concrete Area	1,134.12 in^2	

Project Title:
Engineer:
Project ID:
Project Descr:

ENERCALC Cloud Project ID: 270980

Concrete Column

Project File: 2562 - mantel of leadership_011135.EC6

LIC# : KW-06011135, Build:20.25.07.16 RBHU (c) ENERCALC, LLC 1982-2025

DESCRIPTION: Concrete Footing - Reinforcement

Governing Load Combination Results

Governing Factored Load Combination	Moment X-X	Moment Y-Y	Dist. from base ft	Axial Load k Pu	φ * Pn	Bending Analysis k-ft δx	δx * Mux	δy	δy * Muy	Alpha (deg)	δ Mu	φ Mn	Utilization Ratio
+1.40D	Actual	M2,min	4.64	8.14	1,327.83	1.000		1.000	1.18	90.000	1.18	196.04	**0.006**
+1.40D	M2,min	Actual	4.64	8.14	1,327.83	1.000	1.18	1.000		0.000	1.18	196.04	**0.006**
+1.20D+1.60L	Actual	M2,min	4.64	6.98	1,327.83	1.000	1.49	1.000	1.01	34.000	1.80	343.47	**0.005**
+1.20D+L	Actual	M2,min	4.64	6.98	1,327.83	1.000	0.93	1.000	1.01	47.000	1.38	264.14	**0.005**
+1.20D+L	M2,min	Actual	4.64	6.98	1,327.83	1.000	1.01	1.000		0.000	1.01	196.04	**0.005**
+1.20D+0.50W	Actual	M2,min	4.64	6.98	993.07	1.000	3.72	1.000	1.01	15.000	3.86	548.93	**0.007**
+1.20D+L+W	Actual	M2,min	4.64	6.98	523.55	1.000	8.38	1.000	1.01	7.000	8.44	633.68	**0.013**
+0.90D+W	Actual	M2,min	4.64	5.24	408.03	1.000	7.45	1.000	0.76	6.000	7.48	586.02	**0.013**
+0.90D	Actual	M2,min	4.64	5.24	1,327.83	1.000		1.000	0.76	90.000	0.76	196.04	**0.004**
+0.90D	M2,min	Actual	4.64	5.24	1,327.83	1.000	0.76	1.000		0.000	0.76	196.04	**0.004**

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
D Only					5.817				
+D+L			0.320		5.817	-0.552			
+D+0.750L			0.240		5.817	-0.414			
+D+0.60W			1.050		5.817	-0.404			
+D+0.750L+0.450W			1.028		5.817	-0.717			
+0.60D+0.60W			1.050		3.490	-0.404			
+0.60D					3.490				
L Only			0.320			-0.552			
W Only			1.750			-0.672			

Maximum Moment Reactions

Note: Only non-zero reactions are listed.

Load Combination	Moment About X-X Axis @ Base	@ Top	Moment About Y-Y Axis @ Base	@ Top
D Only		k-ft		k-ft
+D+L	-0.552	k-ft		k-ft
+D+0.750L	-0.414	k-ft		k-ft
+D+0.60W	-0.404	k-ft		k-ft
+D+0.750L+0.450W	-0.717	k-ft		k-ft
+0.60D+0.60W	-0.404	k-ft		k-ft
+0.60D		k-ft		k-ft
L Only	-0.552	k-ft		k-ft
W Only	-0.672	k-ft		k-ft

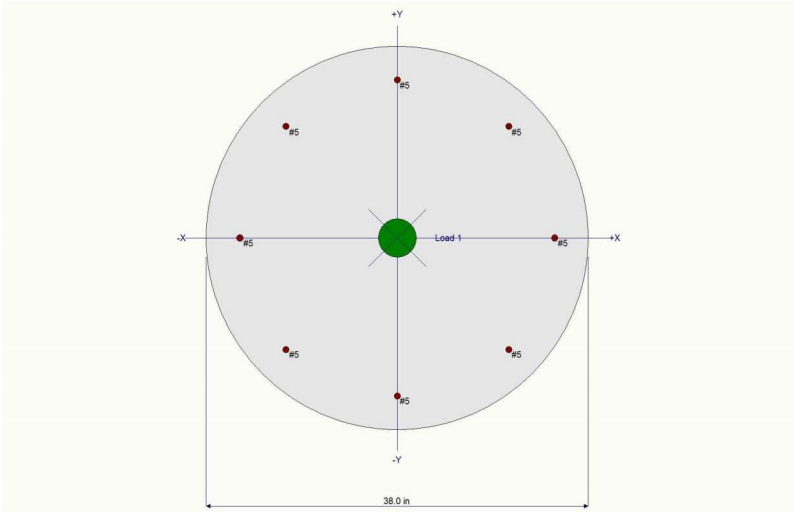
Maximum Deflections for Load Combinations

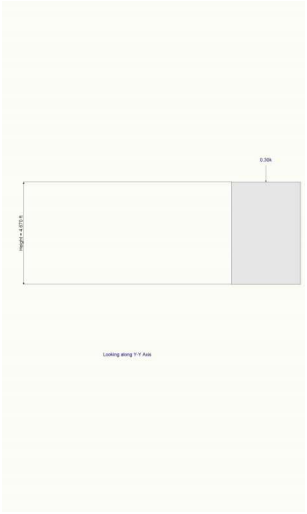
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	-0.000 in	4.670 ft
+D+0.750L+0.450W	0.0000 in	0.000 ft	-0.000 in	4.670 ft
+0.60D+0.60W	0.0000 in	0.000 ft	-0.000 in	4.670 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	-0.000 in	4.639 ft

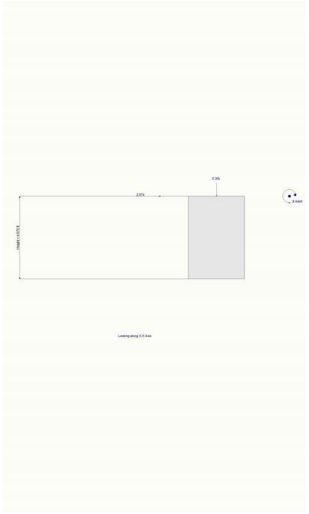
Concrete Column

DESCRIPTION: Concrete Footing - Reinforcement

Sketches







Interaction Diagrams