

Frames 2, 3, 4 (Vertical Column)

Wind loads:

0.73	k/ft for horizontal loads on wall column =	0.061 k/in
0.34	k/ft for horizontal loads on roof beam =	0.028 k/in

Horizontal Wind Loads:
$[(0.73\text{k/ft} \cdot 24\text{ft}) + (0.34\text{k/ft} \cdot 2.08\text{ft})] =$ 18.2 k

Vertical Dead Loads:

Assuming roofing & side panels = 1.2 psf + insulation

Roof panel (25ft*26ft)*5psf =	3250 lbs	=	3.25 k
Roof Framing Member	2236 lbs	=	2.236 k
Support Beam @ Crest 1/2(60#/lf)*25=	750 lbs	=	0.75 k
Support Beam @ Eave 1/2(60#/lf)*25=	750 lbs	=	0.75 k
Side panel (25ft*24ft)*10psf =	6000 lbs	=	6 k
Total Dead Load			12.986 k

Roof Live Load (25*26 ft) * 20psf	13000 lbs	=	13 k
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LRFD Load Combinations Horizontal Loads

1.4D	0 k
1.2D + 1.6L + 0.5L _r	0 k
1.2D + 1.6L _r + 0.8W	14.58176 k
1.2D + 1.6W + 0.5L _r	29.16352 k

LRFD Load Combinations Vertical Loads

1.4D	18.1804 k
1.2D + 1.6L + 0.5L _r	22.0832 k
1.2D + 1.6L _r + 0.8W	50.96496 k
1.2D + 1.6W + 0.5L _r	51.24672 k

Required Z for Horizontal Loads (Column):

$29.16352\text{k} \cdot (24/2)\text{ft} =$	349.9622 ft-k	=	$\frac{4199.547 \text{ in-k}}{(.9 \cdot 50\text{ksi})} =$	93 in³
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Beam Selection (Column) according to Z_{req}

W18x50 (Z= 101 in³)

Column Geometric Properties:

24ft * 50Plf =	1.2k	A =	14.7 in ²
I _{xx} =	800 in ⁴	I _{yy} =	40.1 in ⁴
S _{xx} =	88.9 in ³	S _{yy} =	10.7 in ³
r _{xx} =	7.38 in ²	r _{yy} =	1.65 in

rxx=

Frames 2, 3, 4 (Roof Beam)

Wind Loads:

0.92	k/lft for vertical roof load =	0.076667 k/in
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Loads:

Wind Load	$0.92\text{k/lft} \times (26\text{ft}) =$	23.9 k
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Roof Live Load $(25 \times 26 \text{ ft}) \times 20\text{psf}$	13000 lbs	=	13 k
Roof Dead Load $(25\text{ft} \times 26\text{ft}) \times 5\text{psf} =$	3250 lbs	=	3.25 k
Roof Beam $86\#/lf \times 26\text{ft} =$	2236 lbs	=	2.236 k
Support Beam @ Crest $1/2(60\#/lf) \times 25 =$	750 lbs	=	0.75 k
Total Dead Load			4 k

LRFD Load Combinations

1.4D	5.6 k
1.2D + 1.6L + 0.5L _r	11.3 k
1.2D + 1.6L _r + 0.8W	44.736 k
1.2D + 1.6W + 0.5L _r	49.572 k

Required Z:

$49.572\text{k} \times (26/2) \times \text{ft}$	644.436 ft-k	=	$\frac{7733.232 \text{ in-k}}{(.9 \times 50\text{ksi})}$	=	171.8496 in³
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Beam Selection according to Z_{req}

W18x86 (Z = 186 in³)
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Geometric Properties:

Beam Weight 26ft * 86Plf =	2.24k	A= 25.3 in ²
lxx =	1530 in ⁴	lyy= 175 in ⁴
Sxx =	166 in ³	Syy= 31.6 in ³
rxx=	7.77 in	ryy= 2.63 in