REAVELEY
Engineers

Structural Calculations

Farmington Regional Center

2021.0089
Division of Facilities and Construction Management
Construction Documents

REVIEWED FOR
CODE COMPLIANCE
Patrick Tomasino
06/03/2025
DIVISION OF FACILITIES
CONSTRUCTION AND
MANAGEMENT

PREPARED FOR

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REAVELEY
Engineers

Calculations Index

1. Design Criteria

1.1. Governing Building Code .... 2021 International Building Code (IBC)
   A. Risk Category II

1.2. Roof Loading
   A. Roof Live Load .... 20 psf
   B. Roof Snow Load .... 21 psf + Drift per IBC
      1. Ground Snow Load, P_g .... 33 psf
      2. Snow Exposure Factor, C_e............................. 0.9
      3. Importance Factor, I_s...................................... 1.0
      4. Thermal Factor, C_t .... 1.0 Roof, 1.2 Canopies
      5. Slope Factor, C_s... 1.0
   C. Roof Rain Load Intensity:
      1. 15-min duration/100-year return period, i_{15}..... 4.63 inches per hour
      2. 60-min duration/100-year return period, i_{60}..... 1.93 inches per hour

1.3. Superimposed Dead Load
   A. Roof .... 11 psf

1.4. Earthquake
   A. Seismic Design Category .... D
   B. Spectral Response Accelerations:
      S_S = 1.338 g S_{DS} = .869 g
      S_1 = 0.494 g S_{D1} = .807 g
   C. Site Class .... D (with data)
   D. Basic Seismic-Force-Resisting System .... Light-frame (steel stud) walls, plywood sheathed (building frame system)
      R = 7 Ω_0 = 2.5 C_d = 4.5
   E. Importance Factor, I_e 1.0
   F. Redundancy Factor, ρ 1.0
   G. Analysis Procedure .... Equivalent Lateral Force (Static)
   H. Seismic Design Coefficient, C_s........................... 0.124
   I. Design Base Shear .... 113 kips
   J. Building Seismic Movement:

Level	Total Displacement		Story Drift	
	Elastic – δ_e	Inelastic - δ	Elastic - Δ_e	Inelastic - Δ
High Roof	0.8”	3.6”	0.18”	0.82”
Low Roof	0.62”	2.8”	0.62”	2.8”
Base	-	-	-	-

1.5. Wind
   A. Basic Design Wind Speed, V .... 140 mph
   B. Velocity pressure exponent coefficient, K_d 0.85
   C. Ground elevation factor, K_e 0.86
   D. Exposure category C
   E. Internal Pressure Coefficient, GC_{pi}..................... 0.18
   F. Topographic Factor, K_{zt} 1.0
   G. Overall Horizontal Wind Load:
      1. Lengthwise Direction .... 121 kips
      2. Crosswise Direction .... 149 kips
   H. Components and Cladding Design Pressure:

Design Wind Pressure - LRFD (psf)	
Location	Tributary Area (ft^2)

		< 10	50	100	> 500
Walls	Within 7 ft of building corner	44.7	37.8	34.9	28
	All other areas	36.3	32.9	31.4	28
Roof	Zone 3: Within 8 ft "L" shape at building corner	105	82	72.1	49.1
	Zone 2: Within 8 ft of building edge	77	65.5	60.6	49.1
	Zone 1: Between 8 ft and 17 ft of building exterior perimeter	58.4	49.4	45.6	36.7
	Zone 1': All other areas	33.5	33.5	33.5	22.7

1.6. Foundations

A. The soils report and log of borings was obtained by the Owner for the Engineer's use in the design of the foundation and is not a part of the Contract Documents. This report and log of borings is available for the Contractor's information but is not a warranty of the subsurface conditions. The Contractor may use the report at their own risk.

B. Soils Report by CMT Technical Services, dated July 3, 2024.

C. Soil Bearing Pressure .... 2000 psf on suitable, undisturbed natural soils and/or on structural fill extending to suitable natural soils.

D. Increase for seismic or wind loading 50%

E. Frost Depth .... 30 inches below grade

F. Lateral Soil Pressure Fluid Equivalent Density:

Active (increase for seismic)	At-Rest (increase for seismic)	Passive (decrease for seismic)
40 pcf (38 pcf)	60 pcf (N/A)	350 pcf (180 pcf)

Coefficient of Friction 0.3

1.7. Classification for Fire Rated Construction

A. For the purpose of determining fire-resistive assemblies, the following framing systems shall be considered unrestrained:

1. Open web steel framing members supporting metal decking.

B. All other steel floor and roof framing members shall be considered restrained.

C. Diagonal members in vertical braced frames shall be considered as secondary members for fireproofing protection.

2. Earthwork

2.1. Soil conditions shall be verified by the Geotechnical Engineer prior to placement of structural fill, floor slabs, and foundations. If soil conditions exist that are different than the soils report, the Structural Engineer shall be notified to re-evaluate the foundation design at additional expense to the owner.

2.2. Clearing: Prior to placing fill or base course, non-engineered fill, topsoil, organics, debris, and other deleterious material shall be removed at least 3 feet beyond the perimeter of the proposed building and flatwork. As a minimum the entire building area shall be scraped to remove the top 4 inches of soil.

2.3. Near surface roots and thin organic layers: The depth of this material is potentially extending up to 5 feet. Do not place any footing on this material.

2.4. Proof Rolling: The natural undisturbed soil below all footings shall be proof rolled prior to placing concrete. Remove all soft spots and completely replace them with compacted structural fill.

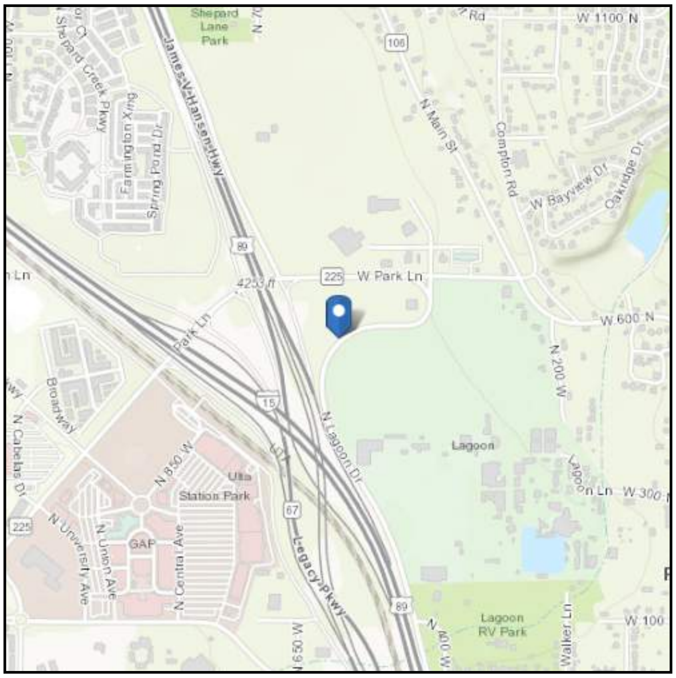

Park Ln
Driver License Division
DABS Utah State Liquor Store #50 Farmington
577 Lagoon Dr
Lat 40.9897
Long -111.9
Elev 4270 ft
89
Lagoon Dr
N
600 ft
Google Earth
Image © 2024 Airbus

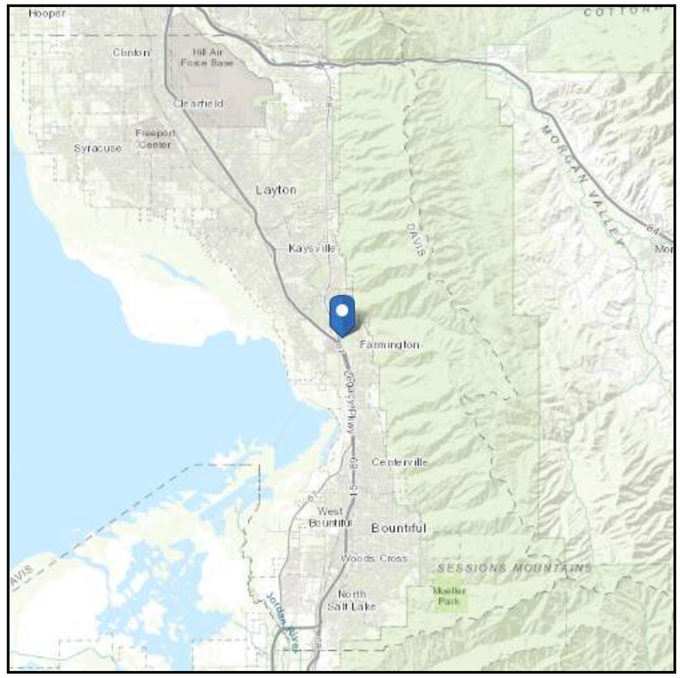
ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16
Risk Category:	II
Soil Class:	D - Stiff Soil
Latitude:	40.9897
Longitude:	-111.9
Elevation:	4267.307528184414 ft (NAVD 88)





Wind

Results:

Not used, Farmington City Code governs

Wind Speed	103 Vmph
10-year MRI	74 Vmph
25-year MRI	80 Vmph
50-year MRI	84 Vmph
100-year MRI	89 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Mon Sep 23 2024

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Farmington City's design criterions are: 2021 International Building Code, 2020 Electrical Code, Seismic Zone D2, **Wind 140 MPH 3 second gust** V-ult ASCE-7 exposure B for most of Farmington (engineer shall evaluate), snow load 30 lb. (or utilize the Utah state amendment based upon the Utah State University snow study).

https://ascehazardtool.org/

Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.339	S_{D1} :	N/A
S_1 :	0.495	T_L :	8
F_a :	1	PGA :	0.612
F_v :	N/A	PGA_M :	0.673
S_{MS} :	1.339	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.892	C_v :	1.368

Not used, Site-Specific Analysis was conducted by Geotech

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

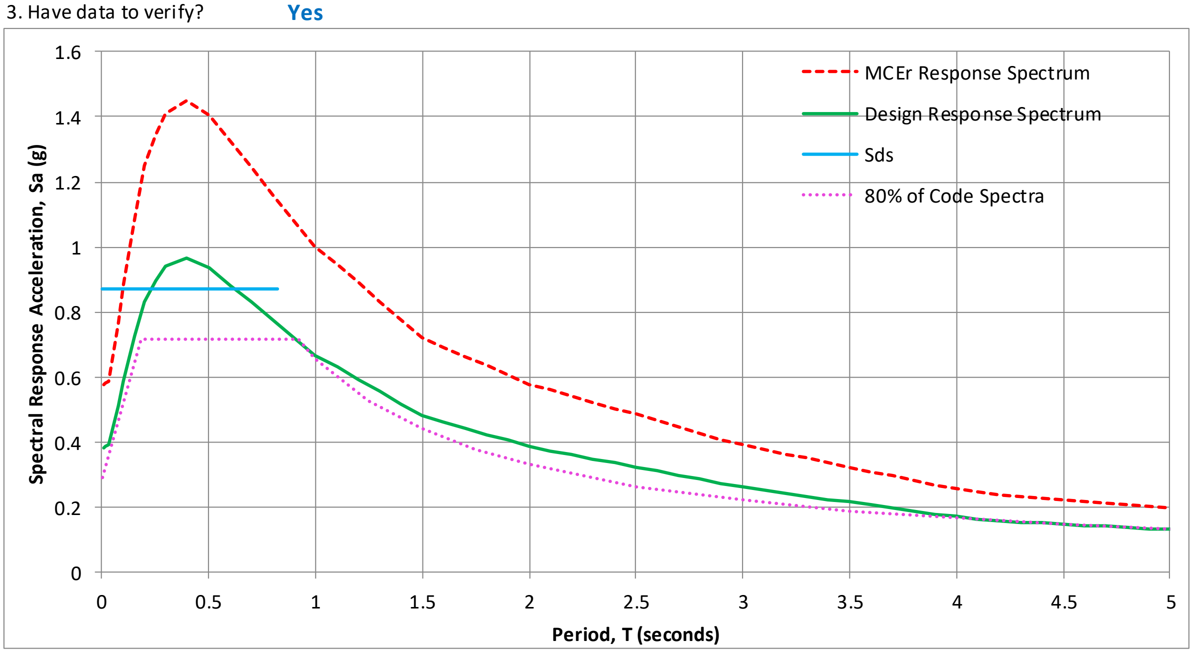
Data Accessed: Mon Sep 23 2024

Date Source: [USGS Seismic Design Maps]

SPECTRAL ACCELERATION VALUE, T	SITE CLASS B/C BOUNDARY [mapped values] (g)	SITE CLASS D [GMHA Results] (g)	MULTIPLIER	DESIGN VALUES (g)
Peak Ground Acceleration	PGA_M = **0.735**	PGA_M = 0.575	1.000	PGA_M = 0.575
0.2 Seconds (Long Period Acceleration)	S_S = **1.338**	S_{MS} = 1.303	0.667	S_{DS} = 0.869
1.0 Second (Long Period Acceleration)	S_1 = **0.494**	S_{M1} = 1.210	0.667	S_{D1} = 0.807

NOTES: *** Site Class D With Data**

1. T_L (seconds): **8**
2. Site Class: **D**
3. Have data to verify? **Yes**



Rain

Results:

15-minute Precipitation Intensity: 4.63 in./h

60-minute Precipitation Intensity: 1.93 in./h

Data Source: NOAA National Weather Service, Precipitation Frequency Data Server, Atlas 14 (https://www.nws.noaa.gov/oh/hdsc/)

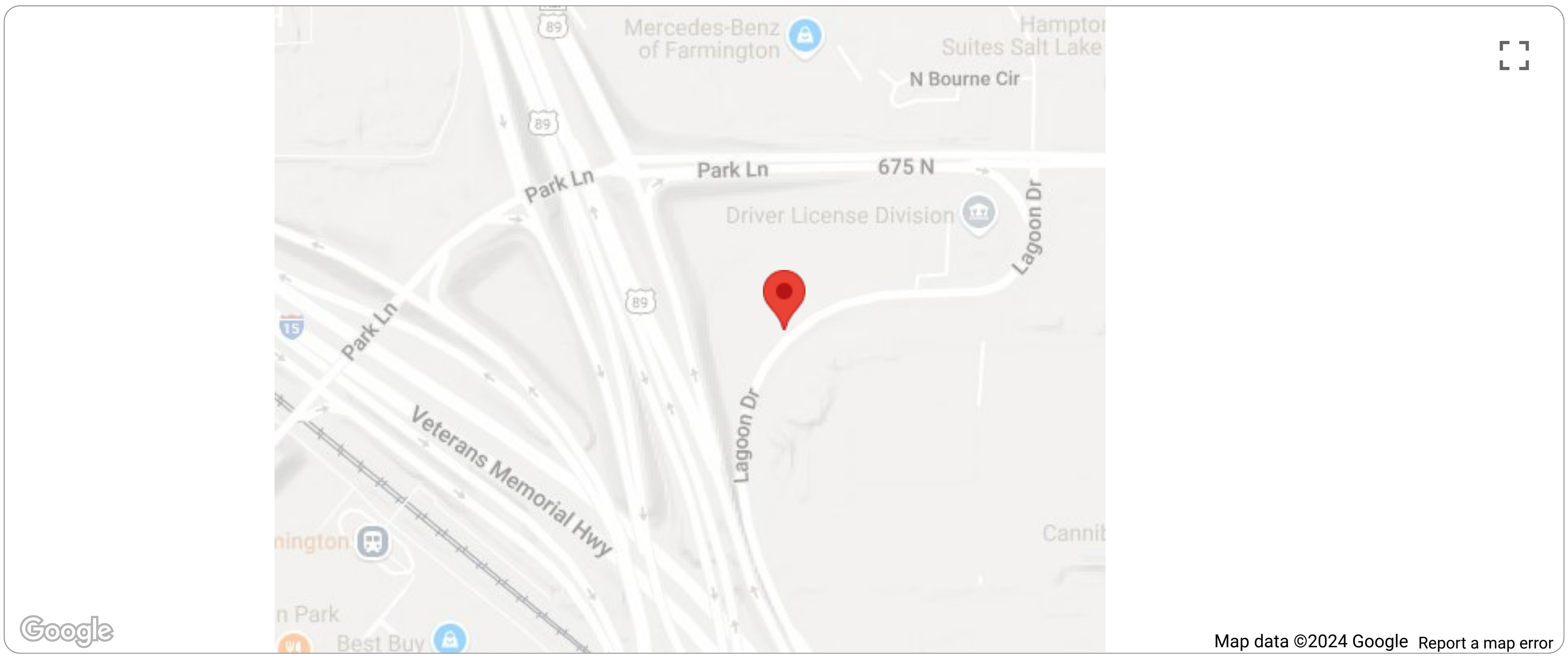
Date Accessed: Mon Sep 23 2024

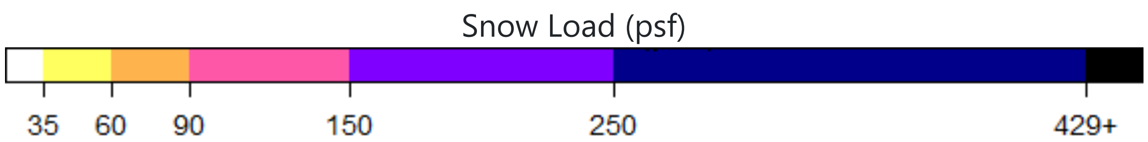
Utah Ground Snow Load Map

Latitude: 40.990
Longitude: -111.900
Elevation: 4,265 ft

Ground Snow Load:
33 psf / 1.60 kPa

*This document is not legally binding. The user is urged to verify ground snow load values with the local authority having jurisdiction.





These ground snow load values represent 50-year ground snow load estimated value at a 2% probability of exceedance for the location given. The grid used in the map is 3350ft by 3350ft. Elevations for these grid cells were estimated by aggregating data from 100ft by 100ft USGS digital elevation models and may not coincide with the actual site elevation. These predictions are calculated using the process outlined in The Utah Snow Load Study.[1]

Final predictions given are bounded at a lower limit for a minimum ground snow load of 21 psf to meet ASCE 7. Estimated values for snow loads at elevations significantly higher than all nearby stations lead to unreasonably high snow load estimates, therefore, the predictions in the map are not allowed to extend beyond the highest 50-year station ground snow load of 429 psf. Elevations over 9,000 ft are also considered less accurate due to the limited number of stations at these elevations. The results shown in this report have included a warning if the results have reached or exceeded the upper limit.

While great efforts have been made to ensure these predictions are as accurate as possible, designers must use expert judgement to ensure that such predictions are appropriate for their particular project. The SEAU and the authors cannot accept responsibility for prediction errors or any consequences resulting therefrom.

1 Bean, Brennan; Maguire, Marc; and Sun, Yan, "The Utah Snow Load Study" (2018). Civil and Environmental Engineering Faculty Publications. Paper 3589.

Lengthwise drifting

SNOW LOADING

In accordance with ASCE7-16

Tedds calculation version 1.0.12

Building details

Roof type	Flat
Width of roof	b = **209.00** ft

Ground snow load

Ground snow load (Figure 7.2-1)	p_g = **33.00** lb/ft^2
Density of snow	$\gamma = \min(0.13 \times p_g / 1\text{ft} + 14\text{lb/ft}^3, 30\text{lb/ft}^3)$ = **18.29** lb/ft^3
Surface roughness category (Sect. 26.7)	C
Exposure condition (Table 7.3-1)	Fully exposed
Exposure factor (Table 7.3-1)	C_e = **0.90**
Thermal condition (Table 7.3-2)	All
Thermal factor (Table 7.3-2)	C_t = **1.00**
Importance category (Table 1.5-1)	II
Importance factor (Table 1.5-2)	I_s = **1.00**
Min snow load for low slope roofs (Sect 7.3.4)	$p_{f\_min} = I_s \times 20$ lb/ft^2 = **20.00** lb/ft^2
Flat roof snow load (Sect 7.3)	$p_f = 0.7 \times C_e \times C_t \times I_s \times p_g$ = **20.79** lb/ft^2

Roof projection drifts

Max height of obstruction	$h_{obs} = \max(h_{1\_obs}, h_{2\_obs})$ = **7.00** ft
Width of obstruction	b_{obs} = **40.00** ft
Distance from LHS eaves	b_{1_obs} = **169.00** ft
Distance from RHS eaves	b_{2_obs} = **0.00** ft
Balanced snow load height	$h_b = p_f / \gamma$ = **1.14** ft
Height from balance load to top of projection	$h_{c\_obs} = h_{obs} - h_b$ = **5.86** ft
Length of lower roof	$l_{l\_obs} = \max(b_{1\_obs}, b_{2\_obs})$ = **169.00** ft
Drift height windward drift	$h_{d\_l\_obs} = \sqrt{(I_s)} \times 0.75 \times (0.43 \times (\max(20\text{ ft}, l_{l\_obs}) \times 1\text{ft}^2)^{1/3} \times (p_g / 1\text{lb/ft}^2 + 10)^{1/4} - 1.5\text{ft})$ = **3.44** ft
Drift height	$h_{d\_obs} = \min(h_{d\_l\_obs}, h_{obs} - h_b)$ = **3.44** ft
Drift width	$W_{d\_obs} = \min(4 \times h_{d\_l\_obs}, 8 \times (h_{obs} - h_b))$ = **13.76** ft
Drift surcharge load	$p_{d\_obs} = h_{d\_obs} \times \gamma$ = **62.93** lb/ft^2

Left parapet

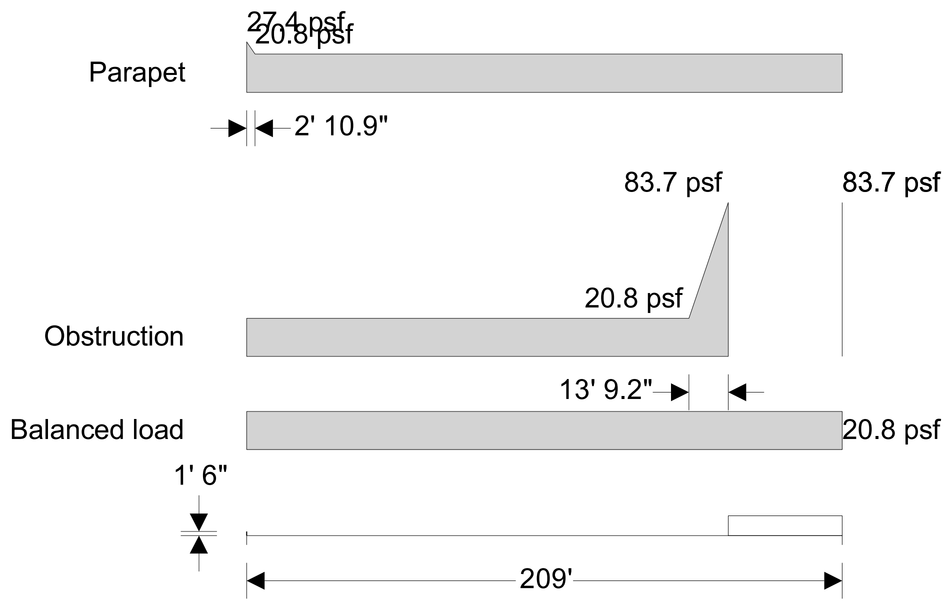
Balanced snow load height	$h_b = p_f / \gamma$ = **1.14** ft
Height of left parapet	h_{pptL} = **1.50** ft
Height from balance load to top of left parapet	$h_{c\_pptL} = h_{pptL} - h_b$ = **0.36** ft
Length of roof - left parapet	$l_{u\_pptL} = b$ = **209.00** ft

Drift height windward drift - left parpet $h_{d\_l\_pptL} = \sqrt{(I_s)} \times 0.75 \times (0.43 \times (\max(20\text{ ft}, l_{u\_pptL}) \times 1\text{ft}^2)^{1/3} \times (p_g / 1\text{lb/ft}^2 + 10)^{1/4} - 1.5\text{ft}) = \mathbf{3.78}$ ft

Drift height - left parapet $h_{d\_pptL} = \min(h_{d\_l\_pptL}, h_{pptL} - h_b) = \mathbf{0.36}$ ft

Drift width $W_{d\_pptL} = \min(4 \times h_{d\_l\_pptL}{}^2 / h_{c\_pptL}, 8 \times (h_{pptL} - h_b), b) = \mathbf{2.91}$ ft

Drift surcharge load - left parapet $p_{d\_pptL} = h_{d\_pptL} \times \gamma = \mathbf{6.64}$ lb/ft^2



Roof elevation

Drift calculations

Balanced snow load height $h_b = p_f / \gamma = \mathbf{1.14}$ ft

Length of upper roof $l_u = \mathbf{34.00}$ ft

Length of lower roof $l_l = \mathbf{10.00}$ ft

Height diff between uppper and lower roofs $h_{diff} = \mathbf{5.00}$ ft

Height from balance load to top of upper roof $h_c = h_{diff} - h_b = \mathbf{3.86}$ ft

Drift height leeward drift $h_{d\_l} = \min(\sqrt{(I_s)} \times (0.43 \times (\max(20\text{ ft}, l_u) \times 1\text{ft}^2)^{1/3} \times (p_g / 1\text{lb/ft}^2 + 10)^{1/4} - 1.5\text{ft}), 0.6 \times l_l) = \mathbf{2.07}$ ft

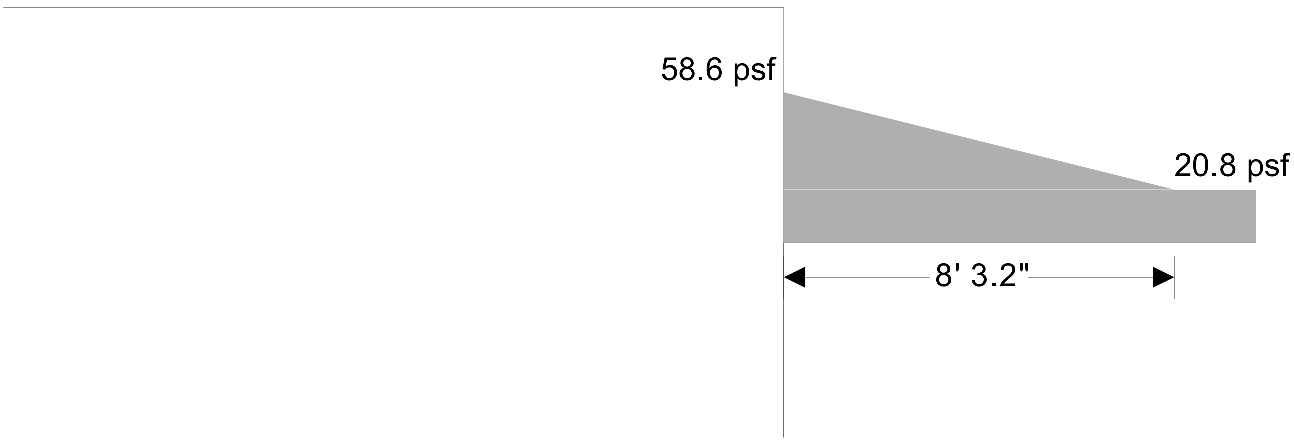
Drift height windward drift $h_{d\_w} = \min(0.75 \times \sqrt{(I_s)} \times (0.43 \times (\max(20\text{ ft}, l_l) \times 1\text{ft}^2)^{1/3} \times (p_g / 1\text{lb/ft}^2 + 10)^{1/4} - 1.5\text{ft}), \sqrt{(I_s \times p_g \times l_l / (4 \times \gamma))}) = \mathbf{1.12}$ ft

Maximum lw/ww drift height $h_{d\_max} = \max(h_{d\_w}, h_{d\_l}) = \mathbf{2.07}$ ft

Drift height $h_d = \min(h_{d\_max}, h_c) = \mathbf{2.07}$ ft

Drift width $W_d = \min(4 \times h_{d\_max}, 8 \times h_c) = \mathbf{8.27}$ ft

Drift surcharge load $p_d = h_d \times \gamma = \mathbf{37.81}$ lb/ft^2



Elevation on snow drift

SNOW LOADING

In accordance with ASCE7-16

Tedds calculation version 1.0.12

Building details

Roof type	Flat
Width of roof	b = **121.00** ft

Ground snow load

Ground snow load (Figure 7.2-1)	p_g = **33.00** lb/ft^2
Density of snow	$\gamma = \min(0.13 \times p_g / 1\text{ft} + 14\text{lb/ft}^3, 30\text{lb/ft}^3)$ = **18.29** lb/ft^3
Surface roughness category (Sect. 26.7)	C
Exposure condition (Table 7.3-1)	Fully exposed
Exposure factor (Table 7.3-1)	C_e = **0.90**
Thermal condition (Table 7.3-2)	All
Thermal factor (Table 7.3-2)	C_t = **1.00**
Importance category (Table 1.5-1)	II
Importance factor (Table 1.5-2)	I_s = **1.00**
Min snow load for low slope roofs (Sect 7.3.4)	$p_{f\_min} = I_s \times 20$ lb/ft^2 = **20.00** lb/ft^2
Flat roof snow load (Sect 7.3)	$p_f = 0.7 \times C_e \times C_t \times I_s \times p_g$ = **20.79** lb/ft^2

Roof projection drifts

Max height of obstruction	$h_{obs} = \max(h_{1\_obs}, h_{2\_obs})$ = **7.00** ft
Width of obstruction	b_{obs} = **42.00** ft
Distance from LHS eaves	b_{1_obs} = **22.00** ft
Distance from RHS eaves	b_{2_obs} = **57.00** ft
Balanced snow load height	$h_b = p_f / \gamma$ = **1.14** ft
Height from balance load to top of projection	$h_{c\_obs} = h_{obs} - h_b$ = **5.86** ft
Length of lower roof	$l_{l\_obs} = \max(b_{1\_obs}, b_{2\_obs})$ = **57.00** ft
Drift height windward drift	$h_{d\_l\_obs} = \sqrt{(I_s)} \times 0.75 \times (0.43 \times (\max(20\text{ ft}, l_{l\_obs}) \times 1\text{ft}^2)^{1/3} \times (p_g / 1\text{lb/ft}^2 + 10)^{1/4} - 1.5\text{ft})$ = **2.05** ft
Drift height	$h_{d\_obs} = \min(h_{d\_l\_obs}, h_{obs} - h_b)$ = **2.05** ft
Drift width	$W_{d\_obs} = \min(4 \times h_{d\_l\_obs}, 8 \times (h_{obs} - h_b))$ = **8.21** ft
Drift surcharge load	$p_{d\_obs} = h_{d\_obs} \times \gamma$ = **37.55** lb/ft^2

Left parapet

Balanced snow load height	$h_b = p_f / \gamma$ = **1.14** ft
Height of left parapet	h_{pptL} = **2.00** ft
Height from balance load to top of left parapet	$h_{c\_pptL} = h_{pptL} - h_b$ = **0.86** ft
Length of roof - left parapet	$l_{u\_pptL} = b$ = **121.00** ft

PROJECT Farmington | DATE 10/11/2024 | BY rmm

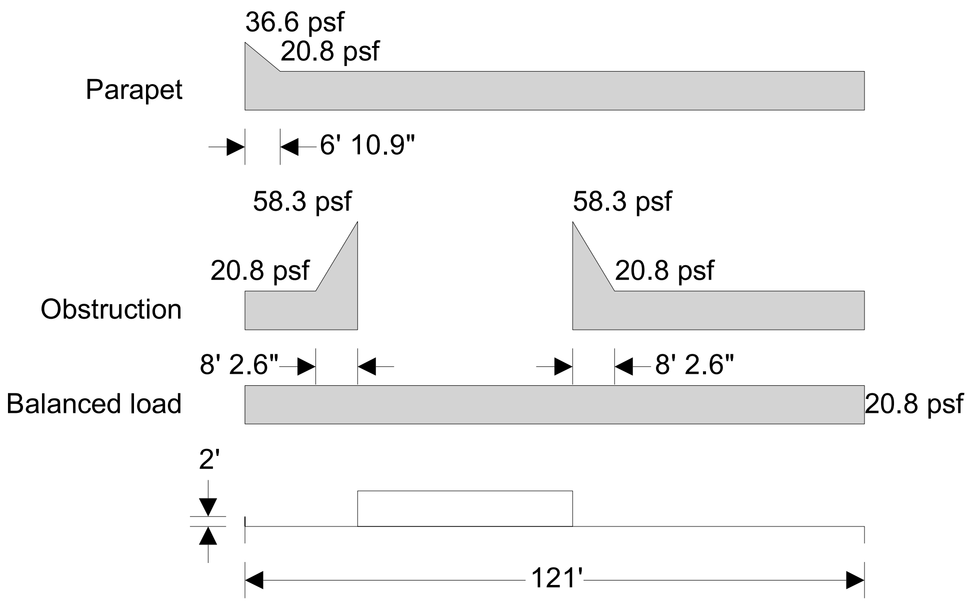
crosswise drifts

Drift height windward drift - left parpet: $h_{d\_l\_pptL} = \sqrt{(I_s)} \times 0.75 \times (0.43 \times (\max(20\ ft, l_{u\_pptL}) \times 1ft^2)^{1/3} \times (p_g / 1lb/ft^2 + 10)^{1/4} - 1.5ft) =$ **2.96** ft

Drift height - left parapet: $h_{d\_pptL} = \min(h_{d\_l\_pptL}, h_{pptL} - h_b) =$ **0.86** ft

Drift width: $W_{d\_pptL} = \min(4 \times h_{d\_l\_pptL}{}^2 / h_{c\_pptL}, 8 \times (h_{pptL} - h_b), b) =$ **6.91** ft

Drift surcharge load - left parapet: $p_{d\_pptL} = h_{d\_pptL} \times \gamma =$ **15.79** lb/ft^2



Roof elevation

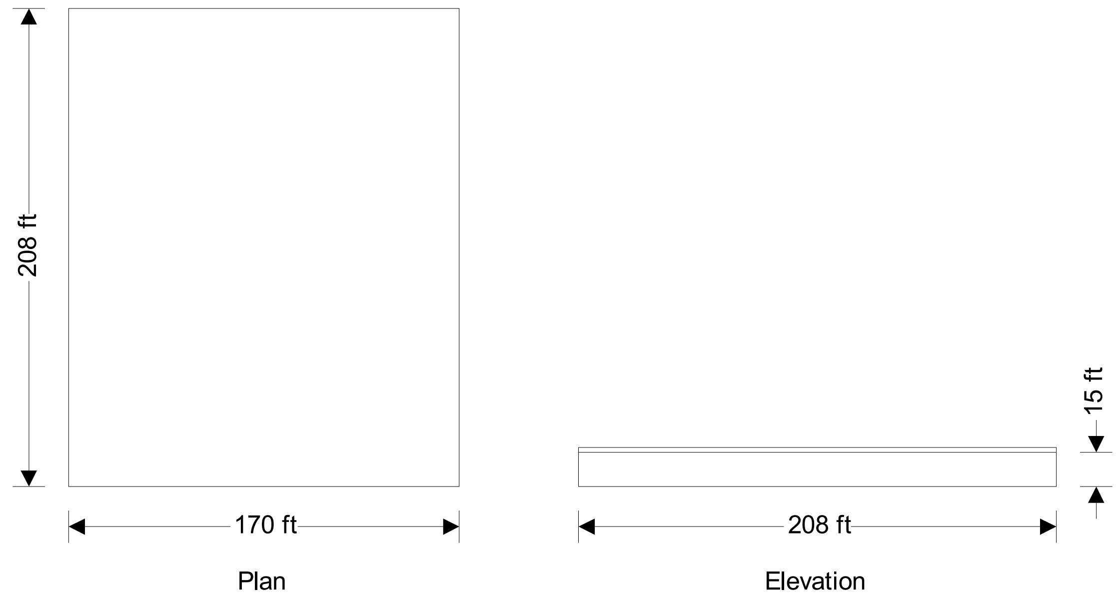
PROJECT Components and Cladding Wind Pressures
DATE 9/24/2024
BY

WIND LOADING

In accordance with ASCE7-16

Using the components and cladding design method

Tedds calculation version 2.1.17



Building data

Type of roof	Flat
Length of building	b = **170.00** ft
Width of building	d = **208.00** ft
Height to eaves	H = **15.00** ft
Height of parapet	h_p = **2.00** ft
Mean height	h = **15.00** ft
End zone width	a = max(min(0.1×min(b, d), 0.4×h), 0.04×min(b, d), 3ft) = **6.80** ft

General wind load requirements

Basic wind speed	V = **140.0** mph
Risk category	II
Velocity pressure exponent coef (Table 26.6-1)	K_d = **0.85**
Ground elevation above sea level	z_{gl} = **4270** ft
Ground elevation factor	$K_e = \exp(-0.0000362 \times z_{gl}/1ft)$ = **0.86**
Exposure category (cl 26.7.3)	C
Enclosure classification (cl.26.12)	Enclosed buildings
Internal pressure coef +ve (Table 26.13-1)	GC_{pi_p} = **0.18**
Internal pressure coef –ve (Table 26.13-1)	GC_{pi_n} = **-0.18**
Parapet internal pressure coef +ve (Table 26.11-1)	GC_{pi_pp} = **0.55**
Parapet internal pressure coef –ve (Table 26.11-1)	GC_{pi_np} = **-0.55**
Gust effect factor	G_f = **0.85**

PROJECT

DATE 9/24/2024

BY

Components and Cladding Wind Pressures

Topography

Topography factor not significant $K_{zt} = 1.0$

Velocity pressure

Velocity pressure coefficient (Table 26.10-1) $K_z =$ **0.85**

Velocity pressure $q_h = 0.00256 \times K_z \times K_{zt} \times K_d \times K_e \times V^2 \times 1\text{psf/mph}^2 =$ **31.1** psf

Velocity pressure at parapet

Velocity pressure coefficient (Table 26.10-1) $K_z =$ **0.87**

Velocity pressure $q_p = 0.00256 \times K_z \times K_{zt} \times K_d \times K_e \times V^2 \times 1\text{psf/mph}^2 =$ **31.8** psf

Peak velocity pressure for internal pressure

Peak velocity pressure – internal (as roof press.) $q_i =$ **31.06** psf

Equations used in tables

Net pressure $p = q_h \times (GC_p - GC_{pi})$

Parapet net pressure $p = q_p$ x $(GC_p - GC_{pi\_p})$

Components and cladding pressures - Wall (Table 30.3-1 and (Figure 30.3-2A))

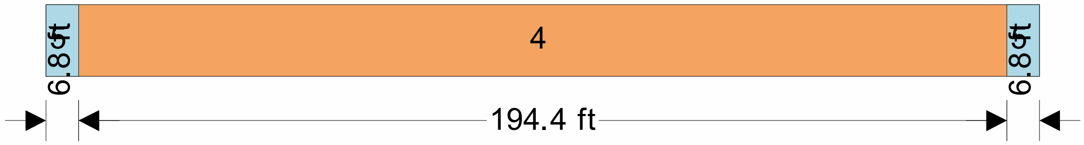
Component	Zone	Length (ft)	Width (ft)	Eff. area (ft^2)	$+GC_p$	$-GC_p$	Pres (+ve) (psf)	Pres (-ve) (psf)
10 sq. ft.	4	-	-	10.0	0.90	-0.99	33.5	-36.3
50 sq. ft.	4	-	-	50.0	0.79	-0.88	30.1	-32.9
100 sq. ft.	4	-	-	100.0	0.74	-0.83	28.6	-31.4
500 sq. ft.	4	-	-	500.1	0.63	-0.72	25.2	-28.0
10 sq. ft.	5	-	-	10.0	0.90	-1.26	33.5	-44.7
50 sq. ft.	5	-	-	50.0	0.79	-1.04	30.1	-37.8
100 sq. ft.	5	-	-	100.0	0.74	-0.94	28.6	-34.9
500 sq. ft.	5	-	-	500.1	0.63	-0.72	25.2	-28.0
10 sq. ft. (W)	4p	-	-	10.0	0.90	-2.30	46.1	-90.6
50 sq. ft. (W)	4p	-	-	50.0	0.79	-1.93	42.6	-78.8
100 sq. ft. (W)	4p	-	-	100.0	0.74	-1.77	41.0	-73.8
500 sq. ft. (W)	4p	-	-	500.1	0.63	-1.40	37.5	-62.0
10 sq. ft. (W)	5p	-	-	10.0	0.90	-3.20	46.1	-119.2
50 sq. ft. (W)	5p	-	-	50.0	0.79	-2.46	42.6	-95.7
100 sq. ft. (W)	5p	-	-	100.0	0.74	-2.14	41.0	-85.5
500 sq. ft. (W)	5p	-	-	500.1	0.63	-1.40	37.5	-62.0

PROJECT

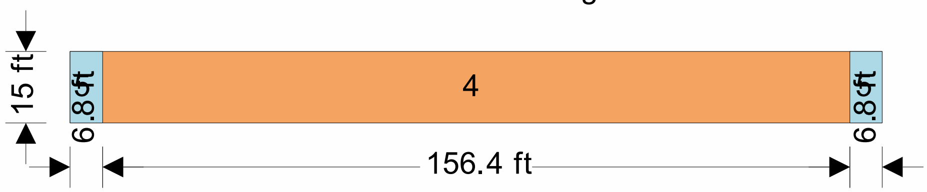
DATE 9/24/2024

BY

Components and Cladding Wind Pressures



Elevation of gable wall



Elevation of side wall

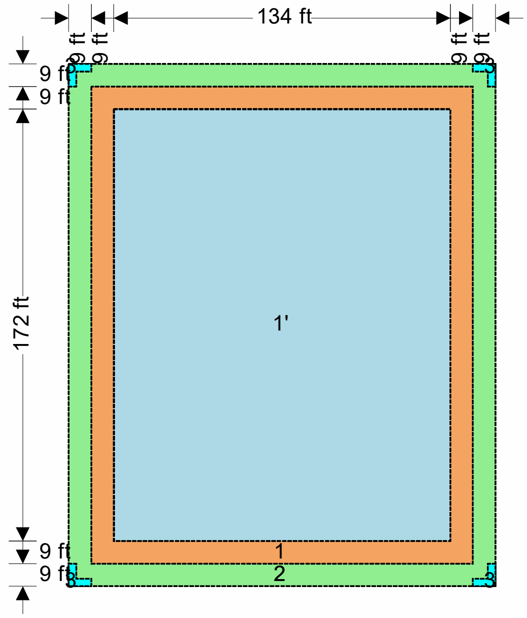
Components and cladding pressures - Roof (Figure 30.3-2A)

Component	Zone	Length (ft)	Width (ft)	Eff. area (ft^2)	$+GC_p$	$-GC_p$	Pres (+ve) (psf)	Pres (-ve) (psf)
10 sq. ft.	1	-	-	10.0	0.30	-1.70	14.9 #	-58.4
50 sq. ft.	1	-	-	50.0	0.23	-1.41	12.7 #	-49.4
100 sq. ft.	1	-	-	100.0	0.20	-1.29	11.8 #	-45.6
500 sq. ft.	1	-	-	500.1	0.20	-1.00	11.8 #	-36.7
10 sq. ft.	1'	-	-	10.0	0.30	-0.90	14.9 #	-33.5
50 sq. ft.	1'	-	-	50.0	0.23	-0.90	12.7 #	-33.5
100 sq. ft.	1'	-	-	100.0	0.20	-0.90	11.8 #	-33.5
500 sq. ft.	1'	-	-	500.1	0.20	-0.55	11.8 #	-22.7
10 sq. ft.	2	-	-	10.0	0.30	-2.30	14.9 #	-77.0
50 sq. ft.	2	-	-	50.0	0.23	-1.93	12.7 #	-65.5
100 sq. ft.	2	-	-	100.0	0.20	-1.77	11.8 #	-60.6
500 sq. ft.	2	-	-	500.1	0.20	-1.40	11.8 #	-49.1
10 sq. ft.	3	-	-	10.0	0.30	-3.20	14.9 #	-105.0
50 sq. ft.	3	-	-	50.0	0.23	-2.46	12.7 #	-82.0
100 sq. ft.	3	-	-	100.0	0.20	-2.14	11.8 #	-72.1
500 sq. ft.	3	-	-	500.1	0.20	-1.40	11.8 #	-49.1

The final net design wind pressure, including all permitted reductions, used in the design shall not be less than 16psf acting in either direction

PROJECT | DATE 9/24/2024 | BY

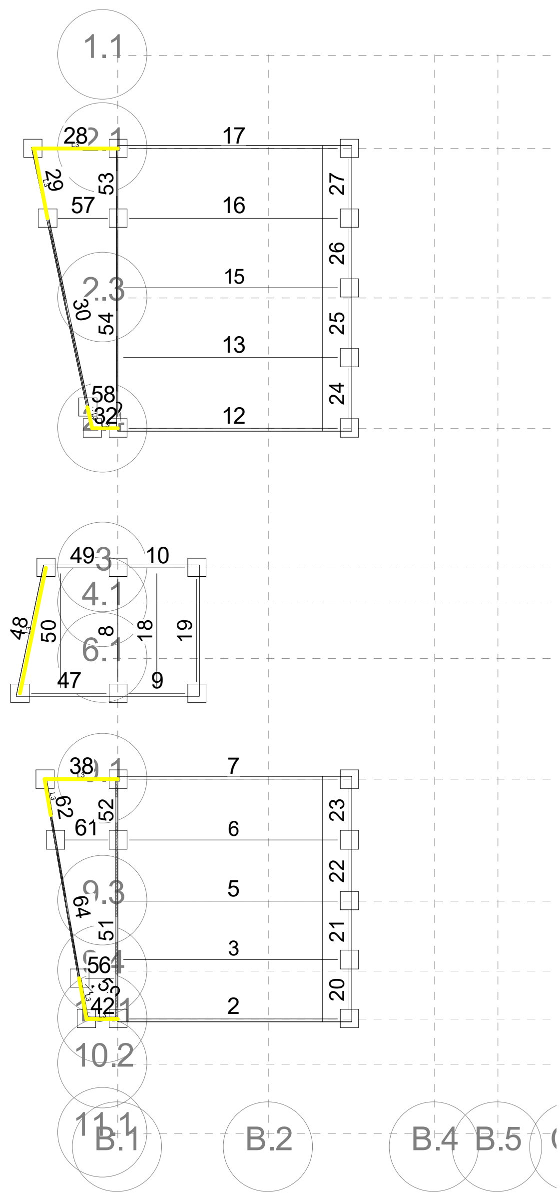
Components and Cladding Wind Pressures



Plan on roof

Floor Map

Floor Type: Hi Roof **Beam Numbers**



Surface Loads

	Label	DL psf	CDL psf	LL psf	Reduction Type	PLL psf	CLL psf	Mass DL psf
	Roof	14.0	3.0	20.0	Roof	0.0	20.0	14.0
	Sunshade	4.0	3.0	20.0	Roof	0.0	20.0	4.0

Line Loads

	Label	DL k/ft	CDL k/ft	LL k/ft	Reduction Type	PLL k/ft	CLL k/ft	Mass DL k/ft
L3	Metal Panel	0.000	0.000	0.000	Reducible	0.060	0.000	0.060

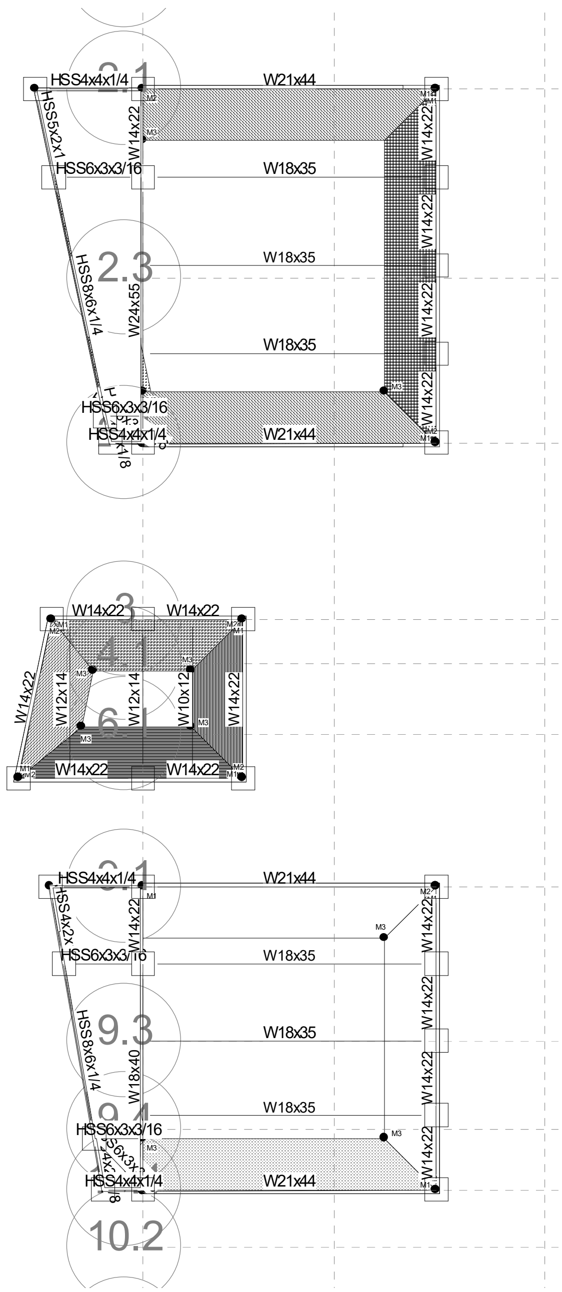
Software adds beam and column self
weights to loads shown - typical

Floor Map

RAM Steel 24.00.02.51
Reaveley Engineers
DataBase: DFCM Farmington Office 5
Building Code: IBC

04/03/25 16:17:07
Steel Code: AISC360-16 LRFD

Floor Type: Hi Roof **Beam Designs**



Snow Loads

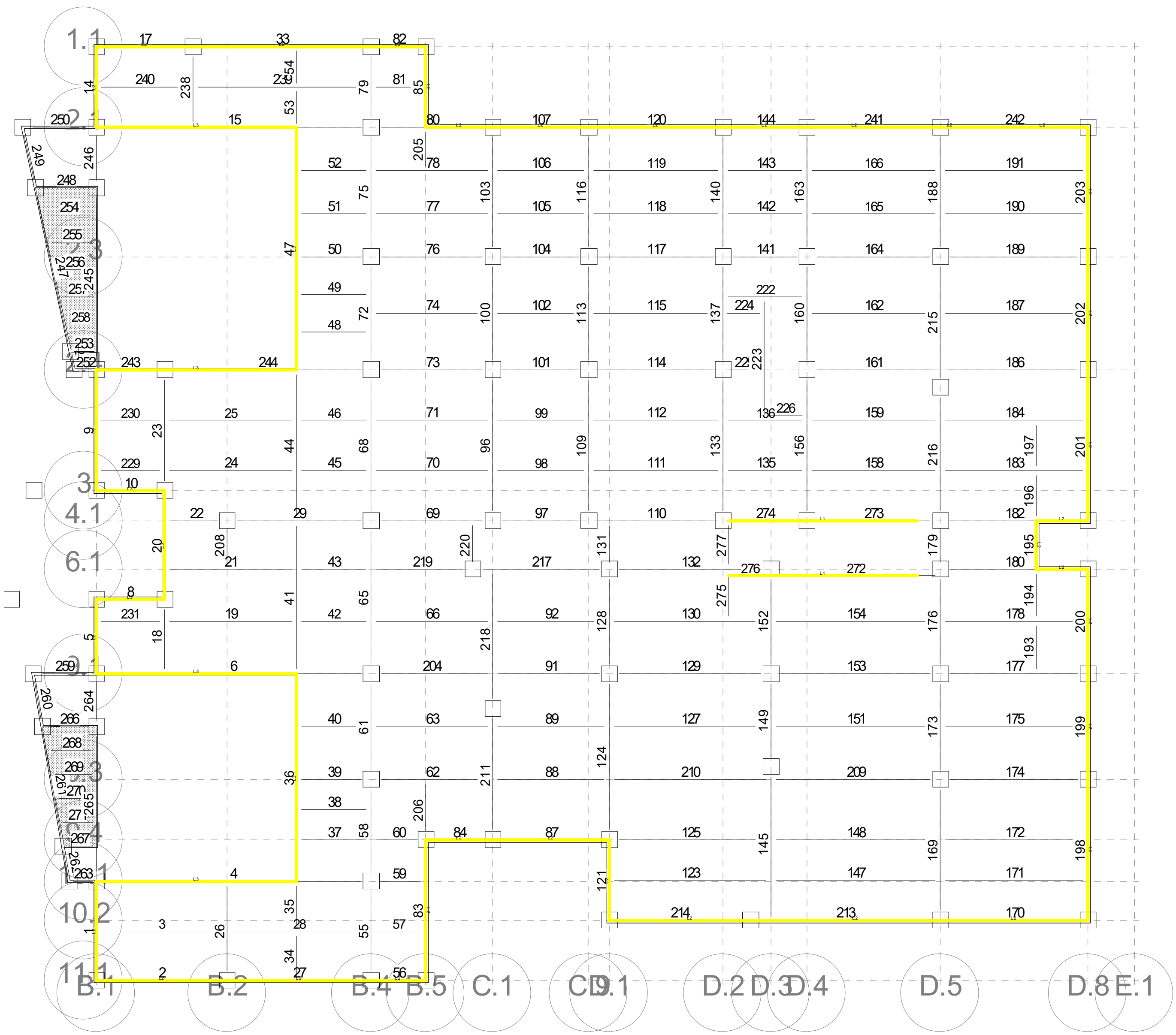
Label	Type	Magnitude 1 psf	Magnitude 2 psf	Magnitude 3 psf
Sm Drift	Drift	37.000	37.000	21.000
Snow	Constant	21.000	---	---
Snow	Constant	21.000	---	---
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Snow	Constant	21.000	---	---
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000

Floor Map

RAM Steel 24.00.02.51
Reaveley Engineers
DataBase: DFCM Farmington Office 5
Building Code: IBC

04/03/25 16:17:07
Steel Code: AISC360-16 LRFD

Floor Type: Roof **Beam Numbers**



Floor Map

Surface Loads

	Label	DL psf	CDL psf	LL psf	Reduction Type	PLL psf	CLL psf	Mass DL psf
	Roof	14.0	3.0	20.0	Roof	0.0	20.0	14.0
	Sunshade	4.0	3.0	20.0	Roof	0.0	20.0	4.0

Line Loads

	Label	DL k/ft	CDL k/ft	LL k/ft	Reduction Type	PLL k/ft	CLL k/ft	Mass DL k/ft
L1	RTU	0.320	0.000	0.000	Reducible	0.000	0.000	0.320
L2	Brick	0.000	0.000	0.000	Reducible	0.000	0.000	0.440
L3	Metal Panel	0.000	0.000	0.000	Reducible	0.060	0.000	0.060

Floor Map

RAM Steel 24.00.02.51
Reaveley Engineers
DataBase: DFCM Farmington Office 5
Building Code: IBC

04/03/25 16:17:07
Steel Code: AISC360-16 LRFD

Floor Type: Roof **Beam Designs**

Floor Map

Snow Loads

Label	Type	Magnitude 1 psf	Magnitude 2 psf	Magnitude 3 psf
Snow	Constant	21.000	---	---
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Lrg Drift	Drift	84.000	84.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Lrg Drift	Drift	84.000	84.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Lrg Drift	Drift	84.000	84.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Sm Drift	Drift	37.000	37.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Med Drift	Drift	58.000	58.000	21.000
Med Drift	Drift	58.000	58.000	21.000

Floor Map

	Med Drift	Drift	58.000	58.000	21.000
	Med Drift	Drift	58.000	58.000	21.000
	Med Drift	Drift	58.000	58.000	21.000
	Med Drift	Drift	58.000	58.000	21.000
	Med Drift	Drift	58.000	58.000	21.000

TABLES SELECTED:

Master Steel Table:	ramaisc
Default Steel Table:	ramaisc
Alternate Steel Table:	reacomp

UNBRACED LENGTH:

Check Unbraced Length

Do Not Consider Point of Inflection as Brace Point

Noncomposite/Precomposite Beam Design:

Deck Perpendicular to Beam Braces flange

Deck Parallel to Beam does not Brace flange

Calculate Cb for all Simple Span Beams

Use Cb=1 for all Cantilevers

SPAN/DEPTH CRITERIA:

Maximum Span/Depth Ratio (ft/ft): 36.00

COMPOSITE IEFF:

Do Not Reduce Ieff per AISC 360 Commentary

DEMAND/CAPACITY LIMITS:

	Strength	Deflection
Steel Beam:	1.000	1.000
C-Beams:	1.000	1.000

DEFLECTION CRITERIA:

Default Criteria	L/d	Δ (in)
Unshored		
Initial (Construction Load):	280.0	0.0
Post Composite		
Live Load:	360.0	0.0
Total Superimposed:	240.0	0.0
Total (Init+Superimp-Camber):	240.0	0.0
Shored		
Dead Load:	0.0	0.0
Live Load:	360.0	0.0
Total Load:	240.0	0.0
Noncomposite		
Dead Load:	0.0	0.0
Live Load:	360.0	0.0

Total Load:	240.0	0.0
L/600 Criteria	L/d	Δ (in)
Unshored		
Initial (Construction Load):	280.0	0.0
Post Composite		
Live Load:	360.0	0.0
Total Superimposed:	600.0	0.0
Total (Init+Superimp-Camber):	240.0	0.0
Shored		
Dead Load:	0.0	0.0
Live Load:	600.0	0.0
Total Load:	240.0	0.0
Noncomposite		
Dead Load:	0.0	0.0
Live Load:	600.0	0.0
Total Load:	240.0	0.0

Perimeter beams

Limited Criteria	L/d	Δ (in)
Unshored		
Initial (Construction Load):	0.0	0.0
Post Composite		
Live Load:	0.0	0.0
Total Superimposed:	0.0	0.0
Total (Init+Superimp-Camber):	0.0	0.0
Shored		
Dead Load:	0.0	0.0
Live Load:	0.0	0.0
Total Load:	0.0	0.0
Noncomposite		
Dead Load:	0.0	0.0
Live Load:	480.0	0.5
Total Load:	240.0	0.0

Note: 0.0 indicates No Limit

CAMBER CRITERIA FOR COMPOSITE BEAMS:

Do not Camber Beams with Span < 20.0 ft

Do not Camber Beams with Weight < 24.0 lbs/ft

Do not Camber Beams with Weight > 1000.0 lbs/ft

Do not Camber Beams with Depth < 14.0 in

Do not Camber Beams with Depth > 100.0 in

Do not Camber Beams with Cantilevers

Percent of Dead Load used for Camber: 85.00

(For Unshored Composite the specified % of Construction DL is used)

Camber Increment (in): 0.250

Minimum Camber (in): 0.750

Maximum Camber (in): 4.000

CAMBER CRITERIA FOR NONCOMPOSITE BEAMS:

Do not Camber

STUD CRITERIA:

Stud Distribution: Use Optimum

Maximum % of Full Composite Allowed: 95.00

Minimum % of Full Composite Allowed - Short Span: 25.00

Minimum % of Full Composite Allowed - Long Span: 50.00

Long Span Defined as Span Greater Than: 30.00 ft

Maximum Rows of Studs Allowed: 3

Minimum Flange Width for 2 Rows of Studs (in): 5.500

Minimum Flange Width for 3 Rows of Studs (in): 8.500

Maximum Stud Spacing - Deck Parallel: Per Code

Maximum Stud Spacing - Deck Not Parallel: Per Code

Ductility of Shear Connection:

Enforce AISC 360-16 Commentary I3.2d(1) for Spans greater than 30'

WEB OPENING CRITERIA:

Stiffener Fy (ksi): 36.000

Stiffener Dimensions

Minimum Width (in): 1.000

Minimum Thickness (in): 0.250

Increment of Width (in): 0.250

Increment of Thickness (in): 0.125

Increment of Length (in): 1.000

Allow Stiffeners on One Side of web

Allow Stiffeners on Two Sides of web

Beam Summary

STEEL BEAM DESIGN SUMMARY:

Demand/Capacity Limits for: Strength: 1.000 Deflection: 1.000

Floor Type: Hi Roof

Beam #	Length ft	+Mu kip-ft	-Mu kip-ft	ΦMn kip-ft	Fy ksi	Beam Size		Studs
2	40.00	80.1	0.0	357.8	50.0	W21X44		
3	40.00	115.5	0.0	249.4	50.0	W18X35		
5	40.00	113.2	0.0	249.4	50.0	W18X35		
6	40.00	118.8	0.0	249.4	50.0	W18X35		
7	40.00	82.5	0.0	357.8	50.0	W21X44		
8	21.66	27.6	0.0	65.2	50.0	W12X14		
9	13.65	17.1	0.0	124.5	50.0	W14X22	u	
10	13.65	17.1	0.0	124.5	50.0	W14X22	u	
12	40.00	90.7	0.0	357.8	50.0	W21X44		
13	40.00	134.5	0.0	249.4	50.0	W18X35		
15	40.00	130.6	0.0	249.4	50.0	W18X35		
16	40.00	134.0	0.0	249.4	50.0	W18X35		
17	40.00	90.7	0.0	357.8	50.0	W21X44		
18	21.66	23.6	0.0	46.9	50.0	W10X12		
19	21.66	16.7	0.0	124.5	50.0	W14X22	u	
20	10.13	0.7	0.0	89.0	50.0	W14X22	u	
21	10.12	0.7	0.0	89.1	50.0	W14X22	u	
22	10.45	0.7	0.0	86.3	50.0	W14X22	u	
23	10.47	0.7	0.0	86.0	50.0	W14X22	u	
24	12.09	0.7	0.0	67.5	50.0	W14X22	u	
25	12.00	0.7	0.0	68.4	50.0	W14X22	u	
26	12.00	0.7	0.0	68.4	50.0	W14X22	u	
27	12.00	0.7	0.0	68.4	50.0	W14X22	u	
28	14.75	3.2	0.0	17.6	50.0	HSS4X4X1/4	u	
29	12.27	2.2	0.0	8.9	50.0	HSS5X2X1/8		
30	33.23	5.7	0.0	63.4	50.0	HSS8X6X1/4	u	
31	3.67	0.2	0.0	6.2	50.0	HSS4X2X1/8		
32	4.50	0.3	0.0	17.6	50.0	HSS4X4X1/4	u	
38	12.67	2.2	0.0	17.6	50.0	HSS4X4X1/4	u	
41	7.02	0.8	0.0	6.2	50.0	HSS4X2X1/8		
42	5.50	0.4	0.0	17.6	50.0	HSS4X4X1/4	u	
47	17.00	24.0	0.0	124.5	50.0	W14X22	u	

Beam Summary

48	22.12	19.0	0.0	124.5	50.0	W14X22	u	
49	12.50	10.4	0.0	123.4	50.0	W14X22	u	
50	21.66	26.3	0.0	65.2	50.0	W12X14		
51	30.70	123.2	0.0	219.2	50.0	W18X40		
52	10.47	0.4	0.0	86.0	50.0	W14X22	u	
53	12.00	0.6	0.0	68.4	50.0	W14X22	u	
54	36.09	171.5	0.0	341.9	50.0	W24X55		
56	6.71	0.1	0.0	21.0	50.0	HSS6X3X3/16	u	
57	12.19	0.3	0.0	21.0	50.0	HSS6X3X3/16	u	
58	5.27	0.0	0.0	21.0	50.0	HSS6X3X3/16	u	
59	9.64	0.2	0.0	21.0	50.0	HSS6X3X3/16	u	
60	6.37	0.1	0.0	21.0	50.0	HSS6X3X3/16	u	
61	10.85	0.2	0.0	21.0	50.0	HSS6X3X3/16	u	
62	10.63	1.2	0.0	6.2	50.0	HSS4X2X1/8		
64	24.14	2.5	0.0	63.4	50.0	HSS8X6X1/4	u	

Floor Type: Roof

Beam #	Length ft	+Mu kip-ft	-Mu kip-ft	ΦMn kip-ft	Fy ksi	Beam Size		Studs
1	19.75	43.7	0.0	124.5	50.0	W14X22	u	
2	26.10	31.6	0.0	124.5	50.0	W14X22	u	
3	26.10	51.8	0.0	92.6	50.0	W12X19		
4	54.79	745.0	0.0	1061.2	50.0	W30X90		
5	14.75	12.6	0.0	119.6	50.0	W14X22	u	
6	54.79	845.2	0.0	1170.0	50.0	W30X99	u	
8	13.65	8.0	0.0	32.9	50.0	W8X10		
9	24.00	35.7	0.0	93.3	50.0	W14X22	u	
10	13.65	7.7	0.0	32.9	50.0	W8X10		
14	16.00	22.7	0.0	124.5	50.0	W14X22	u	
15	54.79	787.0	0.0	1170.0	50.0	W30X99	u	
17	19.27	14.7	0.0	124.5	50.0	W14X22	u	
18	14.75	44.5	0.0	68.3	50.0	W12X19	u	
19	26.35	61.8	0.0	124.5	50.0	W14X22		
20	21.66	75.0	0.0	87.8	50.0	W14X22		
21	26.35	63.8	0.0	124.5	50.0	W14X22		
22	12.45	20.4	0.0	32.9	50.0	W8X10		
23	24.00	93.9	0.0	126.7	50.0	W16X26		
24	26.35	55.9	0.0	92.6	50.0	W12X19		
25	26.35	51.5	0.0	92.6	50.0	W12X19		

26	19.75	83.3	0.0	124.5	50.0	W14X22	
27	28.69	38.6	0.0	124.5	50.0	W14X22	
28	28.69	62.8	0.0	124.5	50.0	W14X22	
29	28.69	237.6	0.0	249.4	50.0	W18X35	
33	35.52	51.9	0.0	202.5	50.0	W16X31	
34	9.87	0.2	0.0	29.1	50.0	W12X14	u
35	9.88	0.2	0.0	29.1	50.0	W12X14	u
36	41.17	461.3	0.0	641.4	50.0	W24X68	u
37	14.79	15.4	0.0	65.2	50.0	W12X14	u
38	14.79	12.9	0.0	32.9	50.0	W8X10	
39	14.79	17.5	0.0	32.9	50.0	W8X10	
40	14.79	22.2	0.0	32.9	50.0	W8X10	
41	30.41	131.9	0.0	141.1	50.0	W16X31	
42	14.79	15.5	0.0	32.9	50.0	W8X10	
43	14.79	14.1	0.0	32.9	50.0	W8X10	
44	30.00	121.9	0.0	143.3	50.0	W16X31	
45	14.79	14.1	0.0	32.9	50.0	W8X10	
46	14.79	15.0	0.0	32.9	50.0	W8X10	
47	48.09	620.9	0.0	911.7	50.0	W27X84	
48	14.79	16.0	0.0	32.9	50.0	W8X10	
49	14.79	16.0	0.0	32.9	50.0	W8X10	
50	14.79	17.1	0.0	32.9	50.0	W8X10	
51	14.79	18.2	0.0	32.9	50.0	W8X10	
52	14.79	18.2	0.0	32.9	50.0	W8X10	
53	8.00	0.2	0.0	41.8	50.0	W12X14	u
54	8.00	0.2	0.0	41.8	50.0	W12X14	u
55	19.75	57.7	0.0	74.4	50.0	W12X19	u
56	10.96	5.7	0.0	124.5	50.0	W14X22	u
57	10.96	8.9	0.0	32.9	50.0	W8X10	
58	20.25	39.5	0.0	53.9	50.0	W12X14	
59	10.96	8.1	0.0	65.2	50.0	W12X14	u
60	10.96	8.7	0.0	65.2	50.0	W12X14	u
61	20.92	61.7	0.0	68.0	50.0	W12X19	
62	24.29	44.8	0.0	75.4	50.0	W12X16	
63	24.29	40.1	0.0	65.2	50.0	W12X14	
65	30.41	106.1	0.0	111.1	50.0	W16X26	
66	24.29	40.1	0.0	65.2	50.0	W12X14	
68	30.00	105.8	0.0	111.7	50.0	W16X26	
69	24.29	38.7	0.0	65.2	50.0	W12X14	

Beam Summary

70	24.29	38.9	0.0	65.2	50.0	W12X14	
71	24.29	38.4	0.0	65.2	50.0	W12X14	
72	22.42	67.8	0.0	92.6	50.0	W12X19	
73	24.29	40.7	0.0	65.2	50.0	W12X14	
74	24.29	43.1	0.0	75.4	50.0	W12X16	
75	25.67	84.5	0.0	89.7	50.0	W14X22	
76	24.29	38.0	0.0	65.2	50.0	W12X14	
77	24.29	33.1	0.0	65.2	50.0	W12X14	
78	24.29	35.0	0.0	65.2	50.0	W12X14	
79	16.00	47.8	0.0	165.8	50.0	W16X26	u
80	24.29	42.2	0.0	124.5	50.0	W14X22	u
81	10.96	7.3	0.0	32.9	50.0	W8X10	
82	10.96	4.8	0.0	124.5	50.0	W14X22	u
83	28.00	36.6	0.0	82.1	50.0	W14X22	u
84	13.33	9.5	0.0	124.5	50.0	W14X22	u
85	16.00	13.2	0.0	124.5	50.0	W14X22	u
87	23.25	28.8	0.0	124.5	50.0	W14X22	u
88	23.25	40.6	0.0	65.2	50.0	W12X14	
89	23.25	36.8	0.0	65.2	50.0	W12X14	
91	23.25	36.7	0.0	65.2	50.0	W12X14	
92	23.25	38.8	0.0	65.2	50.0	W12X14	
96	30.00	124.6	0.0	144.4	50.0	W16X31	
97	19.11	32.9	0.0	65.2	50.0	W12X14	
98	19.11	27.7	0.0	46.9	50.0	W10X12	
99	19.11	23.7	0.0	46.9	50.0	W10X12	
100	22.42	72.5	0.0	111.6	50.0	W14X22	
101	19.11	25.1	0.0	46.9	50.0	W10X12	
102	19.11	26.5	0.0	46.9	50.0	W10X12	
103	25.67	88.4	0.0	125.1	50.0	W16X26	
104	19.11	23.4	0.0	46.9	50.0	W10X12	
105	19.11	20.3	0.0	46.9	50.0	W10X12	
106	19.11	21.5	0.0	46.9	50.0	W10X12	
107	19.11	15.0	0.0	124.5	50.0	W14X22	u
109	30.00	132.1	0.0	144.3	50.0	W16X31	
110	26.81	47.6	0.0	92.6	50.0	W12X19	
111	26.81	48.0	0.0	92.6	50.0	W12X19	
112	26.81	47.3	0.0	92.6	50.0	W12X19	
113	22.42	76.9	0.0	111.6	50.0	W14X22	
114	26.81	50.1	0.0	92.6	50.0	W12X19	

115	26.81	52.8	0.0	92.6	50.0	W12X19	
116	25.67	93.6	0.0	125.1	50.0	W16X26	
117	26.81	46.8	0.0	92.6	50.0	W12X19	
118	26.81	40.5	0.0	75.4	50.0	W12X16	
119	26.81	42.7	0.0	75.4	50.0	W12X16	
120	26.81	29.5	0.0	124.5	50.0	W14X22	u
121	16.00	33.2	0.0	124.5	50.0	W14X22	u
123	32.21	59.8	0.0	124.5	50.0	W14X22	
124	32.92	191.7	0.0	220.0	50.0	W18X40	
125	32.21	69.6	0.0	124.5	50.0	W14X22	
127	32.21	72.4	0.0	150.8	50.0	W14X26	u
128	20.83	84.3	0.0	124.5	50.0	W14X22	
129	32.21	72.3	0.0	150.8	50.0	W14X26	u
130	32.21	76.3	0.0	150.8	50.0	W14X26	u
131	9.58	0.2	0.0	19.4	50.0	W8X10	
132	32.21	82.3	0.0	165.8	50.0	W16X26	
133	30.00	143.1	0.0	145.0	50.0	W16X31	
135	16.67	22.4	0.0	46.9	50.0	W10X12	
136	16.67	40.1	0.0	46.9	50.0	W10X12	
137	22.42	83.5	0.0	111.7	50.0	W14X22	
140	25.67	88.6	0.0	125.1	50.0	W16X26	
141	16.67	14.8	0.0	32.9	50.0	W8X10	
142	16.67	15.4	0.0	32.9	50.0	W8X10	
143	16.67	16.2	0.0	32.9	50.0	W8X10	
144	16.67	11.4	0.0	124.5	50.0	W14X22	u
145	30.50	223.0	0.0	260.0	50.0	W18X40	
147	33.79	65.1	0.0	124.5	50.0	W14X22	
148	33.79	76.4	0.0	165.8	50.0	W16X26	
149	18.42	84.4	0.0	124.5	50.0	W14X22	
151	33.79	79.7	0.0	150.8	50.0	W14X26	u
152	20.83	118.8	0.0	161.7	50.0	W16X26	u
153	33.79	79.6	0.0	150.8	50.0	W14X26	u
154	33.79	83.6	0.0	165.8	50.0	W16X26	
156	30.00	151.4	0.0	181.2	50.0	W18X35	
158	26.66	58.0	0.0	124.5	50.0	W14X22	
159	26.66	48.7	0.0	92.6	50.0	W12X19	
160	22.42	89.6	0.0	124.5	50.0	W14X22	
161	26.66	54.3	0.0	92.6	50.0	W12X19	
162	26.66	56.5	0.0	124.5	50.0	W14X22	

Beam Summary

163	25.67	88.3	0.0	125.1	50.0	W16X26	
164	26.66	46.5	0.0	92.6	50.0	W12X19	
165	26.66	40.0	0.0	75.4	50.0	W12X16	
166	26.66	42.2	0.0	75.4	50.0	W12X16	
169	28.00	169.4	0.0	217.4	50.0	W18X35	
170	29.42	34.2	0.0	124.5	50.0	W14X22	u
171	29.42	49.6	0.0	92.6	50.0	W12X19	
172	29.42	58.4	0.0	124.5	50.0	W14X22	
173	20.92	93.8	0.0	124.5	50.0	W14X22	
174	29.42	65.3	0.0	124.5	50.0	W14X22	
175	29.42	61.0	0.0	124.5	50.0	W14X22	
176	20.83	107.0	0.0	164.9	50.0	W16X26	u
177	29.42	61.3	0.0	124.5	50.0	W14X22	
178	29.42	62.7	0.0	124.5	50.0	W14X22	
179	9.58	0.2	0.0	30.6	50.0	W12X14	u
180	29.42	60.4	0.0	165.8	50.0	W16X26	
182	29.42	59.2	0.0	165.8	50.0	W16X26	
183	29.42	60.4	0.0	124.5	50.0	W14X22	
184	29.42	58.9	0.0	124.5	50.0	W14X22	
186	29.42	61.8	0.0	124.5	50.0	W14X22	
187	29.42	65.2	0.0	124.5	50.0	W14X22	
188	25.67	115.7	0.0	125.1	50.0	W16X26	
189	29.42	57.8	0.0	124.5	50.0	W14X22	
190	29.42	50.4	0.0	124.5	50.0	W14X22	u
191	29.42	52.9	0.0	124.5	50.0	W14X22	
193	10.41	0.3	0.0	26.6	50.0	W12X14	u
194	10.42	0.3	0.0	26.6	50.0	W12X14	u
195	9.58	0.6	0.0	93.5	50.0	W14X22	u
196	10.00	0.2	0.0	28.5	50.0	W12X14	u
197	10.00	0.2	0.0	28.5	50.0	W12X14	u
198	28.00	89.9	0.0	173.4	50.0	W16X31	
199	20.92	50.0	0.0	124.3	50.0	W14X22	u
200	20.83	50.8	0.0	124.5	50.0	W14X22	u
201	30.00	95.5	0.0	180.4	50.0	W18X35	
202	22.42	57.2	0.0	110.5	50.0	W14X22	u
203	25.67	69.5	0.0	124.7	50.0	W16X26	
204	24.29	40.0	0.0	65.2	50.0	W12X14	
205	8.56	0.2	0.0	37.2	50.0	W12X14	u
206	12.00	0.4	0.0	21.2	50.0	W12X14	u

Beam Summary

208	9.58	0.2	0.0	19.4	50.0	W8X10	
209	33.79	85.3	0.0	165.8	50.0	W16X26	
210	32.21	77.6	0.0	165.8	50.0	W16X26	
211	26.00	116.4	0.0	130.5	50.0	W16X26	
213	37.89	114.3	0.0	357.8	50.0	W21X44	
214	28.11	31.2	0.0	124.5	50.0	W14X22	u
215	25.92	135.3	0.0	157.9	50.0	W16X31	
216	26.50	142.4	0.0	153.7	50.0	W16X31	
217	27.25	97.3	0.0	165.8	50.0	W16X26	
218	27.75	124.1	0.0	147.5	50.0	W16X31	
219	20.29	26.7	0.0	46.9	50.0	W10X12	
220	9.58	0.2	0.0	19.4	50.0	W8X10	
222	16.67	38.9	0.0	46.9	50.0	W10X12	
223	24.50	44.5	0.0	65.2	50.0	W12X14	
224	8.17	5.2	0.0	32.9	50.0	W8X10	
225	8.17	7.6	0.0	32.9	50.0	W8X10	
226	8.50	0.3	0.0	32.9	50.0	W8X10	
229	13.65	11.7	0.0	32.9	50.0	W8X10	
230	13.65	14.3	0.0	32.9	50.0	W8X10	
231	13.65	12.7	0.0	32.9	50.0	W8X10	
238	16.00	59.6	0.0	165.8	50.0	W16X26	u
239	35.52	85.2	0.0	165.8	50.0	W16X26	
240	19.27	24.5	0.0	46.9	50.0	W10X12	
241	26.66	29.2	0.0	124.5	50.0	W14X22	u
242	29.42	35.6	0.0	124.5	50.0	W14X22	
243	13.65	12.6	0.0	32.9	50.0	W8X10	
244	41.14	742.5	0.0	915.0	50.0	W27X84	
245	36.09	61.5	0.0	273.7	50.0	HSS18X6X5/16	u
246	12.00	0.1	0.0	6.2	50.0	HSS4X2X1/8	
247	33.23	37.1	0.0	116.6	50.0	HSS12X6X1/4	u
248	12.19	3.2	0.0	21.0	50.0	HSS6X3X3/16	u
249	12.27	0.6	0.0	8.9	50.0	HSS5X2X1/8	
250	14.75	0.9	0.0	8.9	50.0	HSS5X2X1/8	
251	3.67	0.1	0.0	6.2	50.0	HSS4X2X1/8	
252	4.50	0.1	0.0	6.2	50.0	HSS4X2X1/8	
253	5.27	0.7	0.0	21.0	50.0	HSS6X3X3/16	u
254	11.04	5.0	0.0	21.0	50.0	HSS6X3X3/16	u
255	9.88	4.2	0.0	21.0	50.0	HSS6X3X3/16	u
256	8.73	3.4	0.0	21.0	50.0	HSS6X3X3/16	u

Beam Summary

257	7.57	2.4	0.0	21.0	50.0	HSS6X3X3/16	u
258	6.42	1.8	0.0	21.0	50.0	HSS6X3X3/16	u
259	12.67	0.6	0.0	8.9	50.0	HSS5X2X1/8	
260	10.63	0.4	0.0	6.2	50.0	HSS4X2X1/8	
261	24.14	20.2	0.0	116.6	50.0	HSS12X6X1/4	u
262	7.02	0.2	0.0	6.2	50.0	HSS4X2X1/8	
263	5.50	0.1	0.0	6.2	50.0	HSS4X2X1/8	
264	10.47	0.1	0.0	6.2	50.0	HSS4X2X1/8	
265	30.70	41.3	0.0	182.2	50.0	HSS14X6X5/16	u
266	10.85	2.4	0.0	21.0	50.0	HSS6X3X3/16	u
267	6.71	1.0	0.0	21.0	50.0	HSS6X3X3/16	u
268	10.02	3.8	0.0	21.0	50.0	HSS6X3X3/16	u
269	9.19	3.3	0.0	21.0	50.0	HSS6X3X3/16	u
270	8.36	2.8	0.0	21.0	50.0	HSS6X3X3/16	u
271	7.53	2.3	0.0	21.0	50.0	HSS6X3X3/16	u
272	33.79	160.3	0.0	249.4	50.0	W18X35	
273	26.66	94.4	0.0	165.8	50.0	W16X26	
274	16.67	36.7	0.0	65.2	50.0	W12X14	
275	10.41	4.1	0.0	29.8	50.0	W8X10	
276	8.40	7.4	0.0	32.9	50.0	W8X10	
277	9.58	0.2	0.0	19.4	50.0	W8X10	

* after Size denotes beam failed stress/capacity criteria.
# after Size denotes beam failed deflection criteria.
u after Size denotes this size has been assigned by the User.

Gravity Beam Design

RAM Steel 24.00.02.51
Reaveley Engineers
DataBase: DFCM Farmington Office 5
Building Code: IBC

04/03/25 16:17:07
Steel Code: AISC360-16 LRFD

Floor Type: Roof **Beam Number = 6**

SPAN INFORMATION (ft): I-End (0.00,60.92) J-End (54.79,60.92)

Beam Size (User Selected) = W30X99 Fy = 50.0 ksi
Total Beam Length (ft) = 54.79
Mp (kip-ft) = 1300.00

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
13.650	1.02	0.00	0.0	0.00	0.00	0.0	1.98	Snow	0.00
40.000	15.35	0.00	0.0	0.00	0.00	0.0	22.25	Snow	1.24

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.000	0.000	0.0%	Red	0.060
	40.000	0.000	0.000			0.060
2	0.000	0.073	0.000	---	Snow	0.000
	54.790	0.073	0.000			0.000
3	0.000	0.000	0.000	---	Snow	0.000
	1.376	0.000	0.074			0.000
4	0.000	0.000	0.193	---	Snow	0.000
	1.376	0.000	0.131			0.000
5	1.377	0.000	0.074	---	Snow	0.000
	2.752	0.000	0.128			0.000
6	1.377	0.000	0.130	---	Snow	0.000
	2.752	0.000	0.083			0.000
7	2.753	0.000	0.128	---	Snow	0.000
	4.128	0.000	0.166			0.000
8	2.753	0.000	0.083	---	Snow	0.000
	4.128	0.000	0.048			0.000
9	4.129	0.000	0.166	---	Snow	0.000
	6.042	0.000	0.202			0.000
10	4.129	0.000	0.048	---	Snow	0.000
	5.085	0.000	0.030			0.000
11	5.086	0.000	0.030	---	Snow	0.000
	6.042	0.000	0.014			0.000
12	6.043	0.000	0.202	---	Snow	0.000
	7.000	0.000	0.216			0.000
13	6.043	0.000	0.014	---	Snow	0.000
	7.000	0.000	0.000			0.000
14	7.000	0.000	0.216	---	Snow	0.000

Gravity Beam Design

	21.907	0.000	0.216			0.000
15	21.908	0.000	0.216	---	Snow	0.000
	23.821	0.000	0.214			0.000
16	23.822	0.000	0.214	---	Snow	0.000
	25.735	0.000	0.210			0.000
17	23.822	0.000	0.000	---	Snow	0.000
	25.735	0.000	0.006			0.000
18	25.736	0.000	0.210	---	Snow	0.000
	27.650	0.000	0.205			0.000
19	25.736	0.000	0.006	---	Snow	0.000
	27.650	0.000	0.009			0.000
20	27.650	0.000	0.205	---	Snow	0.000
	40.000	0.000	0.205			0.000
21	27.650	0.000	0.009	---	Snow	0.000
	49.000	0.000	0.009			0.000
22	40.000	0.000	0.439	---	Snow	0.000
	43.000	0.000	0.466			0.000
23	40.000	0.000	0.205	---	Snow	0.000
	43.000	0.000	0.091			0.000
24	43.000	0.000	0.467	---	Snow	0.000
	46.000	0.000	0.378			0.000
25	43.000	0.000	0.091	---	Snow	0.000
	46.000	0.000	0.028			0.000
26	46.000	0.000	0.378	---	Snow	0.000
	49.000	0.000	0.210			0.000
27	46.000	0.000	0.028	---	Snow	0.000
	49.000	0.000	0.000			0.000
28	49.000	0.000	0.219	---	Snow	0.000
	54.790	0.000	0.219			0.000
29	0.000	0.003	0.000	---	Snow	0.000
	40.000	0.003	0.000			0.000
30	0.000	0.000	0.005	---	Snow	0.000
	40.000	0.000	0.005			0.000
31	40.000	0.073	0.000	---	Snow	0.000
	54.790	0.073	0.000			0.000
32	0.000	0.099	0.000	---	NonR	0.000
	54.790	0.099	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 62.70 kips 1.00Vn = 463.32 kips

Gravity Beam Design

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	Max +	1.2DL+1.6LL	845.2	40.0	0.0	1.00	0.90	1170.00
Controlling		1.2DL+1.6LL	845.2	40.0	0.0	1.00	0.90	1170.00

REACTIONS (kips):

	Left	**Right**
DL reaction	9.84	17.15
Max +LL reaction	15.84	26.33
Max +total reaction (factored)	37.15	62.70

DEFLECTIONS:

										Ratio
Dead load (in)	at	29.31 ft	=	-0.942	L/D	=	698			
Live load (in)	at	29.31 ft	=	-1.498	L/D	=	439	>	360	0.82
Net Total load (in)	at	29.31 ft	=	-2.440	L/D	=	269	>	240	0.89

Gravity Beam Design

Floor Type: Roof **Beam Number = 198**

SPAN INFORMATION (ft): I-End (197.75,12.00) J-End (197.75,40.00)

Beam Size (Optimum) = W16X31 Fy = 50.0 ksi
Total Beam Length (ft) = 28.00
Mp (kip-ft) = 225.00

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
8.000	1.93	0.00	0.0	0.00	0.00	0.0	3.05	Snow	0.00
16.000	2.38	0.00	0.0	0.00	0.00	0.0	3.60	Snow	0.00

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.000	0.000	0.0%	Red	0.000
	28.000	0.000	0.000			0.000
2	0.000	0.007	0.000	---	Snow	0.000
	28.000	0.007	0.000			0.000
3	0.000	0.000	0.011	---	Snow	0.000
	28.000	0.000	0.011			0.000
4	0.000	0.031	0.000	---	NonR	0.000
	28.000	0.031	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 9.71 kips 1.00Vn = 131.18 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	Max +	1.2DL+1.6LL	89.9	16.0	8.0	1.06	0.90	173.40
Controlling		1.2DL+1.6LL	89.9	16.0	8.0	1.06	0.90	173.40

REACTIONS (kips):

	Left	**Right**
DL reaction	2.93	2.45
Max +LL reaction	3.87	3.08
Max +total reaction (factored)	9.71	7.87

DEFLECTIONS:

												Ratio
Dead load (in)	at	13.86 ft	=	-0.324			L/D	=	1038			
Live load (in)	at	13.86 ft	=	-0.437	<	-0.500	L/D	=	769	>	480	0.87
Net Total load (in)	at	13.86 ft	=	-0.761			L/D	=	442	>	240	0.54

Connection Table File Name: C:\ProgramData\Bentley\Engineering\RAM Structural System\Tables\\AISC15th LRFD SS875 2020-08-28.con

Single shear tab connection FACTORED capacities using 7/8" dia bolts, threads n
ot excluded (A325N) in Std or SSLT holes.
Designed per 15th ed. AISC pgs 10-87 to 10-91
Shear tabs: A36 (3/8" thick)
a = 3" Max (see AISC figure 10-11)
First bolt is located 2.1/2" from top of steel. Top coped shall be limited to 1
".
Engineer must verify that the standard number of bolts will fit in the connecti
on.

User Defined Allowable Connection Values - Factored (kips):

Size	Capacity	Comments
MC8X8.5	20.94	
MC8	33.79	
MC9	33.79	
MC10X6.5	17.78	
MC10X8.4	19.89	
MC10	33.79	
MC12X10.6	33.34	
MC12X14.3	43.87	
MC12	58.72	
MC13	58.72	
MC18	97.87	
C8X11.5	25.74	
C8	33.79	
C9X13.4	27.26	
C9X15	33.34	
C9	33.79	
C10X15.3	28.08	
C10	33.79	
C12X20.7	49.49	
C12	58.72	
C15	78.30	
W8X10	19.89	
W8X13	26.91	

Beam Connection Check

W8X15	28.66
W8X18	26.91
W8X21	29.25
W8X24	28.66
W8X28	33.34
W8X31	33.34
W8	33.79
W10X12	22.23
W10X15	26.91
W10X17	28.08
W10X19	29.25
W10X22	28.08
W10X26	30.42
W10	33.79
W12X14	35.10
W12X16	38.61
W12X19	41.24
W12X22	45.63
W12X26	40.36
W12X30	45.63
W12X35	52.65
W12X40	51.77
W12	58.72
W14X22	40.36
W14X26	44.75
W14X30	47.38
W14X34	50.02
W14X38	54.40
W14X43	53.53
W14	58.72
W16X26	58.50
W16X31	64.35
W16X36	69.03
W16X40	71.37
W16	78.30
W18X35	87.75
W18X40	92.14
W18	97.87
W21	97.87

W24	117.45
W27	137.02
W30	156.60
W33	175.30
W36	193.53
W40	211.75
W44	229.98
	0.00

Load Combinations:

1	1.4DL
2	1.2DL+1.6LL

Floor Type: Hi Roof

Number of Warnings = 0

Floor Type: Roof

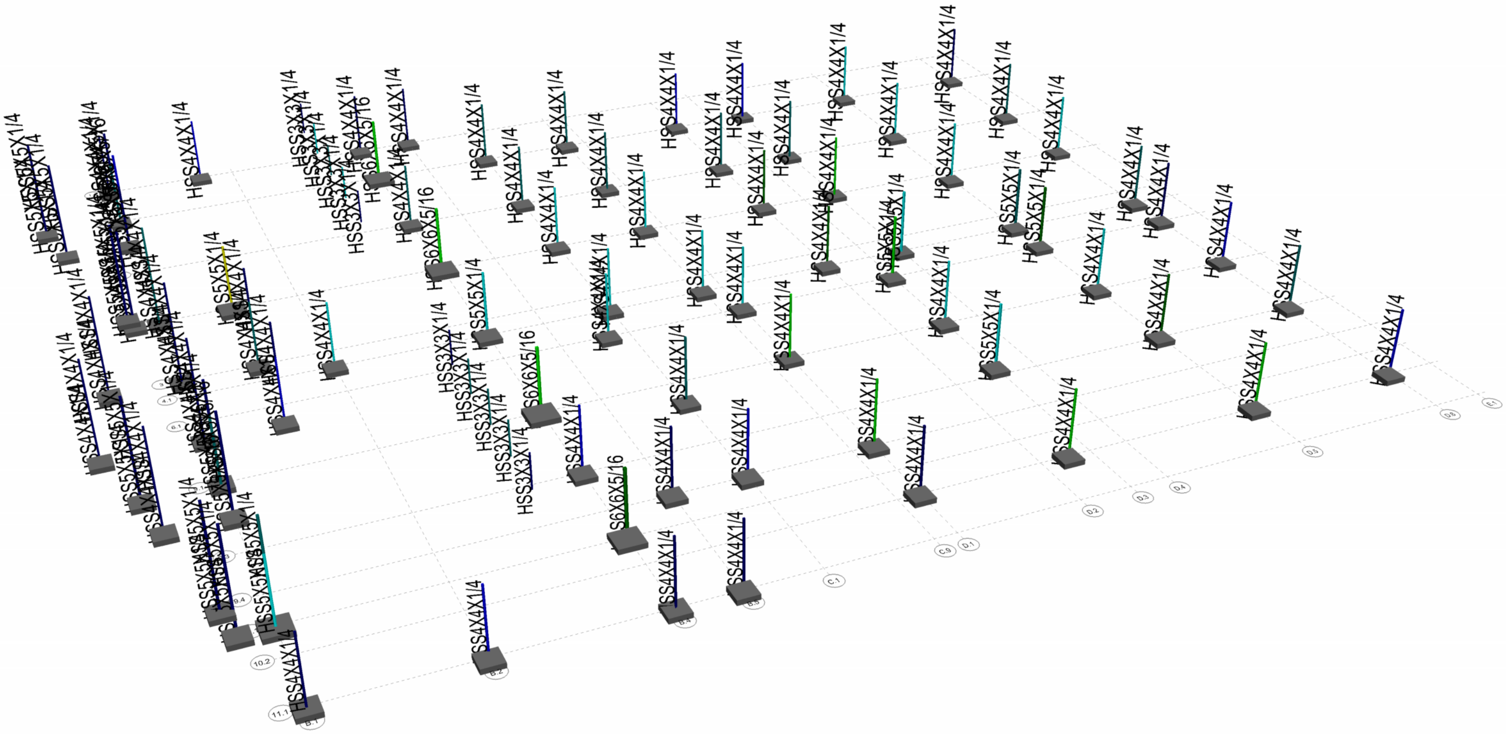
Number of Warnings = 0

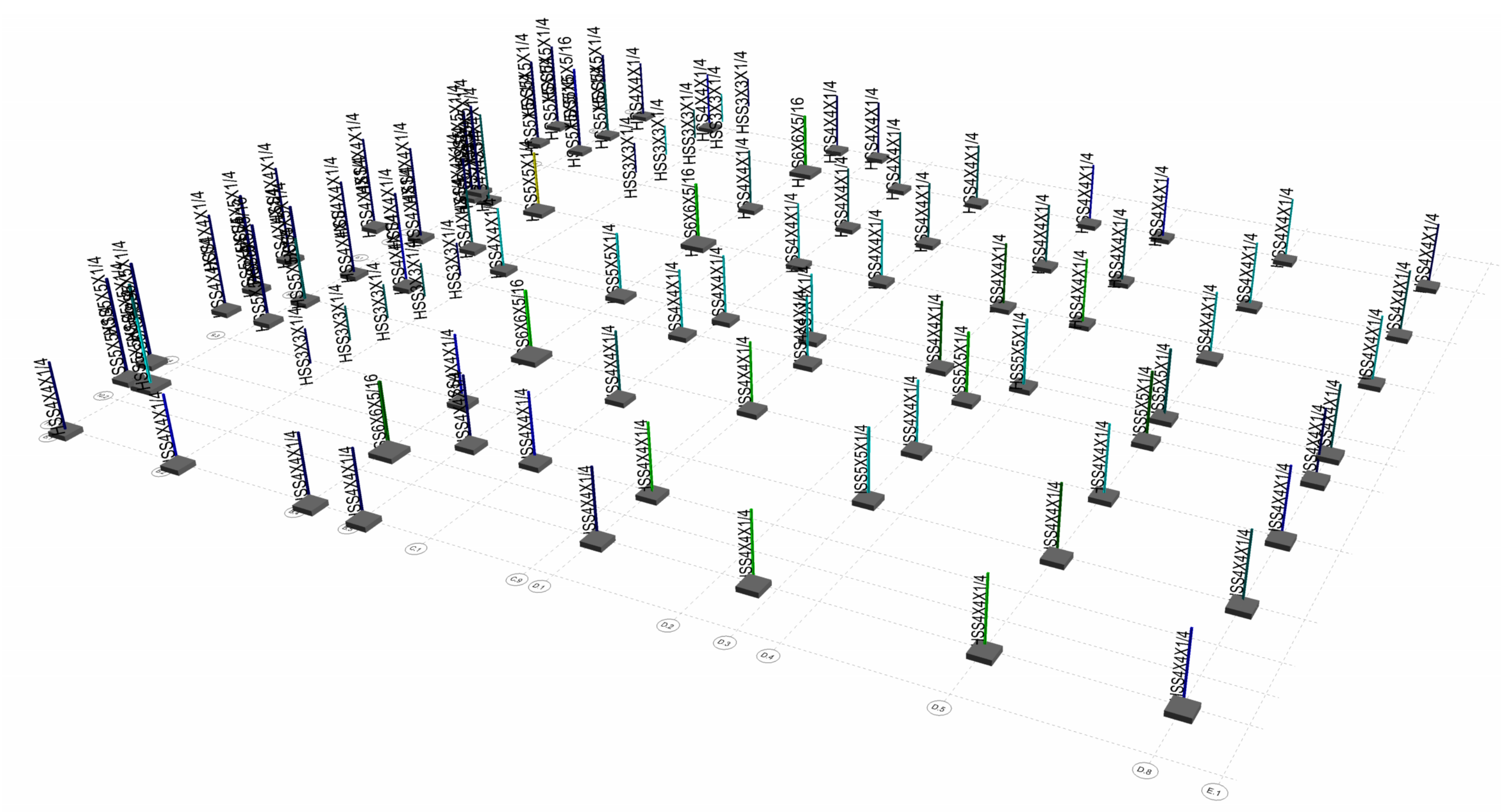
No matching capacity was found in the Connection table for the following sizes:

HSS12X6X1/4
HSS14X6X5/16
HSS18X6X5/16
HSS4X2X1/8
HSS4X4X1/4
HSS5X2X1/8
HSS6X3X3/16
HSS8X6X1/4

Notes:

Beams with cantilevers are not checked at supports under cantilevers.
Frame beams are not checked.





DEMAND/CAPACITY LIMIT FOR STRENGTH : 1.000

Column Line -17.00ft-75.67ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	6.8	1.4	-1.1	1	0.34 Eq H1-1a	0.0	50	HSS4X4X1/4
First	6.9	0.9	-0.8	1	0.30 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line -14.75ft-169.42ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	1.7	0.4	0.3	1	0.03 Eq H1-1b	0.0	50	HSS5X5X1/4
First	2.2	0.0	0.0	1	0.02 Eq Axial	0.0	50	HSS5X5X1/4

Column Line -12.67ft-60.92ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	1.3	0.3	0.2	1	0.02 Eq H1-1b	0.0	50	HSS5X5X1/4
First	1.7	0.0	0.0	1	0.01 Eq Axial	0.0	50	HSS5X5X1/4

Column Line -12.50ft-97.33ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	6.8	1.6	0.9	1	0.34 Eq H1-1a	0.0	50	HSS4X4X1/4
First	7.0	1.1	0.6	1	0.30 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line -12.19ft-157.42ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	1.6	0.2	1.1	2	0.05 Eq H1-1b	0.0	50	HSS5X5X1/4
First	6.9	0.0	0.0	1	0.06 Eq Axial	0.0	50	HSS5X5X1/4

Column Line -10.85ft-50.45ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	0.5	0.2	0.7	2	0.05 Eq H1-1b	0.0	50	HSS4X4X1/4
First	4.4	0.0	0.0	1	0.06 Eq Axial	0.0	50	HSS4X4X1/4

Column Line -6.71ft-26.67ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	0.6	0.1	-0.7	5	0.03 Eq H1-1b	0.0	50	HSS5X5X1/4
First	4.1	0.0	0.0	1	0.03 Eq Axial	0.0	50	HSS5X5X1/4

Column Line -5.50ft-19.75ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	0.8	0.1	-0.2	1	0.01 Eq H1-1b	0.0	50	HSS5X5X1/4
First	1.2	0.0	0.0	1	0.01 Eq Axial	0.0	50	HSS5X5X1/4

Gravity Column Design Summary

Column Line -5.27ft-124.92ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	1.3	0.1	-1.0	5	0.04 Eq H1-1b	0.0	50	HSS5X5X1/4
First	5.6	0.0	0.0	1	0.05 Eq Axial	0.0	50	HSS5X5X1/4

Column Line -4.50ft-121.33ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	0.6	0.1	-0.1	1	0.01 Eq H1-1b	0.0	50	HSS5X5X1/4
First	0.9	0.0	0.0	1	0.01 Eq Axial	0.0	50	HSS5X5X1/4

Column Line B.1-11.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	9.8	1.9	-1.8	1	0.28 Eq H1-1b	0.0	50	HSS4X4X1/4

Column Line B.1-10.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	20.6	8.9	-5.1	2	0.55 Eq H1-1b	0.0	50	HSS5X5X1/4
First	61.5	4.5	0.1	1	0.66 Eq H1-1a	0.0	50	HSS5X5X1/4

Column Line -0.00ft-50.45ft to 0.00ft-50.45ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	24.1	4.9	4.9	1	0.34 Eq H1-1b	0.0	50	HSS5X5X5/16
First	30.5	-0.1	0.7	1	0.23 Eq H1-1a	0.0	50	HSS5X5X5/16

Column Line B.1-9.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	8.8	9.7	-0.4	5	0.38 Eq H1-1b	0.0	50	HSS5X5X1/4
First	45.8	4.8	-0.2	1	0.54 Eq H1-1a	0.0	50	HSS5X5X1/4

Column Line -0.00ft-75.67ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	9.2	-0.7	-2.1	12	0.19 Eq H1-1b	0.0	50	HSS4X4X1/4
First	16.0	0.2	0.4	1	0.26 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line B.1-3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	8.8	0.8	2.1	8	0.20 Eq H1-1b	0.0	50	HSS4X4X1/4
First	16.9	0.2	-0.7	1	0.29 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line B.1-2.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size

2nd	23.8	3.4	-5.5	8	0.60 Eq H1-1b	0.0	50 HSS4X4X1/4
First	36.5	0.4	-0.2	1	0.55 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line 0.00ft-157.42ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
2nd	28.2	5.5	6.0	6	0.40 Eq H1-1b	0.0	50 HSS5X5X5/16
First	36.3	-0.2	0.9	1	0.28 Eq H1-1a	0.0	50 HSS5X5X5/16

Column Line B.1-2.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
2nd	9.8	9.2	-0.8	5	0.38 Eq H1-1b	0.0	50 HSS5X5X1/4
First	46.5	4.6	-0.4	1	0.54 Eq H1-1a	0.0	50 HSS5X5X1/4

Column Line B.1-1.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	6.3	1.2	1.1	1	0.18 Eq H1-1b	0.0	50 HSS4X4X1/4

Column Line 13.65ft-75.67ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
2nd	5.9	-1.0	-2.3	4	0.21 Eq H1-1b	0.0	50 HSS4X4X1/4
First	30.3	-0.2	-0.2	1	0.45 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line 13.65ft-97.33ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
2nd	5.9	-1.0	-3.6	4	0.29 Eq H1-1b	0.0	50 HSS4X4X1/4
First	34.0	-0.2	-0.8	1	0.54 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line 13.65ft-121.33ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	45.2	14.2	4.0	8	0.94 Eq H1-1a	0.0	50 HSS5X5X1/4

Column Line 19.27ft-185.42ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	14.6	1.8	2.8	8	0.44 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line B.2-11.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	15.6	1.4	-3.2	8	0.46 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line B.2-4.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	22.2	7.4	0.0	8	0.69 Eq H1-1a	0.0	50 HSS4X4X1/4

Gravity Column Design Summary

Column Line 40.00ft-19.75ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	8.5	-2.7	-0.1	1	0.36 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-29.88ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	12.7	-4.1	0.0	6	0.52 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-40.00ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	12.6	-4.0	-0.0	10	0.52 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-50.45ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	13.1	-4.2	-0.0	10	0.54 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-60.92ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	8.7	-2.8	0.1	1	0.37 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-121.33ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	9.5	-3.1	-0.1	1	0.40 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-133.42ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	14.7	-4.8	0.0	1	0.61 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-145.42ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	14.4	-4.6	0.0	1	0.59 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-157.42ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	14.7	-4.7	0.0	1	0.60 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line 40.00ft-169.42ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
2nd	9.5	-3.1	0.1	1	0.40 Eq H1-1b	0.0	50	HSS3X3X1/4

Column Line B.4-11.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size

Gravity Column Design Summary

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	12.1	-1.8	-2.2	12	0.31 Eq H1-1b	0.0	50	HSS4X4X1/4

Column Line B.4-10.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	62.1	-24.0	2.0	15	0.75 Eq H1-1a	0.0	50	HSS6X6X5/16

Column Line B.4-9.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	16.2	2.3	-1.7	17	0.43 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line B.4-9.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	75.9	-26.8	-3.8	16	0.90 Eq H1-1a	0.0	50	HSS6X6X5/16

Column Line B.4-4.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	37.1	-7.4	-2.8	16	0.63 Eq H1-1a	0.0	50	HSS5X5X1/4

Column Line B.4-2.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	69.2	-23.3	3.7	15	0.81 Eq H1-1a	0.0	50	HSS6X6X5/16

Column Line B.4-2.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	20.0	1.9	-2.8	17	0.52 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line B.4-2.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	70.4	-24.5	3.6	15	0.83 Eq H1-1a	0.0	50	HSS6X6X5/16

Column Line B.4-1.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	12.7	-2.0	2.3	12	0.33 Eq H1-1b	0.0	50	HSS4X4X1/4

Column Line B.5-11.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	6.3	-0.8	-1.5	1	0.17 Eq H1-1b	0.0	50	HSS4X4X1/4

Column Line B.5-9.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	8.9	-0.9	1.6	12	0.21 Eq H1-1b	0.0	50	HSS4X4X1/4

Column Line B.5-1.1

Gravity Column Design Summary

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	3.8	-0.7	0.7	1	0.11 Eq H1-1b	0.0	50	HSS4X4X1/4

Column Line 75.08ft-81.75ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	22.8	7.1	-0.0	8	0.68 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line C.1-9.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	15.9	1.5	-3.7	8	0.49 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line 79.08ft-54.00ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	24.0	0.0	4.7	6	0.58 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line C.1-4.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	21.6	-2.0	-4.7	12	0.65 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line C.1-2.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	23.5	-1.8	3.6	15	0.61 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line C.1-2.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	21.0	-1.7	-2.9	16	0.53 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line C.1-2.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	17.0	-1.6	3.9	12	0.52 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line C.9-4.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	23.1	2.3	-5.0	8	0.70 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line C.9-2.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	25.2	2.1	3.9	14	0.66 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line C.9-2.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	22.5	2.0	-3.1	17	0.57 Eq H1-1a	0.0	50	HSS4X4X1/4

Gravity Column Design Summary

Column Line C.9-2.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	16.7	1.3	4.2	8	0.51 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.1-10.2

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	9.1	1.7	-1.6	1	0.25 Eq H1-1b	0.0	50	HSS4X4X1/4

Column Line D.1-9.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	28.8	2.8	-5.5	17	0.83 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.1-9.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	31.8	2.5	5.3	14	0.85 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.1-6.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	24.3	-3.2	3.1	12	0.66 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.2-4.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	25.0	2.2	-5.2	8	0.73 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.2-2.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	25.6	-2.5	4.5	15	0.72 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.2-2.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	21.9	-2.1	-2.7	16	0.56 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.2-2.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	16.0	-1.3	3.9	12	0.49 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line 130.44ft-12.00ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	27.6	9.2	0.0	8	0.86 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line 134.54ft-42.50ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	36.4	0.0	11.6	6	0.67 Eq H1-1a	0.0	50 HSS5X5X1/4

Column Line D.3-9.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	27.7	2.3	-3.1	17	0.67 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line D.3-6.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	41.5	-4.1	13.1	1	0.88 Eq H1-1a	0.0	50 HSS5X5X1/4

Column Line D.4-4.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	34.4	4.0	-6.3	8	0.61 Eq H1-1a	0.0	50 HSS5X5X1/4

Column Line D.4-2.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	29.7	3.8	5.0	6	0.87 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line D.4-2.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	21.9	2.2	-2.7	17	0.56 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line D.4-2.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	15.9	1.3	3.9	8	0.49 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line D.5-10.2

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	28.6	-2.8	-6.8	12	0.89 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line D.5-9.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	31.3	-2.6	4.1	15	0.78 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line D.5-9.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	26.5	-2.4	-2.6	16	0.63 Eq H1-1a	0.0	50 HSS4X4X1/4

Column Line D.5-6.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy Size
First	33.6	3.4	10.5	1	0.71 Eq H1-1a	0.0	50 HSS5X5X1/4

Column Line D.5-4.1

Gravity Column Design Summary

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	30.0	-4.0	-6.0	12	0.56 Eq H1-1a	0.0	50	HSS5X5X1/4

Column Line 168.33ft-117.83ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	28.6	0.0	-5.7	10	0.69 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.5-2.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	28.6	2.0	-3.3	17	0.67 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.5-2.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	20.1	1.3	5.1	8	0.61 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.8-10.2

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	14.6	-1.8	-3.6	1	0.48 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.8-9.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	19.5	-3.6	2.3	6	0.57 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.8-9.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	16.2	-3.4	-1.2	10	0.46 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.8-6.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	12.7	-2.8	1.9	1	0.36 Eq H1-1b	0.0	50	HSS4X4X1/4

Column Line D.8-4.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	17.3	-2.7	-3.7	1	0.57 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.8-2.4

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	21.0	-3.4	2.9	6	0.62 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.8-2.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	18.9	-3.2	-2.4	10	0.55 Eq H1-1a	0.0	50	HSS4X4X1/4

Column Line D.8-2.1

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
First	13.5	-1.8	3.1	1	0.38 Eq H1-1b	0.0	50	HSS4X4X1/4

Base Plate Design Summary

BASE PLATES:

Design Code: AISC360-16 LRFD

Plate Fy (ksi)	36.000
Minimum Dimension From Face of Column to Edge of Plate (in)	0.500
Minimum Dimension From Side of Column to Edge of Plate (in)	1.000
Increment of Plate Dimensions (in)	1.500
Increment of Plate Thickness (in)	0.125
Minimum Footing Dimension Parallel to Web (ft)	3.00
Minimum Footing Dimension Perpendicular to Web (ft)	3.00
Keep Base Plate Square:	N

Column Line	**Column Size**	**Fy (ksi)**	**N (in)**	**B (in)**	**tp (in)**
-17.00ft-75.67ft	HSS4X4X1/4	36	6.00	6.00	0.125
-14.75ft-169.42ft	HSS5X5X1/4	36	6.00	7.50	0.125
-12.67ft-60.92ft	HSS5X5X1/4	36	6.00	7.50	0.125
-12.50ft-97.33ft	HSS4X4X1/4	36	6.00	6.00	0.125
-12.19ft-157.42ft	HSS5X5X1/4	36	6.00	7.50	0.250
-10.85ft-50.45ft	HSS3X3X1/8	36	4.50	6.00	0.250
-6.71ft-26.67ft	HSS5X5X1/4	36	6.00	7.50	0.125
-5.50ft-19.75ft	HSS5X5X1/4	36	6.00	7.50	0.125
-5.27ft-124.92ft	HSS5X5X1/4	36	6.00	7.50	0.125
-4.50ft-121.33ft	HSS5X5X1/4	36	6.00	7.50	0.125
B.1-11.1	HSS4X4X1/4	36	6.00	6.00	0.250
B.1-10.1	HSS5X5X1/4	36	6.00	7.50	0.500
-0.00ft-50.45ft to 0.00ft-50.45ft	HSS5X5X5/16	36	6.00	7.50	0.375
B.1-9.1	HSS5X5X1/4	36	6.00	7.50	0.375
-0.00ft-75.67ft	HSS4X4X1/4	36	6.00	6.00	0.250
B.1-3	HSS4X4X1/4	36	6.00	6.00	0.250
B.1-2.4	HSS4X4X1/4	36	6.00	6.00	0.375
0.00ft-157.42ft	HSS5X5X5/16	36	6.00	7.50	0.375
B.1-2.1	HSS5X5X1/4	36	6.00	7.50	0.375
B.1-1.1	HSS4X4X1/4	36	6.00	6.00	0.125
13.65ft-75.67ft	HSS4X4X1/4	36	6.00	6.00	0.375
13.65ft-97.33ft	HSS4X4X1/4	36	6.00	6.00	0.375
13.65ft-121.33ft	HSS5X5X1/4	36	6.00	7.50	0.375
19.27ft-185.42ft	HSS4X4X1/4	36	6.00	6.00	0.250
B.2-11.1	HSS4X4X1/4	36	6.00	6.00	0.250
B.2-4.1	HSS4X4X1/4	36	6.00	6.00	0.250

Base Plate Design Summary

B.4-11.1	HSS4X4X1/4	36	6.00	6.00	0.250
B.4-10.1	HSS6X6X5/16	36	7.50	9.00	0.500
B.4-9.3	HSS4X4X1/4	36	6.00	6.00	0.250
B.4-9.1	HSS6X6X5/16	36	7.50	9.00	0.500
B.4-4.1	HSS5X5X1/4	36	6.00	7.50	0.375
B.4-2.4	HSS6X6X5/16	36	7.50	9.00	0.500
B.4-2.3	HSS4X4X1/4	36	6.00	6.00	0.250
B.4-2.1	HSS6X6X5/16	36	7.50	9.00	0.500
B.4-1.1	HSS4X4X1/4	36	6.00	6.00	0.250
B.5-11.1	HSS4X4X1/4	36	6.00	6.00	0.125
B.5-9.4	HSS4X4X1/4	36	6.00	6.00	0.250
B.5-1.1	HSS4X4X1/4	36	6.00	6.00	0.125
75.08ft-81.75ft	HSS4X4X1/4	36	6.00	6.00	0.250
C.1-9.4	HSS4X4X1/4	36	6.00	6.00	0.250
79.08ft-54.00ft	HSS4X4X1/4	36	6.00	6.00	0.375
C.1-4.1	HSS4X4X1/4	36	6.00	6.00	0.250
C.1-2.4	HSS4X4X1/4	36	6.00	6.00	0.375
C.1-2.3	HSS4X4X1/4	36	6.00	6.00	0.250
C.1-2.1	HSS4X4X1/4	36	6.00	6.00	0.250
C.9-4.1	HSS4X4X1/4	36	6.00	6.00	0.250
C.9-2.4	HSS4X4X1/4	36	6.00	6.00	0.375
C.9-2.3	HSS4X4X1/4	36	6.00	6.00	0.250
C.9-2.1	HSS4X4X1/4	36	6.00	6.00	0.250
D.1-10.2	HSS4X4X1/4	36	6.00	6.00	0.250
D.1-9.4	HSS4X4X1/4	36	6.00	6.00	0.375
D.1-9.1	HSS4X4X1/4	36	6.00	6.00	0.375
D.1-6.1	HSS4X4X1/4	36	6.00	6.00	0.250
D.2-4.1	HSS4X4X1/4	36	6.00	6.00	0.250
D.2-2.4	HSS4X4X1/4	36	6.00	6.00	0.375
D.2-2.3	HSS4X4X1/4	36	6.00	6.00	0.375
D.2-2.1	HSS4X4X1/4	36	6.00	6.00	0.250
130.44ft-12.00ft	HSS4X4X1/4	36	6.00	6.00	0.375
134.54ft-42.50ft	HSS5X5X1/4	36	6.00	7.50	0.375
D.3-9.1	HSS4X4X1/4	36	6.00	6.00	0.375
D.3-6.1	HSS5X5X1/4	36	6.00	7.50	0.375
D.4-4.1	HSS5X5X1/4	36	6.00	7.50	0.375
D.4-2.4	HSS4X4X1/4	36	6.00	6.00	0.375
D.4-2.3	HSS4X4X1/4	36	6.00	6.00	0.375
D.4-2.1	HSS4X4X1/4	36	6.00	6.00	0.250

Base Plate Design Summary

D.5-10.2	HSS4X4X1/4	36	6.00	6.00	0.375
D.5-9.3	HSS4X4X1/4	36	6.00	6.00	0.375
D.5-9.1	HSS4X4X1/4	36	6.00	6.00	0.375
D.5-6.1	HSS5X5X1/4	36	6.00	7.50	0.375
D.5-4.1	HSS5X5X1/4	36	6.00	7.50	0.375
168.33ft-117.83ft	HSS4X4X1/4	36	6.00	6.00	0.375
D.5-2.3	HSS4X4X1/4	36	6.00	6.00	0.375
D.5-2.1	HSS4X4X1/4	36	6.00	6.00	0.250
D.8-10.2	HSS4X4X1/4	36	6.00	6.00	0.250
D.8-9.3	HSS4X4X1/4	36	6.00	6.00	0.250
D.8-9.1	HSS4X4X1/4	36	6.00	6.00	0.250
D.8-6.1	HSS4X4X1/4	36	6.00	6.00	0.250
D.8-4.1	HSS4X4X1/4	36	6.00	6.00	0.250
D.8-2.4	HSS4X4X1/4	36	6.00	6.00	0.250
D.8-2.3	HSS4X4X1/4	36	6.00	6.00	0.250
D.8-2.1	HSS4X4X1/4	36	6.00	6.00	0.250

Use 3/4" thick baseplates, increase size to fit anchor rods.

REINFORCEMENT PROPERTIES TABLE: ramastm

CODE

ACI318-19

FORCES

Forces in Gravity Members from RAM Steel.

DESIGN METHOD

Footings designed based on soil capacity.
Design Pile Caps Based On Pile Capacity.

DESIGN OPTIONS

Include Moment Due to Shear in Column for Spread Footings............................True
Include Moment Due to Shear in Column for Continuous Footings.................... True
Include Moment Due to Shear in Column for Pile Caps......................................True
Include Spread Footing Self-Weight When Checking Soil Stress......................... False
Keep Spread Footing Square During Optimization.. True
Increase Spread Footing Size to Prevent Uplift in Concrete Load Combinations True
Max Width to Depth Ratio for Design of Continuous Footing as Beam................Not Defined

REINFORCEMENT

Clear Bar Spacing-Shear (in)	Max:	CODE	Min:	CODE		
Clear Bar Spacing-Flexure (in)	Max:	CODE	Min:	CODE		
Reinforcement Ratio	Max:	CODE	Min:	CODE		
Clear Bar Cover (in)	Top:	CODE	Bottom:	CODE	Side:	CODE

Bar Sizes Considered - Shear: #3: #4: #5: #6: #7: #8: #9: #10: #11: #14: #18
Bar Sizes Considered - Flexure: #4: #5: #6: #7: #8

REINFORCEMENT SELECTION

Min. number of bars in footing...4
Keep all bars in spread footing layer the same.. True
Adjacent bars in continuous footing may differ in size by.......................... 1
Segment Spacing Increment (in)... 12.00
Shear Bar Spacing Increment (in)..3.00
Selection Method...Min reinf area
For Square Spread Footings Keep Same Quantity and Size Bars for Layer. True

OPTIMIZATION CRITERIA - SPREAD/CONTINUOUS

Min. Dimensions Edge of Base Plate to Edge of Footing (in)........................ 12.00
Min. Plan Dimensions (in)... 24.00

Pan Dimension Increment (in)	3.00
Min. Thickness (in)	12.00
Thickness Increment (in)	1.00
Uplift Safety Factor Minimum Ratio	1.50

OPTIMIZATION CRITERIA - PILE/PILE CAP

Edge to Center of Pile Spacing is Maximum of:	
Multiple of Pile Dimension	0.00
Edge to Center Distance (in)	21.00
Clear from Face of Pile (in)	9.00
Center to Center Spacing of Piles is Maximum of:	
Multiple of Pile Dimension	3.00
Center to Center Distance (in)	36.00
Clear from Face of Pile (in)	24.00
Min. Thickness (in)	24.00
Thickness Increment (in)	6.00

PILE DEFINITIONS

		Capacity		
Label	**Diameter (in)**	**Compression (kip)**	**Tension (kip)**	**Shear (kip)**

PILE CONFIGURATION

	Rows Parallel to	
Label	**Major**	**Minor**
3 Pile Group	3	0
5 Pile Group	5	0
7 Pile Group	7	0
8 Pile Group	8	0
2 Pile Group	2	1
5 Pile Group Sqr. Cap	5	0

SOIL DEFINITIONS

Fixed Capacities (ksf) : 2.00

Spread Footing Design Summary

RAM Foundation v24.00.02.51
Reaveley Engineers
DataBase: DFCM Farmington Office 5
Building Code: IBC

Grid	Orientation Col/Foot	Dimensions (ft) Length	Width	Thick	f'c/fy ksi	Bottom Reinforcement Parallel to Length	Parallel to Width	Top Reinforcement Parallel to Length	Parallel to Width
(B.1 - 11.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.1 - 10.1)	0.00/ 0.00	5.00	5.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.1 - 9.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-0.00 - 75.67)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.1 - 3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.1 - 2.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.1 - 2.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.1 - 1.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(13.65 - 75.67)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(13.65 - 97.33)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.2 - 11.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.2 - 4.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(19.27 - 185.42)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.4 - 11.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.4 - 10.1)	0.00/ 0.00	5.00	5.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.4 - 9.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.4 - 9.1)	0.00/ 0.00	5.50	5.50	1.08	3.00/60.00	8-#4	8-#4	None	None
(B.4 - 4.1)	0.00/ 0.00	4.50	4.50	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.4 - 2.4)	0.00/ 0.00	5.50	5.50	1.08	3.00/60.00	8-#4	8-#4	None	None
(B.4 - 2.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.4 - 2.1)	0.00/ 0.00	5.50	5.50	1.08	3.00/60.00	8-#4	8-#4	None	None
(B.4 - 1.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.5 - 11.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.5 - 9.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(B.5 - 1.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.1 - 9.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.1 - 4.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.1 - 2.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.1 - 2.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.1 - 2.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.9 - 4.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.9 - 2.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.9 - 2.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(C.9 - 2.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.1 - 10.2)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.1 - 9.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.1 - 9.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.1 - 6.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.2 - 4.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.2 - 2.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.2 - 2.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.2 - 2.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(134.54 - 42.50)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.3 - 9.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.3 - 6.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.4 - 4.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.4 - 2.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.4 - 2.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None

Spread Footing Design Summary

RAM Foundation v24.00.02.51
Reaveley Engineers
DataBase: DFCM Farmington Office 5
Building Code: IBC

(D.4 - 2.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.5 - 10.2)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.5 - 9.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.5 - 9.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.5 - 6.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.5 - 4.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.5 - 2.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.8 - 10.2)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.8 - 9.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.8 - 9.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.8 - 6.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.8 - 4.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.8 - 2.4)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.8 - 2.3)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.8 - 2.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-14.75 - 169.42)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-12.19 - 157.42)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-12.50 - 97.33)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-17.00 - 75.67)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-12.67 - 60.92)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-6.71 - 26.67)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-5.27 - 124.92)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(79.08 - 54.00)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(0.00 - 157.42)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(0.00 - 50.45)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(168.33 - 117.83)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(75.08 - 81.75)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(130.44 - 12.00)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(D.5 - 2.1)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-4.50 - 121.33)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-5.50 - 19.75)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(13.65 - 121.33)	0.00/ 0.00	5.00	5.00	1.00	3.00/60.00	7-#4	7-#4	None	None
(-10.85 - 50.45)	0.00/ 0.00	4.00	4.00	1.00	3.00/60.00	7-#4	7-#4	None	None

Note: Number between () in reinforcement is quantity of bars in center strip of rectangular footing

RAM Structural System V24.00.02.51.
Reaveley Engineers

DataBase: DFCM Farmington Office 5   04/03/25 11:49:39

Loads and Applied Forces

LOAD CASE: EQK

Seismic ASCE 7-16 Equivalent Lateral Force
Importance Factor: 1.00 TL: 8.00 s
Site Class D: Stiff Soil
Ss: 1.338 g S1: 0.494 g
Fa: 1.000 Fv: 1.806 SDs: 0.892 g SD1: 0.595 g
Risk Category: II Seismic Design Category: D
Provisions for: Force
Ground Level: Base

Dir	Eccent	R	Ta Equation	Building Period-T
X	+ And -	7.00	Std,Ct=0.020,x=0.75	Use Ta
Y	+ And -	7.00	Std,Ct=0.020,x=0.75	Use Ta

Dir	Ta	Cu	T	T - used	Cs Eq12.8-2	Cs - used	k
X	0.186	1.400	0.186	0.186	0.127	0.127	1.000

Dir	Ta	Cu	T	T - used	Cs Eq12.8-2	Cs - used	k
Y	0.186	1.400	0.186	0.186	0.127	0.127	1.000

Exception 2 per Section 11.4.8 is applied for site class D with S1 > 0.2

Total Building Weight (kips) = 891.05

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
2nd	1	19.50	0.00	0.00	15.66	149.05
2nd	2	19.50	0.00	0.00	-2.03	87.34
2nd	3	19.50	0.00	0.00	14.95	43.00
First	1	13.00	113.54	0.00	94.48	99.91

APPLIED STORY FORCES

Type: EQ_ASCE716_X_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
2nd	19.50	0.00	0.00
First	13.00	113.54	0.00
		113.54	0.00

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_X_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
2nd	1	19.50	0.00	0.00	15.66	144.14
2nd	2	19.50	0.00	0.00	-2.03	85.07
2nd	3	19.50	0.00	0.00	14.95	38.78
First	1	13.00	113.54	0.00	94.48	82.87

APPLIED STORY FORCES

Type: EQ_ASCE716_X_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
2nd	19.50	0.00	0.00
First	13.00	113.54	0.00
		113.54	0.00

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
2nd	1	19.50	0.00	0.00	18.43	146.59
2nd	2	19.50	0.00	0.00	-0.44	86.20
2nd	3	19.50	0.00	0.00	17.62	40.89
First	1	13.00	0.00	113.54	103.60	91.39

APPLIED STORY FORCES

Type: EQ_ASCE716_Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
2nd	19.50	0.00	0.00
First	13.00	0.00	113.54

0.00	113.54

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE716_Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
2nd	1	19.50	0.00	0.00	12.88	146.59
2nd	2	19.50	0.00	0.00	-3.62	86.20
2nd	3	19.50	0.00	0.00	12.28	40.89
First	1	13.00	0.00	113.54	85.37	91.39

APPLIED STORY FORCES

Type: EQ_ASCE716_Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
2nd	19.50	0.00	0.00
First	13.00	0.00	113.54
		0.00	113.54

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

LOAD CASE: W

ASCE 7-16
Exempt from Torsional Cases 2 and 4 per Appendix D.
Exposure: C
Basic Wind Speed (mph): 140.0
Apply Directionality Factor, Kd = 0.85
Use Topography Factor, Kzt: 1.00
Ground Elevation Factor, Ke: 1.00
Use Calculated Frequency for X-Dir.
Use Calculated Frequency for Y-Dir.
Gust Factor for Rigid Structures, G: Use Calculated G for X-Dir.
Gust Factor for Rigid Structures, G: Use Calculated G for Y-Dir.
Damping Ratio for Flexible Structures= 0.01
Mean Roof Height in X-Dir. (ft): Top Story Height + Parapet = 22.00
Mean Roof Height in Y-Dir. (ft): Top Story Height + Parapet = 22.00
Ground Level for X-Dir.: Base
Ground Level for Y-Dir.: Base

WIND PRESSURES:

X-Direction: Natural Frequency = 1.575 Structure is Rigid
Y-Direction: Natural Frequency = 1.571 Structure is Rigid
CpWindward = 0.80
qLeeward (qh X-Dir.) = 39.24 psf
qLeeward (qh Y-Dir.) = 39.24 psf
GCpn (Parapet): Windward = 1.50 Leeward = -1.00

X-Direction:

Height (ft)	Kz	Kzt	qz (psf)	Gust Factor G	CpLeeward	Pressure (psf)
22.00	0.920	1.000	39.245	----	----	98.112
19.50	0.897	1.000	38.261	0.851	-0.500	42.731
22.00	0.920	1.000	39.245	----	----	98.112
19.50	0.897	1.000	38.261	0.851	-0.500	42.731
22.00	0.920	1.000	39.245	----	----	98.112
19.50	0.897	1.000	38.261	0.851	-0.500	42.731
15.00	0.849	1.000	36.205	----	----	90.511
13.00	0.849	1.000	36.205	0.843	-0.487	40.540
0.00	0.849	1.000	36.205	0.843	-0.487	40.540

Y-Direction:

Height (ft)	Kz	Kzt	qz (psf)	Gust Factor G	CpLeeward	Pressure (psf)

22.00	0.920	1.000	39.245	----	----	98.112
19.50	0.897	1.000	38.261	0.875	-0.270	36.079
22.00	0.920	1.000	39.245	----	----	98.112
19.50	0.897	1.000	38.261	0.875	-0.270	36.079
22.00	0.920	1.000	39.245	----	----	98.112
19.50	0.897	1.000	38.261	0.875	-0.270	36.079
15.00	0.849	1.000	36.205	----	----	90.511
13.00	0.849	1.000	36.205	0.841	-0.500	40.865
0.00	0.849	1.000	36.205	0.841	-0.500	40.865

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_X

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
2nd	1	19.50	0.00	0.00	12.77	145.38
2nd	2	19.50	0.00	0.00	-1.73	86.50
2nd	3	19.50	0.00	0.00	13.82	40.33
First	1	13.00	121.02	0.00	67.03	93.36

APPLIED STORY FORCES

Type: Wind_ASCE716_1_X

Level	Ht	Fx	Fy
	ft	kips	kips
2nd	19.50	0.00	0.00
First	13.00	121.02	0.00
		121.02	0.00

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_1_Y

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
2nd	1	19.50	0.00	0.00	9.74	145.38
2nd	2	19.50	0.00	0.00	-3.67	86.50
2nd	3	19.50	0.00	0.00	11.08	40.33
First	1	13.00	0.00	149.04	61.46	92.54

APPLIED STORY FORCES

Type: Wind_ASCE716_1_Y

Level	Ht	Fx	Fy
	ft	kips	kips
2nd	19.50	0.00	0.00
First	13.00	0.00	149.04
		0.00	149.04

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X+Y

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
2nd	1	19.50	0.00	0.00	9.74	145.38
2nd	2	19.50	0.00	0.00	-3.67	86.50
2nd	3	19.50	0.00	0.00	11.08	40.33
First	1	13.00	96.30	107.55	63.70	92.80

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X+Y

Level	Ht	Fx	Fy
	ft	kips	kips
2nd	19.50	0.00	0.00
First	13.00	96.30	107.55
		96.30	107.55

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE716_3_X-Y

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
2nd	1	19.50	0.00	-0.00	9.74	145.38
2nd	2	19.50	0.00	-0.00	-3.67	86.50
2nd	3	19.50	0.00	-0.00	11.08	40.33

First	1	13.00	96.30	-107.55	63.70	92.80

APPLIED STORY FORCES

Type: Wind_ASCE716_3_X-Y

Level	Ht	Fx	Fy
	ft	kips	kips
2nd	19.50	0.00	0.00
First	13.00	96.30	-107.55
		________	________
		96.30	-107.55

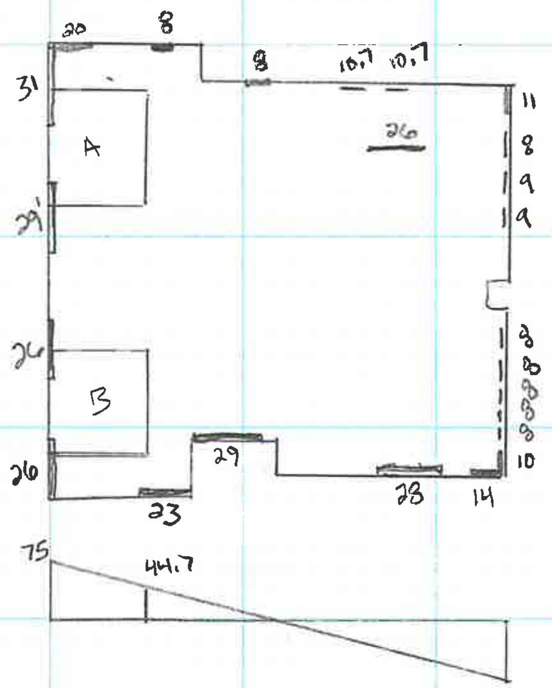
Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

REAVELEY Engineers

THE STRENGTH BEHIND YOUR VISION

PROJECT DATE BY

FARMINGTON



SEISMIC $V = 114^k$ (E)

WIND $V_x = 121^k$ (w)

$V_y = 149^k$

$w_x = \frac{121}{188} = .64$ KLF

$M_x = \frac{1}{8}(.64)(159)^2 = 2022$ FT·K

$F_{CH} = 2022/187 \quad 10.8^k$

$w_y = \frac{149}{198'} = .75$ KLF

$M_y = 1/8(.75)(198)^2 = 3675$ FT·K

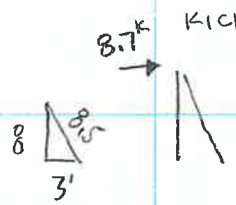
$F_{CH} = 3675/142 = 26^k$

DIAPH. SHEAR @ POP-UPS $V = 44.7^k$ (w)

$= 68^k$ $(\Omega_o E)$

@ POP-UP A $V = 68\left(\frac{47}{185}\right) = 17.3^k$

B V $= 15.1^k$



KICKER $P_u = 8.7\left(\frac{8.5}{3}\right) = 25^k$

$kl = 7'$

HSS3x3x3/16 $\phi P_n = 57^k > 25$ OK

$l = 4"$ $U = .72$ $A_n = 1.89 - .1875(\frac{1}{2})(2) = 1.7$

$\phi P_n = .75(62)(.72)(1.7) = 57^k$ OK

SHEARWALL GRID 1/2

$l = 20 + 8 + 8 + 10.7 + 10.7 + 26 = 83.3'$

$V = 61^k\ (W) \quad 57^k\ (E)$

$36^k\ (.6W) \quad 40^k\ (.7E)$

$v = 40/83.3 = 480$ PLF $(.7E)$

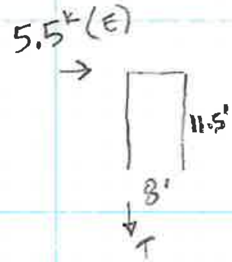
$7/16''$ SHEATHING 16 GA #8@4"/12"

$V_{ALL} = .9\left(\frac{1410}{2.5}\right) = 508 > 480$ OK

FIRE TREATED

$\Omega_E = \frac{1.1(.9)(1410)+230}{.9(1410)}$

$= 1.28$



$W_W = 8_{PSF}\{8(15) + 2.7(6)\} = 1.1^k$

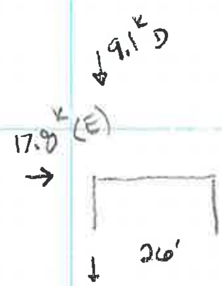
$\Omega_o T_u = \frac{2(5.5)(11.5) - .73(1.1)(4)}{7.5'} = 16.4^k$

S/HDU11 $\quad \phi T_N = 19.4^k$

(2) 16GA

TRANSF. TO REBAR $\quad A_{REQ'D} = \frac{16.4}{.75(60)} = .36\ \text{IN}^2$

(2) #4



$W_W = 2.7^k$

SHEAR TRANSF. TO COLUMN $\quad \Omega_o V = \frac{2(17.8)(11.5) - .73(2.7)(13)}{26.7} = 14.4^k$

16GA TO COL $\quad l_{REQ'D} = \frac{14.4}{.985} = 15''$.

2@16" EA. SIDE $\quad l = 11'\left(4 \times \frac{12}{16}\right) = 33''$ OK

REAVELEY Engineers

THE STRENGTH BEHIND YOUR VISION

PROJECT DATE BY

SHEARWALL

- GRID F

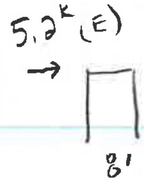
$l = 6(8)+9+9+10+11 = 87'$

$V = 75^k$ (W) 57^k (E)

$= 45^k$ (.6W) 40^k (.7E)

$v = 45/87 = 517$ PLF (.6W) $v_{ALL} = 508$ #8@4" OK 1.8%

$= 460$ PLF (.7E)



$w_w = 1.1^k$

$\Omega_o T_u = \dfrac{2(5.2)(11.5') - .73(1.1)(4)}{7.5} = 15.6^k$

S/HDU 9 $\phi T_N = 15.96^k$

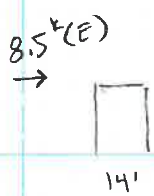
(2) 16 GA

- GRID 8/9 $l = 14+28+29+23 = 94'$

$V = 61^k$ (W) 57^k (E)

36^k (.6W) 40^k (.7E)

$v = 40/94 = 426$ PLF #8@4"



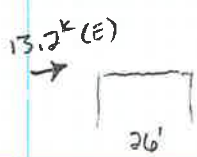
$w_w = 8_{PSF}(14)(15) = 1.7^k$

$\Omega_o T_u = \dfrac{2(8.5)(11.5) - .73(1.7)(7')}{13.5} = 13.8^k$

S/HDU 9

- GRID B $l = 26+26+29+31 = 112'$

$v = 45/112 = 402$ PLF (.6W) #8@4"



$w_w = 8_{PSF}(21')(26) = 4.4^k$

$\Omega_o T_u = \dfrac{2(13.2)(11.5) - .73(4.4)(13)}{25.5} = 10.3^k$

S/HDU 9

REAVELEY Engineers

Steel LRFD Combined Loading Design

AISC 360 15th Ed/AISC 341 3rd Ed

Project: Farmington   **Date:** Sep-18

Location: W12x14 chord   **Engineer:**

Loading Criteria   **Beam/Column is Acceptable**

Pu=	26.0 k	Mu_x=	15.0 kft	Mu_y=	0.0 kft
(AXIAL COMPRESSION)		Vu_x=	10.00 k	Vu_y=	0.00 k

Seismic= No

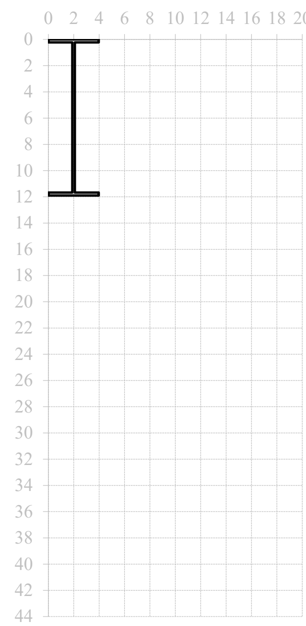
Member information   Member Size: **W12x14**   Fy= 50 ksi

A_g=	4.16 in²	Wt=	14.00 plf	T=	10.850 in	c=	1.00
d=	11.90 in	r_x=	4.62 in	r_y=	0.753 in	h_o=	11.7 in⁴
b=	3.97 in	I_x=	89 in⁴	I_y=	2.360 in⁴	r_{ts}=	0.961 in⁴
t_w=	0.200 in	S_x=	14.9 in³	S_y=	1.190 in⁴	J=	0.07 in⁴
t_f=	0.225 in	Z_x=	17.4 in³	Z_y=	1.900 in³	C_w=	80.4 in⁶
		b/t(act)=	8.82	h/t(act)=	54.30		

Axial Criteria   **Slender**

				Flange Local		**Web Local**	
K_xL_x=	14.00 ft	K_yL_y=	2.00 ft				
K_xL_x/r_x=	36.4	K_yL_y/r_y=	31.9	λ(b/t)=	8.82	λ(h/t)=	54.30
ϕ=	**0.9**			λ_c,flange=	13.49	λ_c,web=	35.88
F_{cr}=	15.26 ksi						
ϕP_n=	**57.1 k**	**Torsional**		K_zL_z=	14.00 ft	F_{cr}=	NA

Flexural Criteria (Strong Orientation)   **Moderately Ductile**



Yielding		**Flange Local**		**Web Local**	
M_{px}=	72.5 kft	λ(b/t)=	8.82	λ(h/t)=	54.30
Lateral Torsional		λ_p(b/t)=	9.15	λ_p(h/t)=	90.55
L_{by}=	2.00 ft	λ_r(b/t)=	24.08	λ_r(h/t)=	137.27
C_{bx}=	1.00	Flange=	Compact	Web=	Compact
L_{py}=	2.66 ft				
L_{ry}=	7.73 ft			Composite Capacity=	No
M_{nx}=	72.5 kft	**ϕ=**	**0.9**	$\phi_c M_{nx}$=	
$\phi_c M_{nx}$=	**65.3 kft**				

Flexural Criteria (Weak Orientation)   **Moderately Ductile**

Yielding		**Flange Local**	
M_{py}=	7.9 kft	λ(b/t)=	8.82
M_{ny}=	7.9 kft	λ_p(b/t)=	9.15
ϕ=	**0.9**	λ_r(b/t)=	24.08
$\phi_c M_{ny}$=	**7.1 kft**	Flange=	Compact

Combined Forces

$P_u/\phi P_n$=	0.455	>=0.2	Use EQ H1-1a		
	P	M_x	M_y		
	0.455	0.204	0.000	**0.659**	<1.0

Shear Criteria

Strong Orientation   **Acceptable**

A_{wx}=	2.4	C_v=	1			
ϕ_v=	0.9	**$\phi_v V_{nx}$=**	**64.26**	**>**	**10.00**	**$=V_{ux}$**

Weak Orientation   **Acceptable**

A_{wy}=	1.8	Cv=	1

Steel LRFD Combined Loading Design

AISC 360 15th Ed/AISC 341 3rd Ed

REAVELEY Engineers

Project: Farmington **Date:** Sep-18
Location: W14x22 chord **Engineer:**

Loading Criteria — Beam/Column is Acceptable

Pu=	25.0 k	Mu_x=	34.0 kft	Mu_y=	0.0 kft
(AXIAL COMPRESSION)		Vu_x=	10.00 k	Vu_y=	0.00 k

Seismic= No

Member information

Member Size: **W14x22** Fy= 50 ksi

A_g=	6.49 in²	Wt=	22.00 plf	T=	12.230 in	c=	1.00
d=	13.70 in	r_x=	5.54 in	r_y=	1.040 in	h_o=	13.4 in⁴
b=	5.00 in	I_x=	199 in⁴	I_y=	7.000 in⁴	r_{ts}=	1.270 in⁴
t_w=	0.230 in	S_x=	29.0 in³	S_y=	2.800 in⁴	J=	0.21 in⁴
t_f=	0.335 in	Z_x=	33.2 in³	Z_y=	4.390 in³	C_w=	314.0 in⁶
		b/t(act)=	7.46	h/t(act)=	53.30		

Axial Criteria

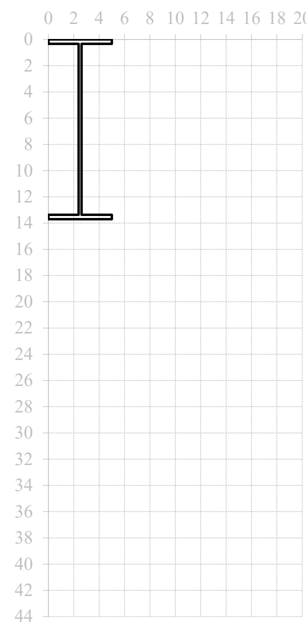
Slender

K_xL_x=	32.00 ft	K_yL_y=	2.00 ft	**Flange Local**		**Web Local**	
K_xL_x/r_x=	69.3	K_yL_y/r_y=	23.1	λ(b/t)=	7.46	λ(h/t)=	53.30
ϕ=	**0.9**			λ_c,flange=	13.49	λ_c,web=	35.88
F_{cr}=	11.53 ksi						
ϕP_n=	**67.4 k**	**Torsional**		K_zL_z=	32.00 ft	F_{cr}=	NA

Flexural Criteria (Strong Orientation)

Moderately Ductile

Yielding		**Flange Local**		**Web Local**	
M_{px}=	138.3 kft	λ(b/t)=	7.46	λ(h/t)=	53.30
Lateral Torsional		λ_p(b/t)=	9.15	λ_p(h/t)=	90.55
L_{by}=	2.00 ft	λ_r(b/t)=	24.08	λ_r(h/t)=	137.27
C_{bx}=	1.00	Flange=	Compact	Web=	Compact
L_{py}=	3.67 ft				
L_{ry}=	10.43 ft			Composite Capacity=	No
M_{nx}=	138.3 kft	**ϕ=**	**0.9**	$\phi_c M_{nx}$=	
$\phi_c M_{nx}$=	**124.5 kft**				



Flexural Criteria (Weak Orientation)

Moderately Ductile

Yielding		**Flange Local**	
M_{py}=	18.3 kft	λ(b/t)=	7.46
M_{ny}=	18.3 kft	λ_p(b/t)=	9.15
ϕ=	**0.9**	λ_r(b/t)=	24.08
$\phi_c M_{ny}$=	**16.5 kft**	Flange=	Compact

Combined Forces

$P_u/\phi P_n$=	0.371	>=0.2	Use EQ H1-1a		
	P	M_x	M_y		
	0.371	0.243	0.000	**0.614**	<1.0

Shear Criteria

Strong Orientation — **Acceptable**

A_{wx}=	3.2	C_v=	1			
ϕ_v=	1	**$\phi_v V_{nx}$=**	**94.53**	**>**	**10.00**	**$=V_{ux}$**

Weak Orientation — **Acceptable**

A_{wy}=	3.4	Cv=	1

REAVELEY Engineers

Calculation Sheet #________

Bolted Collector/Chord Connection

AISC 360/341

PROJECT NAME: Farmington **ENGINEER:** rmm

LOCATION: Roof Chord **DATE:** Apr-25

Beam Size:	W12X14	Bolt Size/Type:	7/8"	A325N
Beam Material:	A992 Gr. 50			
Coped Top Flange:	Yes	Rows of Bolts:	3	
Cope Depth:	1.0 in.	Columns of Bolts:	1	
Coped Bottom Flange:	No	Eccentricity of Bolt Group (a):	2.8 in.	
		Shear Plate Material:	A36 Gr. 36	
Vertical Load (Vu):	10 kips	Shear Plate Thickness:	3/8	in.
Horizontal Load (Tu):	26 kips	Bolt Spacing:	3.00 in	
Resultant Load:	28 kips	L_{eh}:	1.75 in	(beam)
Resultant Angle:	69.0 deg.		1.75 in	(plate)
Plate Flexure (Mu):	27.5 k-in	Depth to 1st bolt:	2.50 in	(from TOSt)
Bolt Hole Type:	Standard	L_{ev}:	1.50 in	(beam top)
Connection Type:	ST/PT		3.40 in	(beam bott)
Surface Type:	N/A		1.50 in	(plate)
		Shear Plate Height:	9.0 in	
		Weld Size:	1/4	in.

Plate to Support Weld Capacity

a:	0.31
C:	4.279
ϕRn:	116 kips
DCR:	**0.24**

Bolt Group Capacity

s:	3.00 in
e_x:	1.38 in.
C:	2.58
$\phi Rn_{(BOLT)}$:	24.4 kips
ϕRn:	62.7 kips
DCR:	**0.44**

Bolt Bearing Capacity

ϕRn (web):	61.7 kips
ϕRn (plate):	128.5 kips
DCR:	**0.45**

Shear Plate in Flexure

ϕMn (plate):	239 k-in
DCR:	**0.03**

Shear Plate Capacity

Shear Yielding, ϕRn:	72.9 kips	
Tension Yielding, ϕRn:	109.4 kips	
Shear Rupture, ϕRn:	58.7 kips	
Tension Rupture, ϕTn:	94.7 kips	
Block Shear Rupture, ϕRn:	66.0 kips	(Vertical)
Block Shear Rupture, ϕRn:	86.5 kips	(Horiz.)
Combined DCR:	**0.35**	

Beam Web Capacity

Shear Yielding, ϕRn:	36.0 kips	
Tension Yielding, ϕRn:	54.0 kips	
Shear Rupture, ϕRn:	35.1 kips	
Tension Rupture, ϕTn:	58.5 kips	
Block Shear Rupture, ϕRn:	41 kips	(Vertical)
Block Shear Rupture, ϕRn:	54 kips	(Horiz.)
Combined DCR:	**0.56**	

Rotational Ductility Check **OK**

Max plate thick: 0.50 in.

Max DCR: **0.56**

Connection Capacity: **52 kips**

Longitudinal Cross-connection

$U := .11$ $\quad B := 4$ $\quad t := .25$ $\quad t_p := .375$ $\quad l_b := 9$ $\quad F_y := 50$

$Q_f := \left(1 - U^2\right)$ $\quad Q_f = 0.988$

$$\phi R_n := 50 \cdot \frac{t^2}{\left(1 - \frac{t_p}{B}\right)} \left(\frac{\left(2 \cdot l_b\right)}{B} + 4 \cdot Q_f \cdot \sqrt{1 - \frac{.375}{5}}\right) = 28.623$$

$C_d = 4.5$

SHEARWALL DEFLECTION

$t_{STUD} = .054"$

$\omega_1 = 4/6 = .67$

$\omega_2 = .033/.054 = .61$

$\omega_3 = \sqrt{\frac{(11/8)}{2}} = .83$

$\omega_4 = 1$

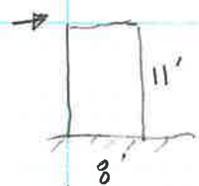
$Gt = 77,500$

$\rho = 1.05$ (OSB)

$\beta = 55$ (OSB)

$b = 96 \quad h = 132$

5.5^K (E)



$v = 57$ LB/IN

$\frac{2vh^3}{3EA_c b} = .031"$

$\omega_1 \omega_2 \frac{vh}{\rho G t} = .086"$

$\omega_1^{(5/4)} \omega_2 \omega_3 \omega_4 \left(\frac{v}{\beta}\right)^2 = .33$

$\frac{h \delta_v}{b} = .12$

7.5^K (E)

15.6^K (ΩE)

S/HDU 11

(2) 600S162-54

$A_c = 1.1$ IN^2

$\delta_v = .243\left(\frac{7.5}{19.4}\right) = .09"$

$\delta = .031 + .086 + .33 + .12 = .567"$

$\times C_d = 2.55"$

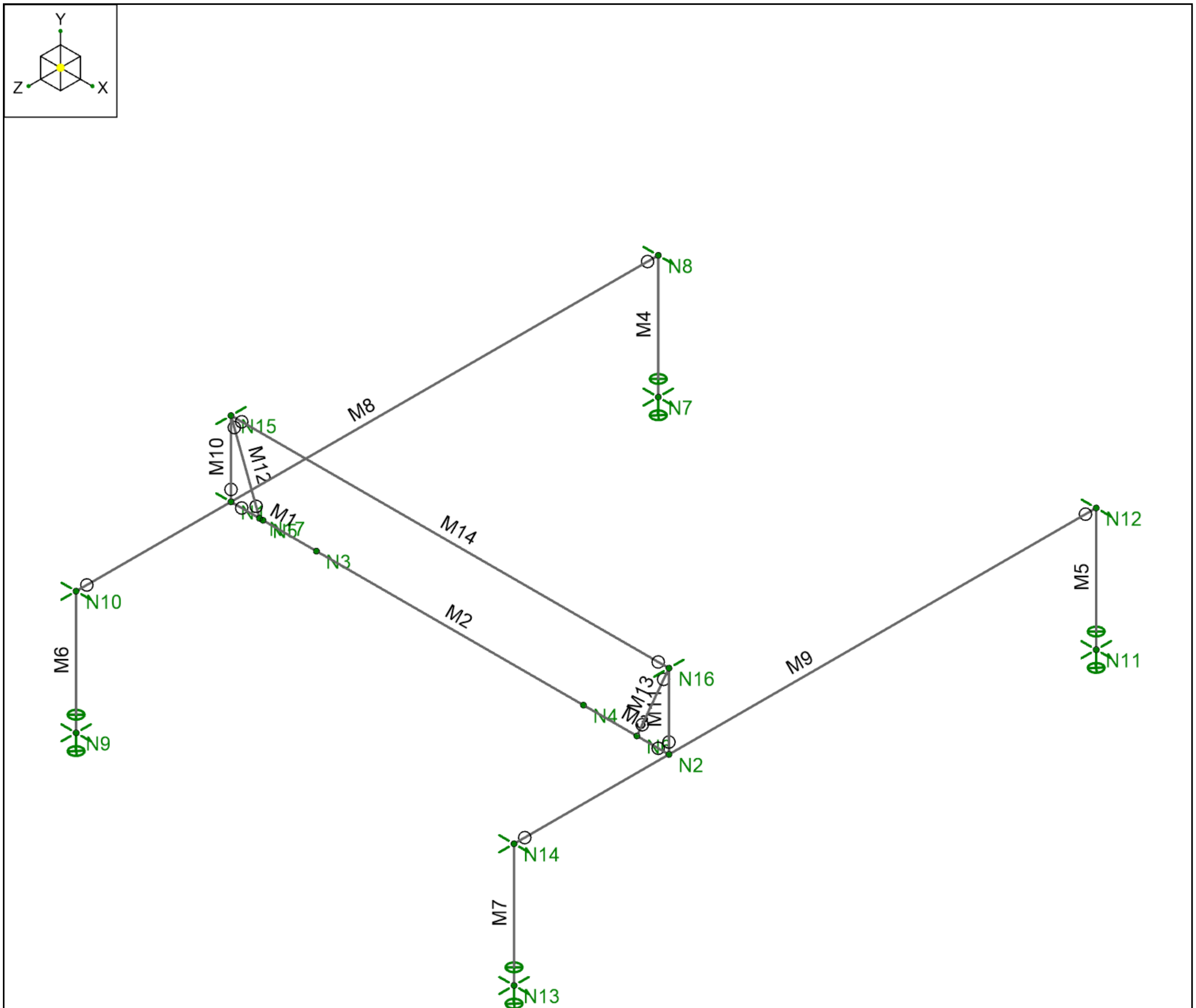
@ 12' $\delta = .619"$

$\times C_d = 2.78" < 2.88$ OK

$.02h = 2.88"$

HIGH ROOF $\delta_{STORY} = .19"$

$\times C_D = .82"$



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rmarostica		Apr 08, 2025
		High Roof Kickers.r3d

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	41	0	0	
3	N3	8	0	0	
4	N4	33	0	0	
5	N5	3	0	0	
6	N6	38	0	0	
7	N7	0	-11.5	-40	
8	N8	0	0	-40	
9	N9	0	-11.5	14.5	
10	N10	0	0	14.5	
11	N11	41	-11.5	-40	
12	N12	41	0	-40	
13	N13	41	-11.5	14.5	
14	N14	41	0	14.5	
15	N15	0	7	0	
16	N16	41	7	0	
17	N17	2.666667	0	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	Y Rot [k-ft/rad]
1	N9	Reaction	Reaction	Fixed	Fixed
2	N7	Reaction	Reaction	Fixed	Fixed
3	N13	Reaction	Reaction	Fixed	Fixed
4	N11	Reaction	Reaction	Fixed	Fixed
5	N1	Reaction			
6	N10	Fixed		Fixed	
7	N14	Fixed		Fixed	
8	N8	Fixed			
9	N12	Fixed			
10	N15			Fixed	
11	N16			Fixed	

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N3	W24X68	Beam	Wide Flange	A992	Typical
2	M2	N3	N4	W24X68	Beam	Wide Flange	A992	Typical
3	M3	N4	N2	W24X68	Beam	Wide Flange	A992	Typical
4	M4	N7	N8	HSS5X5X4	Beam	Tube	A500 Gr.C RECT	Typical
5	M5	N11	N12	HSS5X5X4	Beam	Tube	A500 Gr.C RECT	Typical
6	M6	N9	N10	HSS6X6X5	Beam	Tube	A500 Gr.C RECT	Typical
7	M7	N13	N14	HSS6X6X5	Beam	Tube	A500 Gr.C RECT	Typical
8	M8	N10	N8	W30X99	Beam	Wide Flange	A992	Typical
9	M9	N14	N12	W30X99	Beam	Wide Flange	A992	Typical
10	M10	N1	N15	HSS3X3X4	Beam	Tube	A992	Typical
11	M11	N2	N16	HSS3X3X4	Beam	Tube	A992	Typical
12	M12	N15	N17	HSS3X3X3	Beam	Tube	A992	Typical
13	M13	N16	N6	HSS3X3X3	Beam	Tube	A992	Typical
14	M14	N15	N16	W21X44	Beam	Wide Flange	A992	Typical

Member Advanced Data

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
1	M1	BenPIN		Yes	Default	None
2	M2			Yes	Default	None
3	M3		BenPIN	Yes	Default	None
4	M4			Yes	Default	None
5	M5			Yes	Default	None
6	M6			Yes	Default	None
7	M7			Yes	Default	None
8	M8	BenPIN	BenPIN	Yes	Default	None
9	M9	BenPIN	BenPIN	Yes	Default	None
10	M10	BenPIN		Yes	Default	None
11	M11	BenPIN		Yes	Default	None
12	M12	BenPIN	BenPIN	Yes	Default	None
13	M13	BenPIN	BenPIN	Yes	Default	None
14	M14	BenPIN	BenPIN	Yes	Default	None

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lb y-y [ft]	Lcomp top [ft]	Lcomp bot [ft]	Channel Conn.	a [ft]	Function
1	M1	W24X68	8	8	8	Segment	N/A	N/A	Lateral
2	M2	W24X68	25	8	8	Segment	N/A	N/A	Lateral
3	M3	W24X68	8	8	8	Segment	N/A	N/A	Lateral
4	M4	HSS5X5X4	11.5		Lbyy		N/A	N/A	Lateral
5	M5	HSS5X5X4	11.5		Lbyy		N/A	N/A	Lateral
6	M6	HSS6X6X5	11.5		Lbyy		N/A	N/A	Lateral
7	M7	HSS6X6X5	11.5		Lbyy		N/A	N/A	Lateral
8	M8	W30X99	54.5		2		N/A	N/A	Lateral
9	M9	W30X99	54.5		2		N/A	N/A	Lateral
10	M10	HSS3X3X4	7		Lbyy		N/A	N/A	Lateral
11	M11	HSS3X3X4	7		Lbyy		N/A	N/A	Lateral
12	M12	HSS3X3X3	7.491		Lbyy		N/A	N/A	Lateral
13	M13	HSS3X3X3	7.616		Lbyy		N/A	N/A	Lateral
14	M14	W21X44	41		Lbyy		N/A	N/A	Lateral

Member Point Loads (BLC 1 : D)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M8	Y	-2.4	26
2	M9	Y	-1	41.5

Member Point Loads (BLC 2 : S)

	Member Label	Direction	Magnitude [k, k-ft]	Location [(ft, %)]
1	M8	Y	-3.5	26
2	M9	Y	-2	41.5

Member Distributed Loads (BLC 1 : D)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.54	-0.54	0	%100
2	M2	Y	-0.54	-0.54	0	%100
3	M3	Y	-0.54	-0.54	0	%100

Member Distributed Loads (BLC 2 : S)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M1	Y	-0.57	-0.57	0	%100
2	M2	Y	-0.57	-0.57	0	%100
3	M3	Y	-0.57	-0.57	0	%100

Basic Load Cases

	BLC Description	Category	Nodal	Point	Distributed
1	D	DL	1	2	3
2	S	SL	1	2	3
3	E	EL	2		

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor
1	1.2D+E	Yes	Y	DL	1.2	EL	1		
2	.9D+E	Yes	Y	DL	1	EL	2	SL	
3	1.2D+E+.15S	Yes	Y	DL	1.2	EL	2	SL	0.15

Load Combination Design

	Description	Service	Hot Rolled	Cold Formed	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1	1.2D+E		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	.9D+E		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	1.2D+E+.15S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Node Displacements

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
1	1	N1	0	-0.723	0	-2.668e-3	3.461e-6	0
2	1	N2	0.003	-0.691	0	-2.477e-3	-1.411e-5	0
3	1	N3	0	-0.946	0.003	-2.483e-3	-2.111e-5	-2.522e-3
4	1	N4	0.002	-0.994	0.003	-2.344e-3	2.118e-5	2.743e-3
5	1	N5	-0.001	-0.792	0.001	-2.511e-3	-2.97e-5	-2.241e-3
6	1	N6	0.003	-0.808	0.001	-2.316e-3	2.973e-5	3.208e-3
7	1	N7	0	0	0	0	0	0
8	1	N8	0	-0.007	0	0	0	0
9	1	N9	0	0	0	0	0	0
10	1	N10	0	-0.011	0	0	0	0
11	1	N11	0	0	0	0	0	0
12	1	N12	0	-0.007	0	0	0	0
13	1	N13	0	0	0	0	0	0
14	1	N14	0	-0.011	0	0	0	0
15	1	N15	-0.174	-0.771	0	-3.681e-5	3.608e-4	2.067e-3
16	1	N16	-0.187	-0.704	0	-4.108e-5	-3.691e-4	2.26e-3
17	1	N17	-0.001	-0.782	0.001	-2.512e-3	-3.028e-5	-2.187e-3
18	2	N1	0	-0.671	0	-2.464e-3	3.159e-6	0
19	2	N2	-0.003	-0.507	0	-1.823e-3	8.284e-6	0
20	2	N3	-0.001	-0.797	0.002	-2.209e-3	-1.899e-5	-1.826e-3
21	2	N4	-0.003	-0.834	0.002	-1.814e-3	1.89e-5	2.674e-3
22	2	N5	-0.001	-0.696	0.001	-2.288e-3	-2.702e-5	-1.177e-3
23	2	N6	-0.003	-0.643	0.001	-1.735e-3	2.593e-5	3.519e-3
24	2	N7	0	0	0	0	0	0
25	2	N8	0	-0.007	0	0	0	0

Node Displacements (Continued)

	LC	Node Label	X [in]	Y [in]	Z [in]	X Rotation [rad]	Y Rotation [rad]	Z Rotation [rad]
26	2	N9	0	0	0	0	0	0
27	2	N10	0	-0.011	0	0	0	0
28	2	N11	0	0	0	0	0	0
29	2	N12	0	-0.005	0	0	0	0
30	2	N13	0	0	0	0	0	0
31	2	N14	0	-0.008	0	0	0	0
32	2	N15	-0.35	-0.73	0	-3.356e-5	3.294e-4	4.17e-3
33	2	N16	-0.361	-0.501	0	-3.147e-5	-2.633e-4	4.264e-3
34	2	N17	-0.001	-0.691	0.001	-2.293e-3	-2.756e-5	-1.099e-3
35	3	N1	0	-0.876	0	-3.229e-3	4.162e-6	0
36	3	N2	-0.001	-0.743	0	-2.671e-3	-1.121e-6	0
37	3	N3	-0.001	-1.085	0.003	-2.946e-3	-2.528e-5	-2.66e-3
38	3	N4	-0.001	-1.14	0.003	-2.59e-3	2.525e-5	3.384e-3
39	3	N5	-0.001	-0.93	0.001	-3.017e-3	-3.576e-5	-2.034e-3
40	3	N6	-0.001	-0.903	0.001	-2.519e-3	3.502e-5	4.251e-3
41	3	N7	0	0	0	0	0	0
42	3	N8	0	-0.009	0	0	0	0
43	3	N9	0	0	0	0	0	0
44	3	N10	0	-0.014	0	0	0	0
45	3	N11	0	0	0	0	0	0
46	3	N12	0	-0.008	0	0	0	0
47	3	N13	0	0	0	0	0	0
48	3	N14	0	-0.012	0	0	0	0
49	3	N15	-0.349	-0.945	0	-4.425e-5	4.34e-4	4.151e-3
50	3	N16	-0.364	-0.745	0	-4.52e-5	-3.915e-4	4.319e-3
51	3	N17	-0.001	-0.922	0.001	-3.022e-3	-3.647e-5	-1.948e-3

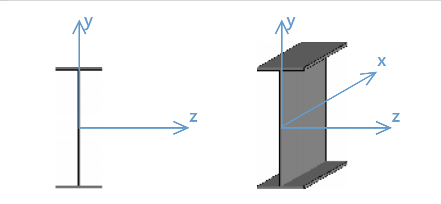
AISC 15TH (360-16): LRFD Member Steel Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	phi*Pnc[k]	phi*Pnt[k]	phi*Mnyy[k-ft]	phi*Mnzz[k-ft]	Cb	Eqn
1	1	M1	W24X68	0.082	2.667	0.068	2.667	y	685.769	904.5	91.875	663.75	1.689	H1-1b
2	1	M2	W24X68	0.129	14.844	0.033	0	y	413.734	904.5	91.875	634.359	1	H1-1b
3	1	M3	W24X68	0.076	0	0.034	5	y	685.769	904.5	91.875	634.359	1	H1-1b
4	1	M4	HSS5X5X4	0.04	11.5	0	11.5	y	133.094	193.5	28.537	28.537	1	H1-1b*
5	1	M5	HSS5X5X4	0.04	11.5	0	11.5	y	133.094	193.5	28.537	28.537	1	H1-1b*
6	1	M6	HSS6X6X5	0.055	11.5	0	11.5	y	222.873	289.35	51	51	1	H1-1b*
7	1	M7	HSS6X6X5	0.056	11.5	0	11.5	y	222.873	289.35	51	51	1	H1-1b*
8	1	M8	W30X99	0.152	14.76	0.027	14.193	y	67.607	1305	144.75	1170	1	H1-1b
9	1	M9	W30X99	0.153	14.76	0.027	14.193	y	67.607	1305	144.75	1170	1	H1-1b
10	1	M10	HSS3X3X4	0.453	7	0.003	7	z	72.373	109.8	9.3	9.3	1	H1-1a
11	1	M11	HSS3X3X4	0.125	7	0.003	7	z	72.373	109.8	9.3	9.3	1	H1-1b*
12	1	M12	HSS3X3X3	0.412	7.491	0.003	7.491	y	54.019	85.05	7.388	7.388	1	H1-1a*
13	1	M13	HSS3X3X3	0.115	7.616	0.003	7.616	y	53.2	85.05	7.388	7.388	1	H1-1b*
14	1	M14	W21X44	0.422	41	0	41	z	19.319	585	38.215	39.032	1	H1-1a*
15	2	M1	W24X68	0.12	2.667	0.094	2.667	y	685.769	904.5	91.875	663.75	1.68	H1-1b
16	2	M2	W24X68	0.121	17.969	0.033	0	y	413.734	904.5	91.875	634.359	1	H1-1b
17	2	M3	W24X68	0.099	0	0.044	8	y	685.769	904.5	91.875	634.359	1	H1-1b
18	2	M4	HSS5X5X4	0.037	11.5	0	11.5	y	133.094	193.5	28.537	28.537	1	H1-1b*
19	2	M5	HSS5X5X4	0.03	11.5	0	11.5	y	133.094	193.5	28.537	28.537	1	H1-1b*
20	2	M6	HSS6X6X5	0.052	11.5	0	11.5	y	222.873	289.35	51	51	1	H1-1b*
21	2	M7	HSS6X6X5	0.041	11.5	0	11.5	y	222.873	289.35	51	51	1	H1-1b*
22	2	M8	W30X99	0.142	14.76	0.025	14.193	y	67.607	1305	144.75	1170	1	H1-1b
23	2	M9	W30X99	0.112	14.76	0.02	14.193	y	67.607	1305	144.75	1170	1	H1-1b
24	2	M10	HSS3X3X4	0.553	7	0.002	7	z	72.373	109.8	9.3	9.3	1	H1-1a
25	2	M11	HSS3X3X4	0.042	7	0.002	7	z	72.373	109.8	9.3	9.3	1	H1-1b*
26	2	M12	HSS3X3X3	0.504	7.491	0.003	7.491	y	54.019	85.05	7.388	7.388	1	H1-1a*

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

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	phi*Pnc[k]	phi*Pnt[k]	phi*Mnyy[k-ft]	phi*Mnzz[k-ft]	Cb	Eqn
27	2	M13	HSS3X3X3	0.094	7.616	0.003	7.616	y	53.2	85.05	7.388	7.388	1	H1-1b*
28	2	M14	W21X44	0.343	41	0	41	z	19.319	585	38.215	39.032	1	H1-1a*
29	3	M1	W24X68	0.131	2.667	0.105	2.667	y	685.769	904.5	91.875	663.75	1.682	H1-1b
30	3	M2	W24X68	0.152	16.406	0.041	0	y	413.734	904.5	91.875	634.359	1	H1-1b
31	3	M3	W24X68	0.11	0	0.038	8	y	685.769	904.5	91.875	634.359	1	H1-1b
32	3	M4	HSS5X5X4	0.048	11.5	0	11.5	y	133.094	193.5	28.537	28.537	1	H1-1b*
33	3	M5	HSS5X5X4	0.044	11.5	0	11.5	y	133.094	193.5	28.537	28.537	1	H1-1b*
34	3	M6	HSS6X6X5	0.067	11.5	0	11.5	y	222.873	289.35	51	51	1	H1-1b*
35	3	M7	HSS6X6X5	0.06	11.5	0	11.5	y	222.873	289.35	51	51	1	H1-1b*
36	3	M8	W30X99	0.185	14.76	0.032	14.193	y	67.607	1305	144.75	1170	1	H1-1b
37	3	M9	W30X99	0.163	14.76	0.029	14.193	y	67.607	1305	144.75	1170	1	H1-1b
38	3	M10	HSS3X3X4	0.643	7	0.003	7	z	72.373	109.8	9.3	9.3	1	H1-1a
39	3	M11	HSS3X3X4	0.016	7	0.003	7	z	72.373	109.8	9.3	9.3	1	H1-1b*
40	3	M12	HSS3X3X3	0.586	7.491	0.004	7.491	y	54.019	85.05	7.388	7.388	1	H1-1a*
41	3	M13	HSS3X3X3	0.015	7.616	0.004	7.616	y	53.2	85.05	7.388	7.388	1	H1-1b*
42	3	M14	W21X44	0.472	41	0	41	z	19.319	585	38.215	39.032	1	H1-1a*

Detail Report: M1 **Unity Check:** 0.131 (axial/bending) **Load Combination:** LC 3: 1.2D+E+.15S



Input Data:

Shape:	W24X68	I Node:	N1
Member Type:	Beam	J Node:	N3
Length (ft):	8	I Release:	BenPIN
Material Type:	Hot Rolled Steel	J Release:	Fixed
Design Rule:	Typical	I Offset (in):	N/A
Number of Internal Sections:	97	J Offset (in):	N/A

Material Properties:

Material:	A992	Therm. Coeff. ($1e^5 °F^{-1}$):	0.65	R_y:	1.1
E (ksi):	29000	Density (k/ft^3):	0.49	F_u (ksi):	65
G (ksi):	11154	F_y (ksi):	50	R_t:	1.1
Nu:	0.3				

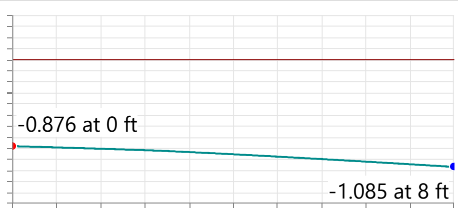
Shape Properties:

d (in):	23.7	Area (in^2):	20.1	S_w (in^4):	68
b_f (in):	8.97	Z_{yy} (in^3):	24.5	r_T (in):	2.26
t_f (in):	0.585	Z_{zz} (in^3):	177	J (in^4):	1.87
t_w (in):	0.415	C_w (in^6):	9430	k_{det} (in):	1.875
I_{yy} (in^4):	70.4	W_{no} (in^2):	51.8	k_{des} (in):	1.09
I_{zz} (in^4):	1830				

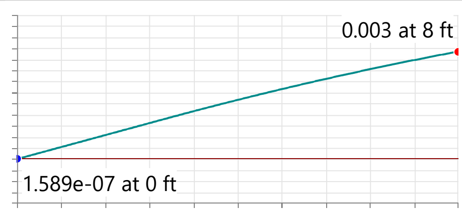
Design Properties:

$L_{b\ y-y}$ (ft):	8	K_{y-y}:	1	Max Defl Ratio:	L/4000
$L_{b\ z-z}$ (ft):	N/A	K_{z-z}:	1	Max Defl Location:	3.083
$L_{comp\ top}$ (ft):	8	y sway:	No	Span:	1
$L_{comp\ bot}$ (ft):	Segment	z sway:	No		
L_{torque} (ft):	N/A	Function:	Lateral		
		Seismic DR:	None		

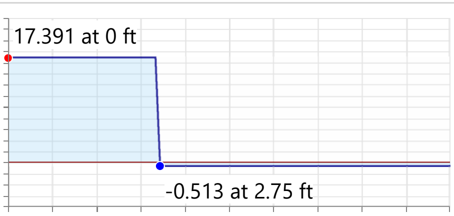
Diagrams:



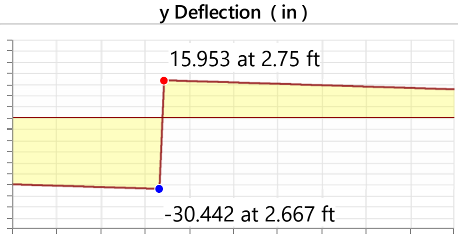
y Deflection (in)



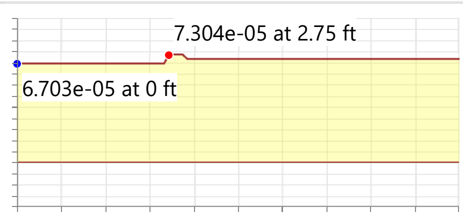
z Deflection (in)



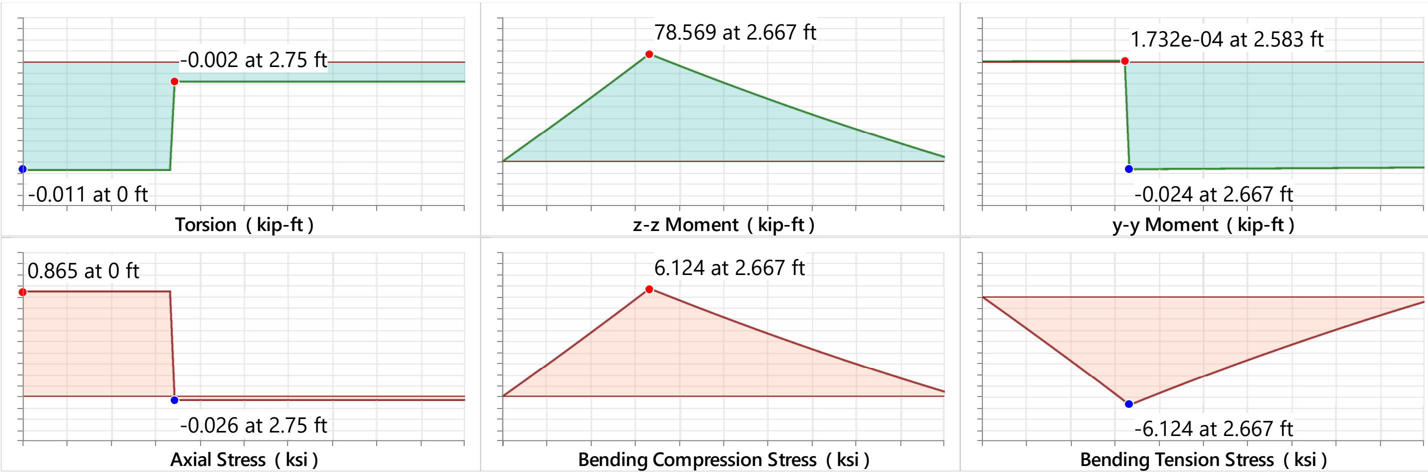
Axial Force (kips)



y Shear Force (kips)



z Shear Force (kips)



AISC 15th (360-16): LRFD Code Check

Limit State	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial				
Applied Loading - Shear + Torsion	-	-	-	-
Axial Tension Analysis	0.000 k	904.5 k	-	-
Axial Compression Analysis	17.391 k	685.769 k	-	-
Flexural Analysis (Strong Axis)	78.569 k-ft	663.75 k-ft	-	-
Flexural Analysis (Weak Axis)	0.024 k-ft	91.875 k-ft	-	-
Shear Analysis (Major Axis y)	30.857 k	295.065 k	0.105	Pass
Shear Analysis (Minor Axis z)	0.444 k	283.362 k	0.002	Pass
Bending & Axial Interaction Check (UC Bending Max)	-	-	0.131	Pass

$\sqrt{I/A}$ Ω_0

16.8^k ←

7.5' 7.8 53

↓45^k @ 3

50 @ 2.5

$W = 797^k$

$V = 99^k$

A 33 20%

$A_{pop} = 4219$

PROJECT	DATE	BY

FARMINGTON

GRID B WIND GIRT

35' SPAN 8.5' TRIB

$w = 18.3\text{PSF}(8.5) = 156\text{PLF}$ (.6W)

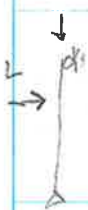
$\frac{L}{.7 \times 240} = 2.5''$ $I_{REQ'D} = 72.7$

HSS12x6x3/8 $I_y = 72.9$

GRID B WIND COLUMN

P

$L = 156\text{PLF}(24') = 3.74^K$ (.6W)



15' L

~18' $\frac{L}{240} = .9''$ $I_{REQ'D} = 14.8$

$P_u = 28^k$

$M_u = \frac{3.74}{.6}\left(\frac{15}{18}\right)(3) + \frac{28}{12} = 18$ FT·K

LIGHT MONITOR

BEAM 13' SPAN 5' TRIB

$w = 5'(15\text{PSF}) + 15 = 90$ PLF D

$5'(21\text{PSF}) = \underline{105}$ PLF S

195

$\frac{L}{240} = .65''$ $I_{y\,REQ'D} = 6.6\text{ IN}^4$

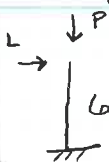
HSS6x4x3/16 $I_y = 8.8$ OK

$w_u = 200$ PLF

$M_u = 4.2$ FT·K $Z_{REQ'D} = 1.1$ $Z_y = 5$ OK

14'-6" SPAN → HSS6x4x1/4

CANT. COL



P L 6'

$L = 38\text{PSF}(3.5')(13') = 1.7^K$ (W)

$= 1.04^K$ (.6W)

$\frac{2L}{.75 \times 240} = .8''$ $I_{REQ'D} = 5.6\text{ IN}^4$

$P_u = 276\text{PLF}(13') = 3.6^K$

$M_u = 1.7(6) + 3.6\left(\frac{6''}{12}\right) = 10.4$ FT·K

HSS4x4x1/4 $I = 7.8$ DCR = .62

PROJECT | DATE | BY

FARMINGTON

SCREEN WALL

WIND COLUMN

18' SPAN 9' TRIB

$W = 21\text{ PSF}(9) = 189\text{ PLF}$

$\frac{L}{240} = .9''$ $I_{REQ'D} = 17.1$

GIRTS OVER OPENING

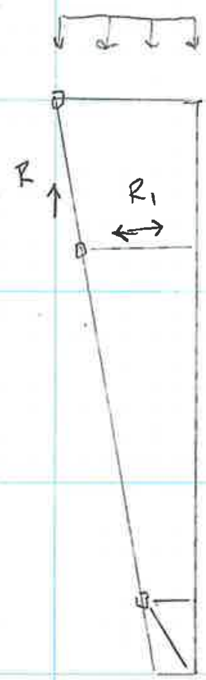
30' SPAN 5' TRIB

$W = 21\text{ PSF}(5) = 105\text{ PLF}$ (.6W)

$\frac{L}{120} = 3''$ $I_{REQ'D} = 22\text{ IN}^4$

HSS8x6x1/4 $I_y = 36.4$

$R = 36\text{ PSF}(6')(12') = 2.6^k$ (W)



$R_1 = 315_{PLF}(21)\left(\frac{10.5}{18}\right) = 3.9^k$ (W)

FORCE IN BRACE $= 2.6\left(\frac{8.5}{6.5}\right) = 3.4^k$

FARMINGTON

17' BRICK LINTEL

GRAVITY $w = 45\,PSF\,(6') = 270\,PLF$

$\frac{L}{600} = .34''$ $I_{x\,REQ'D} = 51.5\ IN^4$

WIND $w = 6'(31.4\,PSF) = 188\ PLF\ (W)$

$= 113\ PLF\ (.6W)$

$\frac{L}{360} = .57''$ $I_{y\,REQ'D} = 12.8\ IN^4$

HSS8x6x1/4 $I_x = 56.6$ $I_y = 36.4$

HSS10x6x1/4 for 19'-4" span

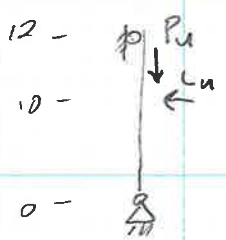
13' LINTEL

$\frac{L}{600} = .26''$ $I_{x\,REQ'D} = 23\ IN^4$

WIND $w = 6'(32\,PSF) = 192\ PLF$

HSS6x6x1/4 $I = 28.6$

POST $P_u = 2.8^K$



$L_u = .188(9.2') = 1.7^K$

$\frac{L}{480} = .3''$ $I_{x\,REQ'D} = 6\ IN^4$

$M_{ux} = 1.7\left(\frac{10}{12}\right)(2) + 2.8\left(\frac{3}{12}\right)$

$= 2.9\ FT{\cdot}K$

$M_{uy} = \frac{1}{2}(2.8)\left(\frac{3''}{12}\right) = .35\ FT{\cdot}K$

HSS6x2x3/16

$P = 2^k$

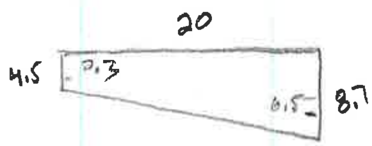
$\frac{3}{8}$ $r = .108$

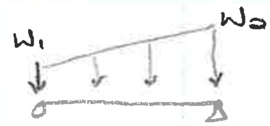
REAVELEY Engineers

THE STRENGTH BEHIND YOUR VISION

PROJECT	DATE	BY

STEEL PLATE SHROUD





FRONT BEAM

$w_1 = 22_{PSF}(4.4') + 12_{PSF}(8') + 24 = 197_{PLF}$ D

$= 22_{PSF}(1.5)(\frac{6}{2.3}) = \underline{86_{PLF}}$ S

283

$w_2 = 22_{PSF}(5.8') + 12(8) + 24 = 248_{PLF}$ D

$= 22(1.5)(\frac{8}{6.5}) = \underline{40_{PLF}}$ S

288

21' SPAN $\frac{l}{600} = .42"$ $I_{x\,REQ'D} = 103\ in^4$

HSS12x6x1/4 $I = 151$

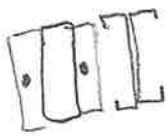
BACK BEAM

$w_1 = 22_{PSF}(.1) + 6_{PSF}(6) + 23 = 61_{PLF}$

$w_2 = 22_{PSF}(2.9') + 36 + 23 = 123_{PLF}$

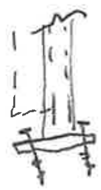
$l/600 = .42"$ $I_{REQ'D} = 37\ in^4$

HSS8x6x1/4 $I = 57\ in^4$



$6'(38\,psf) + 32 = 260\,plf$

7"



$w = .6(37.8\,psf)(5') = 113\,plf$ (.6W)

$I_{req'd} = \dfrac{113 L^4}{1200009\left(\frac{L(12)}{120}\right)} = 2.46 = \dfrac{1130 L^3}{12000009}$

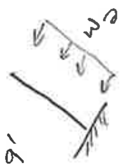
$L = 14'$ 3x3x3/16 — 3.02

$L = 15'$ 3x3x1/4 — 3.45

$L = 15.8'$

$V = 346$ LBS

$T = 484$ LBS



2'

w_2

$w_2 = 22.7\,psf\,(12') = 272\,plf$

$\frac{2L}{120} = 1.00" \div .7 = 2.57"$

$I_{req'd} = 5.17\,in^4$ $I = 6.2$

4x4x3/16

FRESNO 2023.0130

#10 $T_{all} = 84$ LBS

#10@8"

$54.4\left(\frac{h^2}{2}\right) = 84\left(\frac{12}{8}\right)\left(\frac{5}{12}\right)$

$h_{max} = 1.39'$

3765

$W_u = 90.6\,psf$ $W = 54.4\,psf$ (.6W)

STUD PARAPET

600T125-54 $M_{all} = 17.7\,in{\cdot}k$

$= 1475\,ft{\cdot}lb$

$w = 1.25(54.4) = 68\,plf$

$\frac{1}{8}(68)\,l^2 = 1475$

$l_{max} = 13.2'$

HSS2x2x3/16 @ 10'

REAVELEY Engineers

Steel LRFD Combined Loading Design

AISC 360 15th Ed/AISC 341 3rd Ed

Project: Farmington **Date:** Sep-18
Location: Grid B Wind Column **Engineer:**

Loading Criteria — Beam/Column is Acceptable

Pu=	28.0 k	Mu_x=	18.0 kft	Mu_y=	0.0 kft
(AXIAL COMPRESSION)		Vu_x=	10.00 k	Vu_y=	0.00 k

Seismic= No

Member information

Member Size: **HSS5x5x5/16** Fy= 50 ksi

A_g=	5.26 in²	Wt=	19.08 plf			c=	N/A
H=	5.00 in	r_x=	1.90 in	r_y=	1.900 in	h_o=	–
B=	5.00 in	I_x=	19 in⁴	I_y=	19.000 in⁴	r_{ts}=	–
t_w=	0.291 in	S_x=	7.6 in³	S_y=	7.620 in⁴	J=	31.20 in⁴
t_f=	0.291 in	Z_x=	9.2 in³	Z_y=	9.160 in³	C_w=	–
		b/t(act)=	14.20	h/t(act)=	14.20		

Axial Criteria

K_xL_x=	18.00 ft	K_yL_y=	18.00 ft	**Flange Local**		**Web Local**	
K_xL_x/r_x=	113.7	K_yL_y/r_y=	113.7	λ(b/t)=	14.20	λ(h/t)=	14.20
ϕ=	**0.9**			λ_c,flange=	33.72	λ_c,web=	33.72
F_{cr}=	14.20 ksi						
ϕP_n=	**91.9 k**		**Torsional**	K_zL_z=	18.00 ft	F_{cr}=	NA

Flexural Criteria (Strong Orientation)

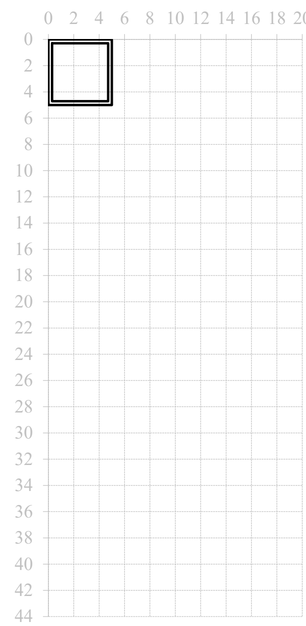
Moderately Ductile

Yielding		**Flange Local**		**Web Local**	
M_{px}=	38.2 kft	λ(b/t)=	14.20	λ(h/t)=	14.20
Lateral Torsional		λ_p(b/t)=	26.97	λ_p(h/t)=	58.28
L_{by}=	18.00 ft	λ_r(b/t)=	33.72	λ_r(h/t)=	137.27
C_{bx}=	1.00	Flange=	Compact	Web=	Compact
L_{py}=	NA				
L_{ry}=	NA			Composite Capacity=	No
M_{nx}=	38.1 kft	**ϕ=**	**0.9**	ϕ_cM_{nx}=	
ϕ_cM_{nx}=	**34.3 kft**				

Flexural Criteria (Weak Orientation)

Moderately Ductile

Yielding		**Flange Local**	
M_{py}=	38.2 kft	λ(b/t)=	14.20
M_{ny}=	38.2 kft	λ_p(b/t)=	NA
ϕ=	**0.9**	λ_r(b/t)=	NA
ϕ_cM_{ny}=	**34.4 kft**	Flange=	Noncompact



Combined Forces

$P_u/\phi P_n$=	0.305	>=0.2	Use EQ H1-1a		
	P	M_x	M_y		
	0.305	0.467	0.000	**0.771**	<1.0

Shear Criteria

Strong Orientation — **Acceptable**

A_{wx}=	2.4	C_v=	1			
ϕ_v=	0.9	**ϕ_vV_{nx}=**	**64.90**	**>**	**10.00**	**$=V_{ux}$**

Weak Orientation — **Acceptable**

A_{wy}=	2.4	Cv=	1

REAVELEY Engineers

Steel LRFD Combined Loading Design

AISC 360 15th Ed/AISC 341 3rd Ed

Project: Farmington **Date:** Sep-18
Location: Light Monitor Cant Column **Engineer:**

Loading Criteria **Beam/Column is Acceptable**

Pu=	3.6 k	Mu_x=	10.4 kft	Mu_y=	0.0 kft
(AXIAL COMPRESSION)		Vu_x=	2.00 k	Vu_y=	0.00 k

Seismic= No

Member information Member Size: **HSS4x4x1/4** Fy= 50 ksi

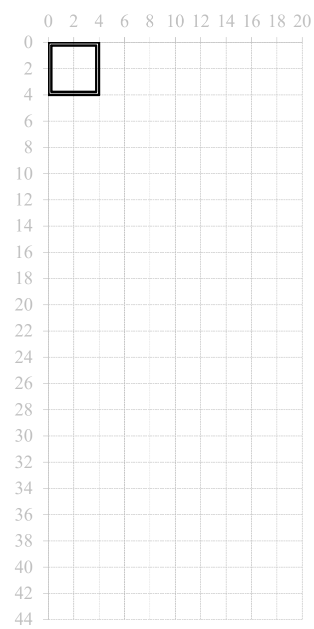
A_g=	3.37 in²	Wt=	12.21 plf			c=	N/A
H=	4.00 in	r_x=	1.52 in	r_y=	1.520 in	h_o=	–
B=	4.00 in	I_x=	8 in⁴	I_y=	7.800 in⁴	r_{ts}=	–
t_w=	0.233 in	S_x=	3.9 in³	S_y=	3.900 in⁴	J=	12.80 in⁴
t_f=	0.233 in	Z_x=	4.7 in³	Z_y=	4.690 in³	C_w=	–
		b/t(act)=	14.20	h/t(act)=	14.20		

Axial Criteria

K_xL_x=	12.60 ft	K_yL_y=	12.60 ft	**Flange Local**		**Web Local**	
K_xL_x/r_x=	99.5	K_yL_y/r_y=	99.5	λ(b/t)=	14.20	λ(h/t)=	14.20
ϕ=	**0.9**			λ_c,flange=	33.72	λ_c,web=	33.72
F_{cr}=	14.20 ksi						
ϕP_n=	**73.6 k**		**Torsional**	K_zL_z=	6.00 ft	F_{cr}=	NA

Flexural Criteria (Strong Orientation) **Moderately Ductile**

Yielding		**Flange Local**		**Web Local**	
M_{px}=	19.5 kft	λ(b/t)=	14.20	λ(h/t)=	14.20
Lateral Torsional		λ_p(b/t)=	26.97	λ_p(h/t)=	58.28
L_{by}=	6.00 ft	λ_r(b/t)=	33.72	λ_r(h/t)=	137.27
C_{bx}=	1.00	Flange=	Compact	Web=	Compact
L_{py}=	NA				
L_{ry}=	NA			Composite Capacity=	No
M_{nx}=	19.5 kft	**ϕ=**	**0.9**	$\phi_c M_{nx}$=	
$\phi_c M_{nx}$=	**17.6 kft**				



Flexural Criteria (Weak Orientation) **Moderately Ductile**

Yielding		**Flange Local**	
M_{py}=	19.5 kft	λ(b/t)=	14.20
M_{ny}=	19.5 kft	λ_p(b/t)=	NA
ϕ=	**0.9**	λ_r(b/t)=	NA
$\phi_c M_{ny}$=	**17.6 kft**	Flange=	Noncompact

Combined Forces

$P_u/\phi P_n$=	0.049	<0.2	Use EQ H1-1b		
	P	M_x	M_y		
	0.024	0.591	0.000	**0.616**	<1.0

Shear Criteria

Strong Orientation **Acceptable**

A_{wx}=	1.5	C_v=	1			
ϕ_v=	0.9	**$\phi_v V_{nx}$=**	**41.52**	**>**	**2.00**	**$=V_{ux}$**

Weak Orientation **Acceptable**

A_{wy}=	1.5	Cv=	1

AISC-LRFD FLEXURE DESIGN

AISC-LRFD - CHAPTER F

REAVELEY Engineers

Project Name: DFCM Farmington — Date: Date

Beam Designation: Metal Panel Wind Girt — Engineer: Engineer

General Input Information

Load Diagram Case: Case 1-Uniformly Distributed Load

Design Section:	HSS3X3X3/16
Design Axis:	X-Axis
Beam Fy:	50 ksi
Total Length:	12.00 ft
Brace Interval (Lb):	12.00 ft
Cb:	1.00
Limiting Mu/ΦMn:	1.00

DESIGN CRITERIA

Service Moment (Mx):	2 k-ft
Factored Moment (Mux):	4 k-ft
Deflection Criteria:	L/120

General Output Information

STRENGTH DESIGN:

Flange b/t:	14.24	Compact
Web h/tw:	14.24	Compact
ϕMnx:	7 k-ft	*F7.1-YIELDING GOVERNS*
ϕMny:	7 k-ft	*F7.1-YIELDING GOVERNS*
Mux:	4 k-ft	

SECTION ADEQUTE

SERVICABILITY DESIGN:

Total Deflection:	0.90 in
Deflection Criteria:	L/120
Deflection Ratio:	160

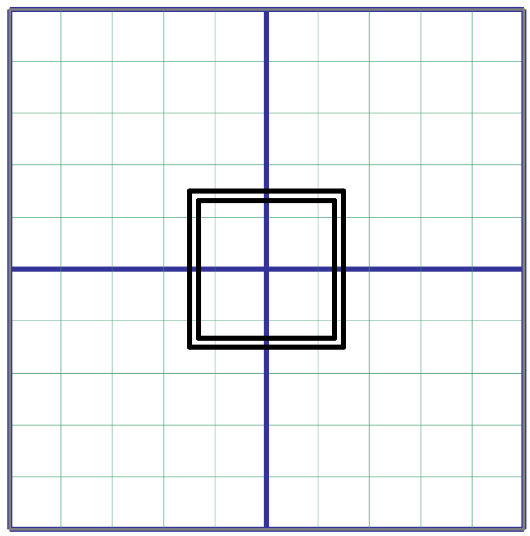
SECTION ADEQUATE

COMBINED FORCES VALUES:

Values to be used in Equations H-1a or H-1b.

Muy:	0 k-ft
Mux/ϕMnx:	0.560
Muy/ϕMuy:	0.000
(Mux/ϕMnx + Muy/ϕMuy):	**0.560**

SECTION ADEQUTE



SECTION PROPERTIES:

SECTION: HSS3X3X3/16

d:	3	Ix:	2.46
w:	3	Sx:	1.64
t_{des}:	0.174	Zx:	1.97
		Iy:	2.46
J:	4.03	Sy:	1.64
A:	1.89	Zy:	1.97
		ry:	1.14

REAVELEY Engineers

Steel LRFD Combined Loading Design

AISC 360 15th Ed/AISC 341 3rd Ed

Project: Farmington **Date:** Sep-18

Location: Metal Panel wind girt/strut **Engineer:**

Loading Criteria — Beam/Column is Acceptable

Pu=	2.7 k	Mu_x=	4.1 kft	Mu_y=	0.0 kft
(AXIAL COMPRESSION)		Vu_x=	1.00 k	Vu_y=	0.00 k

Seismic= No

Member information

Member Size: **HSS3x3x3/16** Fy= 50 ksi

A_g=	1.89 in²	Wt=	6.87 plf			c=	N/A
H=	3.00 in	r_x=	1.14 in	r_y=	1.140 in	h_o=	–
B=	3.00 in	I_x=	2 in⁴	I_y=	2.460 in⁴	r_{ts}=	–
t_w=	0.174 in	S_x=	1.6 in³	S_y=	1.640 in⁴	J=	4.03 in⁴
t_f=	0.174 in	Z_x=	2.0 in³	Z_y=	1.970 in³	C_w=	–
		b/t(act)=	14.20	h/t(act)=	14.20		

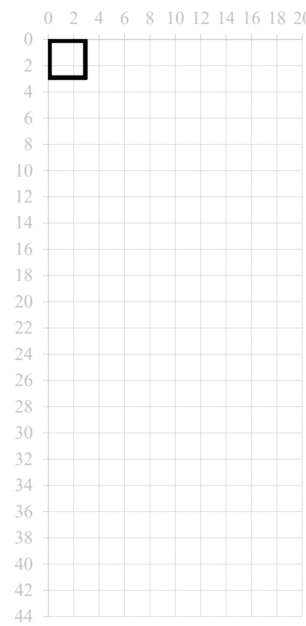
Axial Criteria

				Flange Local		Web Local	
K_xL_x=	12.00 ft	K_yL_y=	12.00 ft				
K_xL_x/r_x=	126.3	K_yL_y/r_y=	126.3	$\lambda(b/t)$=	14.20	$\lambda(h/t)$=	14.20
ϕ=	**0.9**			λ_c,flange=	33.72	λ_c,web=	33.72
F_{cr}=	14.20 ksi						
ϕP_n=	**26.8 k**	Torsional		K_zL_z=	12.00 ft	F_{cr}=	NA

Flexural Criteria (Strong Orientation)

Moderately Ductile

Yielding		Flange Local		Web Local	
M_{px}=	8.2 kft	$\lambda(b/t)$=	14.20	$\lambda(h/t)$=	14.20
Lateral Torsional		$\lambda_p(b/t)$=	26.97	$\lambda_p(h/t)$=	58.28
L_{by}=	12.00 ft	$\lambda_r(b/t)$=	33.72	$\lambda_r(h/t)$=	137.27
C_{bx}=	1.00	Flange=	Compact	Web=	Compact
L_{py}=	NA				
L_{ry}=	NA			Composite Capacity=	No
M_{nx}=	8.2 kft	ϕ=	**0.9**	$\phi_c M_{nx}$=	
$\phi_c M_{nx}$=	**7.4 kft**				



Flexural Criteria (Weak Orientation)

Moderately Ductile

Yielding		Flange Local	
M_{py}=	8.2 kft	$\lambda(b/t)$=	14.20
M_{ny}=	8.2 kft	$\lambda_p(b/t)$=	NA
ϕ=	**0.9**	$\lambda_r(b/t)$=	NA
$\phi_c M_{ny}$=	**7.4 kft**	Flange=	Noncompact

Combined Forces

$P_u/\phi P_n$=	0.099	<0.2	Use EQ H1-1b		
	P	M_x	M_y		
	0.050	0.563	0.000	**0.612**	<1.0

Shear Criteria

Strong Orientation — **Acceptable**

A_{wx}=	0.9	C_v=	1			
ϕ_v=	0.9	**$\phi_v V_{nx}$=**	**23.30**	**>**	**1.00**	**$=V_{ux}$**

Weak Orientation — **Acceptable**

A_{wy}=	0.9	Cv=	1

REAVELEY Engineers

Steel LRFD Combined Loading Design

AISC 360 15th Ed/AISC 341 3rd Ed

Project: Farmington **Date:** Sep-18

Location: Brick Lintel Post **Engineer:**

Loading Criteria **Beam/Column is Acceptable**

Pu=	2.8 k	Mu_x=	2.9 kft	Mu_y=	0.4 kft
(AXIAL COMPRESSION)		Vu_x=	1.00 k	Vu_y=	0.00 k

Seismic= No

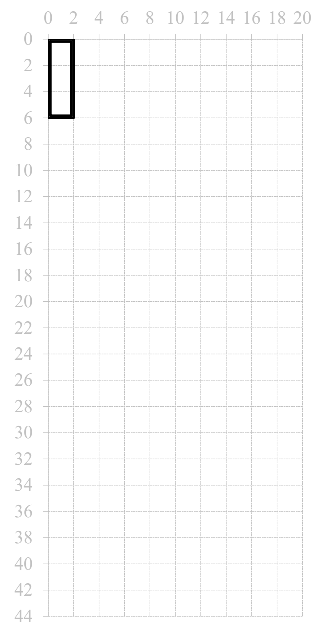
Member information Member Size: **HSS6x2x3/16** Fy= 50 ksi

A_g=	2.58 in²	Wt=	9.42 plf			c=	N/A
H=	6.00 in	r_x=	2.01 in	r_y=	0.836 in	h_o=	–
B=	2.00 in	I_x=	11 in⁴	I_y=	1.800 in⁴	r_{ts}=	–
t_w=	0.174 in	S_x=	3.5 in³	S_y=	1.800 in⁴	J=	5.24 in⁴
t_f=	0.174 in	Z_x=	4.6 in³	Z_y=	2.070 in³	C_w=	–
		b/t(act)=	8.49	h/t(act)=	31.50		

Axial Criteria

				Flange Local		Web Local	
K_xL_x=	12.00 ft	K_yL_y=	10.00 ft				
K_xL_x/r_x=	71.6	K_yL_y/r_y=	143.5	λ(b/t)=	8.49	λ(h/t)=	31.50
ϕ=	**0.9**			λ_c,flange=	33.72	λ_c,web=	33.72
F_{cr}=	31.50 ksi						
ϕP_n=	**28.3 k**		Torsional	K_zL_z=	12.00 ft	F_{cr}=	NA

Flexural Criteria (Strong Orientation) **Compact**



Yielding		Flange Local		Web Local	
M_{px}=	19.1 kft	λ(b/t)=	8.49	λ(h/t)=	31.50
Lateral Torsional		λ_p(b/t)=	26.97	λ_p(h/t)=	58.28
L_{by}=	10.00 ft	λ_r(b/t)=	33.72	λ_r(h/t)=	137.27
C_{bx}=	1.00	Flange=	Compact	Web=	Compact
L_{py}=	NA				
L_{ry}=	NA			Composite Capacity=	No
M_{nx}=	18.6 kft	**ϕ=**	**0.9**	ϕ_cM_{nx}=	
ϕ_cM_{nx}=	**16.7 kft**				

Flexural Criteria (Weak Orientation) **Compact**

Yielding		Flange Local	
M_{py}=	8.6 kft	λ(b/t)=	8.49
M_{ny}=	7.9 kft	λ_p(b/t)=	NA
ϕ=	**0.9**	λ_r(b/t)=	NA
ϕ_cM_{ny}=	**7.1 kft**	Flange=	Compact

Combined Forces

$P_u/\phi P_n$=	0.099	<0.2	Use EQ H1-1b		
	P	M_x	M_y		
	0.049	0.173	0.049	**0.272**	<1.0

Shear Criteria

Strong Orientation **Acceptable**

A_{wx}=	1.9	C_v=	1			
ϕ_v=	0.9	**ϕ_vV_{nx}=**	**51.49**	**>**	**1.00**	**=V_{ux}**

Weak Orientation **Acceptable**

A_{wy}=	0.5	Cv=	1

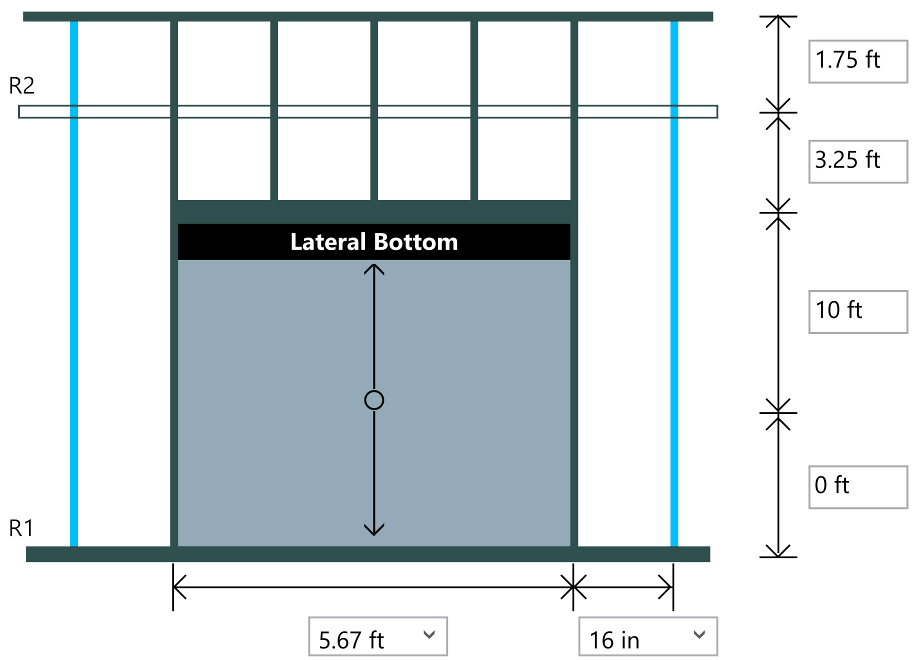
Project Name: 5ft8 open

Model: 1-Span Opening -1

Code: 2012 NASPEC [AISI S100-2012]

Date: 04/09/2025

Simpson Strong-Tie® CFS Designer™ 5.2.2.0



Lateral Pressure to: Head/Sill Only

Design Loads

Wall Lateral Pressure :	**19.7 psf**
Parapet Lateral Pressure :	**44 psf**
RO Lateral Pressure :	**Head/Sill Only**
Lateral element force multiplier	
Strength :	**1.0**
Deflection :	**0.7**
Header:	**Box (lateral top, bottom)**
Gravity Load at Header:	**45 psf**
Cant. Deflection:	**2 x Cantilever**

Brace Settings

Component(s)	Members(s)	Flexural Bracing	Axial KyLy	Axial KtLt	Distortional K-Phi(lb-in/in)	Distortional Lm	Interconnection Spacing
Wall Studs	600S162-54(50), Single@16 in o/c	60 in	60 in	60 in	0	None	N/A
Jamb Studs	600S162-54(50), Single	60 in	60 in	60 in	0	None	N/A
Vertical Header	600S162-54(50), Boxed	Full	N/A	N/A	0	None	N/A
Lat. Top Head	600T125-54(50), Single	Full	N/A	N/A	0	None	N/A
Lat. Bottom Head	600T125-54(50), Single	Full	N/A	N/A	0	None	N/A

Analysis Results

Component(s)	Members(s)	Axial Load (lb)	Max KL/r	Max. Moment (ft-lb)	Max. Shear (lb)	Bottom Reaction (lb)	Top or End Reaction (lb)
Wall Studs	600S162-54(50), Single@16 in o/c	0.0	N/A	532.4	180.8	167.2	283.5
Jamb Studs	600S162-54(50), Single	637.9	105	942.9	325.3	439.2	376.6
Vertical Header	600S162-54(50), Boxed	N/A	N/A	904.2	637.9	N/A	637.9
Lat. Top Head	600T125-54(50), Single	N/A	N/A	45.3	32.0	N/A	32.0
Lat. Bottom Head	600T125-54(50), Single	N/A	N/A	395.8	279.3	N/A	279.3

Design Results

Component(s)	Members(s)	Deflection Span	Deflection Parapet	A + M Interaction	V + M Interaction	Web Stiffners	Design OK
Wall Studs	600S162-54(50), Single@16 in o/c	L/1160	L/794	0.281	0.07	No	Yes
Jamb Studs	600S162-54(50), Single	L/735	L/417	0.617	0.40	No	Yes
Vertical Header	600S162-54(50), Boxed	L/2195	NA	0.18	0.18	No	Yes
Lat. Top Head	600T125-54(50), Single	L/24491	NA	0.03	0.03	No	Yes
Lat. Bottom Head	600T125-54(50), Single	L/2805	NA	0.27	0.10	No	Yes

Simpson Strong-Tie® Connectors @ Studs

Connector	Anchor

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie® Connector	Interaction	Interaction
R2	283.46	0.00	SCB45.5(2) & (2) #12-24 SST X or XL to A36 Steel	37.30 %	25.42 %
R1	167.24	900.00	600T125-33 (33) & (1) .157" SST PDPA/PDPAT-62KP to steel (3/16" to 1/2" thickness)	24.31 %	75.95 %

* Reference catalog for connector and anchor requirement notes as well as screw placements requirement

Simpson Strong-Tie® Connectors @ Jambs

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie® Connector	Connector Interaction	Anchor Interaction
R2	376.62	0.00	SCB45.5(2) & (2) #12-24 SST X or XL to A36 Steel	49.56 %	33.78 %
R1	439.21	1387.88	600T125-54 (50) & (2) .157" SST PDPA/PDPAT-62KP to steel (3/16" to 1/2" thickness)	94.41 %	53.56 %

* Reference catalog for connector and anchor requirement notes as well as screw placements requirement

Simpson Strong-Tie® Wall Stud Bridging Connectors @ Studs

Span/Parapet	Bracing Length(in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Top Parapet	Span	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Span	60	3	8062.1	OK (0.51)	OK (0.36)	OK (0.41)	OK (0.26)	OK (0.25)	OK (0.17)

Simpson Strong-Tie® Wall Stud Bridging Connectors @ Jambs

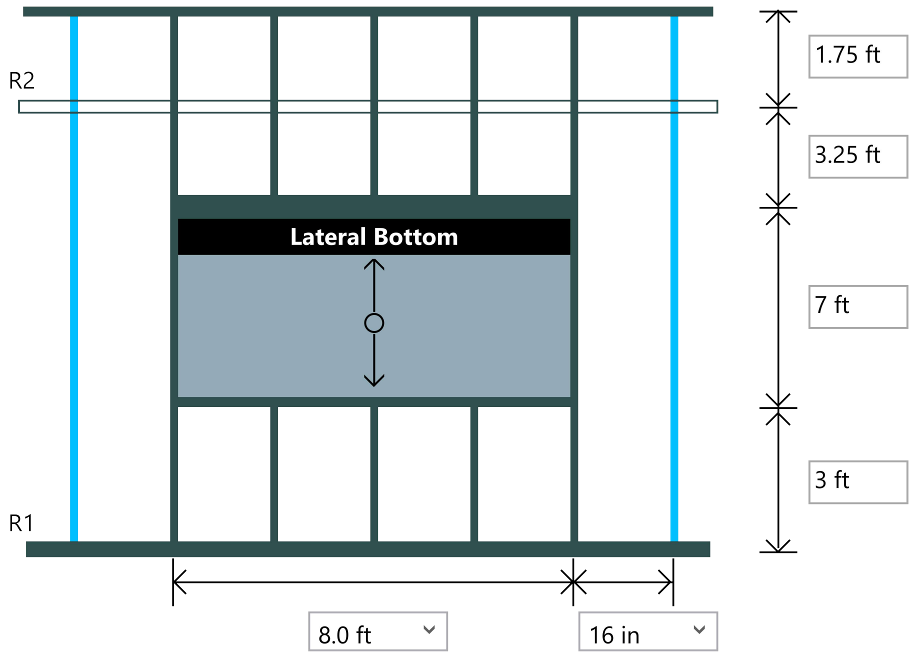
Span/Parapet	Bracing Length(in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Top Parapet	Span	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Span	60	3	8062.1	OK (0.68)	OK (0.48)	OK (0.54)	OK (0.35)	OK (0.34)	OK (0.22)

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back, box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes.
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.

Project Name: 8ft open
Model: 1-Span Opening -1
Code: 2012 NASPEC [AISI S100-2012]

Date: 04/09/2025
Simpson Strong-Tie® CFS Designer™ 5.2.2.0



Lateral Pressure to: Head/Sill Only

Design Loads

Wall Lateral Pressure :	**19.7 psf**
Parapet Lateral Pressure :	**44 psf**
RO Lateral Pressure :	**Head/Sill Only**
Lateral element force multiplier	
Strength :	**1.0**
Deflection :	**0.7**
Header:	**Box (lateral top, bottom)**
Gravity Load at Header:	**45 psf**
Cant. Deflection:	**2 x Cantilever**

Back-to-Back Member L/6 Interconnection Spacing per AISI S100 D1.1

Member	Span	Cantilever
Jamb Studs	26.5 in	3.5 in

See AISI S100 D1.1 for Add'nl Requirements

Brace Settings

Component(s)	Members(s)	Flexural Bracing	Axial KyLy	Axial KtLt	Distortional K-Phi(lb-in/in)	Distortional Lm	Interconnection Spacing
Wall Studs	600S162-54(50), Single@16 in o/c	60 in	60 in	60 in	0	None	N/A
Jamb Studs	600S162-54(50), Back-To-Back	60 in	60 in	60 in	0	None	12 in
Vertical Header	600S162-54(50), Boxed	Full	N/A	N/A	0	None	N/A
Lat. Top Head	600T125-54(50), Single	Full	N/A	N/A	0	None	N/A
Lat. Bottom Head	600T125-54(50), Single	Full	N/A	N/A	0	None	N/A
Sill	600T125-54(50), Single	Full	N/A	N/A	0	None	N/A

Analysis Results

Component(s)	Members(s)	Axial Load (lb)	Max KL/r	Max. Moment (ft-lb)	Max. Shear (lb)	Bottom Reaction (lb)	Top or End Reaction (lb)
Wall Studs	600S162-54(50), Single@16 in o/c	0.0	N/A	532.4	180.8	167.2	283.5
Jamb Studs	600S162-54(50), Back-To-Back	900.0	88	1385.6	467.1	467.1	473.1
Vertical Header	600S162-54(50), Boxed	N/A	N/A	1800.0	900.0	N/A	900.0
Lat. Top Head	600T125-54(50), Single	N/A	N/A	90.3	45.1	N/A	45.1
Lat. Bottom Head	600T125-54(50), Single	N/A	N/A	551.6	275.8	N/A	275.8
Sill	600T125-54(50), Single	N/A	N/A	788.0	394.0	N/A	394.0

Design Results

Component(s)	Members(s)	Deflection Span	Deflection Parapet	A + M Interaction	V + M Interaction	Web Stiffners	Design OK
Wall Studs	600S162-54(50), Single@16 in o/c	L/1160	L/794	0.281	0.07	No	Yes
Jamb Studs	600S162-54(50), Back-To-Back	L/810	L/509	0.403	0.29	No	Yes
Vertical Header	600S162-54(50), Boxed	L/781	NA	0.36	0.36	No	Yes
Lat. Top Head	600T125-54(50), Single	L/8720	NA	0.06	0.06	No	Yes
Lat. Bottom Head	600T125-54(50), Single	L/1427	NA	0.37	0.10	No	Yes
Sill	600T125-54(50), Single	L/999	NA	0.53	0.53	No	Yes

Simpson Strong-Tie® Connectors @ Studs

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie® Connector	Connector Interaction	Anchor Interaction
R2	283.46	0.00	SCB45.5(2) & (2) #12-24 SST X or XL to A36 Steel	37.30 %	25.42 %
R1	167.24	900.00	600T125-33 (33) & (1) .157" SST PDPA/PDPAT-62KP to steel (3/16" to 1/2" thickness)	24.31 %	75.95 %

* Reference catalog for connector and anchor requirement notes as well as screw placements requirement

Simpson Strong-Tie® Connectors @ Jambs

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie® Connector	Connector Interaction	Anchor Interaction
R2	473.15	0.00	SCB45.5(2) & (2) #12-24 SST X or XL to A36 Steel	62.26 %	42.43 %
R1	467.13	1650.00	600T125-54 (50) & (2) .157" SST PDPA/PDPAT-62KP to steel (3/16" to 1/2" thickness)	30.99 %	56.97 %

* Reference catalog for connector and anchor requirement notes as well as screw placements requirement

Simpson Strong-Tie® Wall Stud Bridging Connectors @ Studs

Span/Parapet	Bracing Length(in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Top Parapet	Span	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Span	60	3	8062.1	OK (0.51)	OK (0.36)	OK (0.41)	OK (0.26)	OK (0.25)	OK (0.17)

Simpson Strong-Tie® Wall Stud Bridging Connectors @ Jambs

Span/Parapet	Bracing Length(in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Top Parapet	Span	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Span	60	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back, box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes.
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.