Calculations For

Job: 31 Water St. Mixed Use

Address: 31 South Water Street

Henderson, Nevada 89015

(These calculations apply to the job at this address only)

Client: Assured Development

Index to Calculations

Kurt Guidice

Digitally signed by Kurt Guidice
DN: cn=Kurt Guidice, o=Barker Structural, ou, email=kurt@barkerstructural.com, c=US
Date: 2020.04.22 10:19:47 -07'00'

PROFESSIONAL ENGINEER - STATE OF NEVADA
KURT GUIDICE
Exp: 6/30/2021
CIVIL / STRUCTURAL
No. 21312

March 27, 2020

BARKER STRUCTURAL

Design Criteria

Loads:

Flat Roof -

DL =	15	psf	
LL =	20	psf	Reducible

Floor-

DL =	30	psf
LL =	60	psf (Residential plus Partition)
LL =	60	psf (Balcony)
LL =	80	psf (Corridor)

Code:	2018 IBC					
Wind speed:	106	mph				
Wind exp:	B					
Risk Category:	III					
Site Class:	C					
SRA (S_S):	0.487		(S_{MS}):	0.633	(S_{DS}):	0.422
SRA (S_1):	0.165		(S_{M1}):	0.248	(S_{D1}):	0.165
Seismic Category:	C					
Allowable Bearing:	3000	psf				
Bearing Depth:	18	in				

Soils Engineer:	Dupont Engineering
Report #:	18-0379
Report Date:	4-Sep-18
Update Letter Date:	11-Oct-18

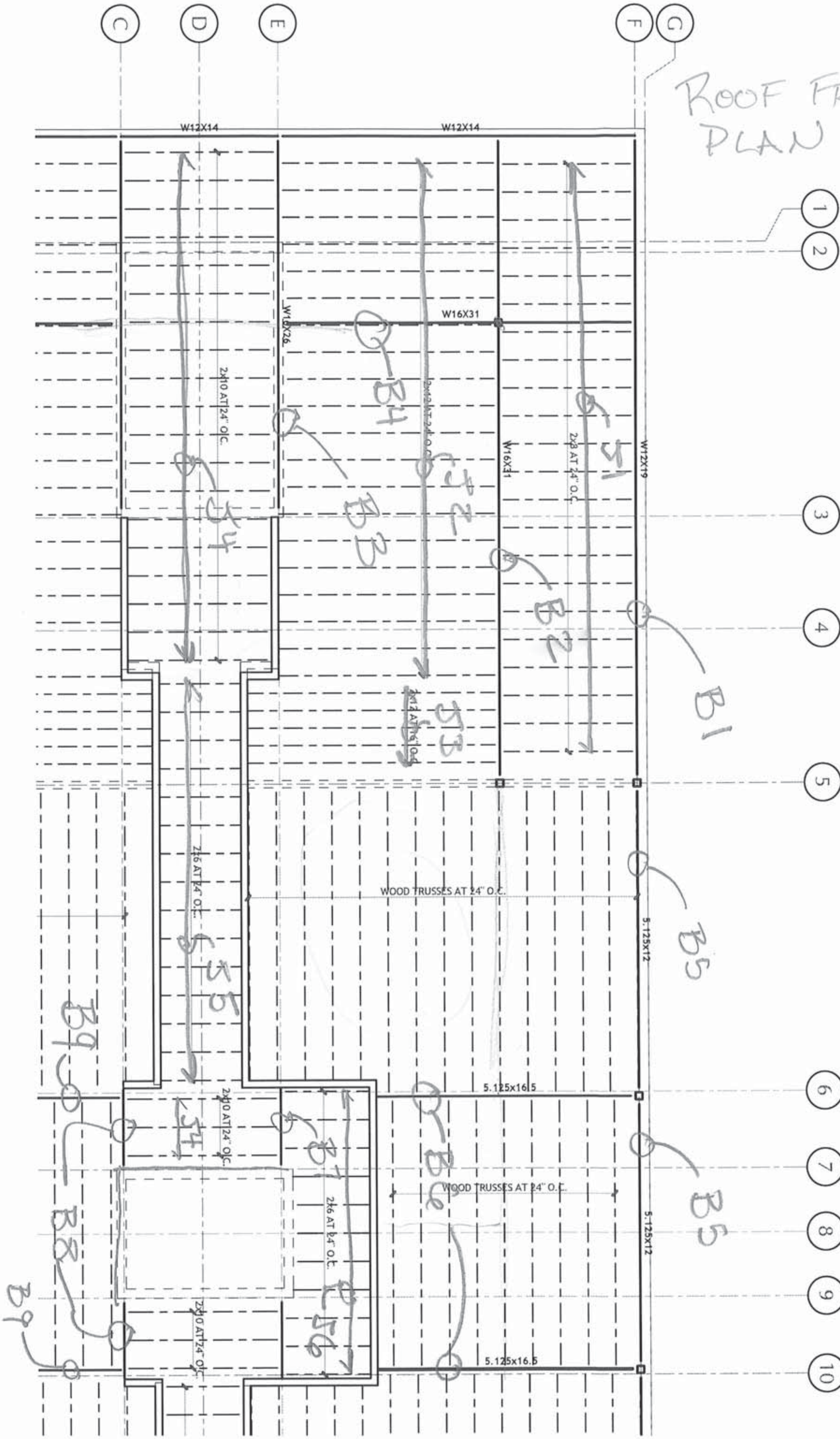
Materials:

Concrete:	f'c =	4500	psi
Rebar:	fy =	60000	psi
	E =	29000000	psi
Masonry:	f'm =	1500	psi
Mortar:		Type S	
Grout:	f'g =	2000	psi

Roof Dead Load	
Roofing Material	3.5
Plywood Sheathing	2
Wood Trusses at 24" O.C.	2.5
Insulation	1
Ceiling	1.5
Sprinklers	1.5
Mech'l, Elec, Misc	3
	15

Floor Dead Load	
Gypcrete	15
Plywood Sheathing	2.5
Flooring	2
Wood Trusses at 24" O.C.	3.5
Ceiling	2.5
Sprinklers	1.5
Mech'l, Elec, Misc	3
	30

ROOF FRAMING PLAN



BARKER STRUCTURAL

Project: 31 Water St Mixed Use

Job No. 218029

Date 3/27/2020

Sheet No. 3

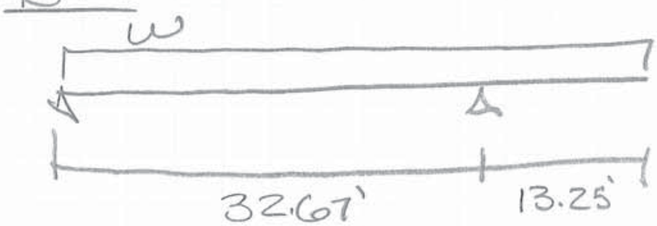
By ____ Chkd KG

ROOF FRAMING

ROOF DL = 20 psf

ROOF LL = 20 psf (REDUCIBLE)

B1



$\omega_D = \omega_L = 20\text{psf}(10.5'/2) = 105\text{plf}$

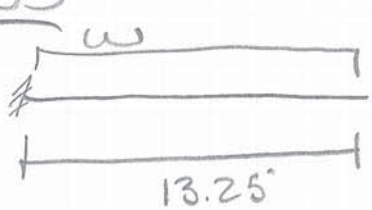
$\boxed{\text{USE W12x22}}$ REF OUTPUT

B2

SPAN SAME AS B1 $\omega_D = \omega_L = 20\text{psf}(26.6'/2) = 266\text{plf}$

$\boxed{\text{USE W16x31}}$ REF OUTPUT

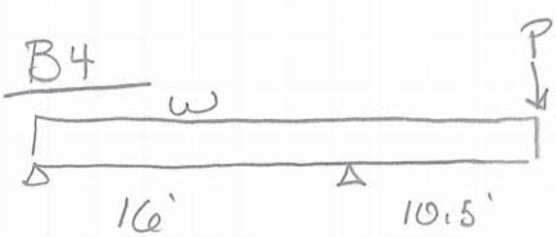
B3



$\omega_D = \omega_L = 20\text{psf}(27.25'/2) = 273\text{plf}$

$\boxed{\text{USE W16x26}}$ REF OUTPUT

B4



$\omega_D = \omega_L = 20\text{psf}(2') = 40\text{ plf}$

$P = R_{B1}$ $P_D = 4.1^K$ $P_L = 3.4^K$

$\boxed{\text{USE W16x31}}$ REF OUTPUT

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

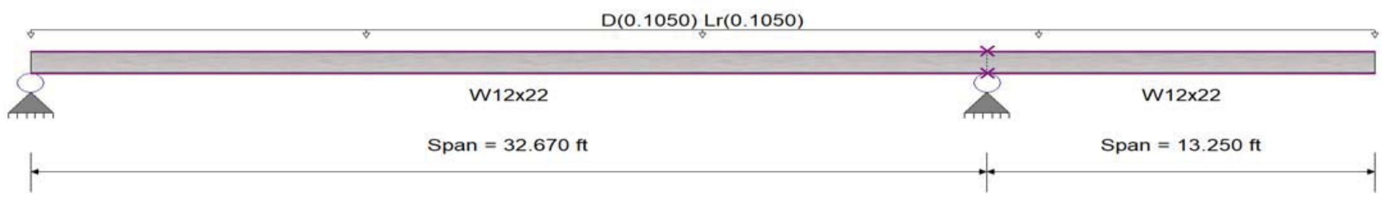
DESCRIPTION: Roof Beam B1

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.1050, Lr = 0.1050 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.351** : 1	Maximum Shear Stress Ratio =	**0.069** : 1
Section used for this span	**W12x22**	Section used for this span	**W12x22**
Ma : Applied	25.635 k-ft	Va : Applied	4.414 k
Mn / Omega : Allowable	73.104 k-ft	Vn/Omega : Allowable	63.960 k
Load Combination	+D+Lr+H, LL Comb Run (L*)	Load Combination	+D+Lr+H, LL Comb Run (LL)
Location of maximum on span	14.898 ft	Location of maximum on span	32.670 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.662 in	Ratio =	480 >=360
Max Upward Transient Deflection	-0.772 in	Ratio =	411 >=360
Max Downward Total Deflection	1.039 in	Ratio =	377 >=180
Max Upward Total Deflection	-0.905 in	Ratio =	351 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 32.67 ft	1	0.279	0.048	8.30	-20.37	20.37	122.08	73.10	1.00	1.00	3.07	95.94	63.96
Dsgn. L = 13.25 ft	2	0.279	0.048		-20.37	20.37	122.08	73.10	1.00	1.00	3.07	95.94	63.96
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 32.67 ft	1	0.351	0.065	25.63	-11.15	25.63	122.08	73.10	1.00	1.00	4.13	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 32.67 ft	1	0.296	0.069	21.61	-20.37	21.61	122.08	73.10	1.00	1.00	4.41	95.94	63.96
Dsgn. L = 13.25 ft	2	0.279	0.048		-20.37	20.37	122.08	73.10	1.00	1.00	3.07	95.94	63.96
+D+S+H													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96

Steel Beam

DESCRIPTION: Roof Beam B1

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750Lr+0.750L+H, LL Comb Run (*													
Dsgn. L = 32.67 ft	1	0.247	0.043	9.12	-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
Dsgn. L = 13.25 ft	2	0.247	0.043		-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
+D+0.750Lr+0.750L+H, LL Comb Run (L													
Dsgn. L = 32.67 ft	1	0.303	0.058	22.16	-11.15	22.16	122.08	73.10	1.00	1.00	3.70	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750Lr+0.750L+H, LL Comb Run (L													
Dsgn. L = 32.67 ft	1	0.262	0.061	19.17	-18.07	19.17	122.08	73.10	1.00	1.00	3.91	95.94	63.96
Dsgn. L = 13.25 ft	2	0.247	0.043		-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
+D+0.750L+0.750S+H, LL Comb Run (*L													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750L+0.750S+H, LL Comb Run (L*													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750L+0.750S+H, LL Comb Run (LL													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+W+H													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.70E+H													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 32.67 ft	1	0.247	0.043	9.12	-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
Dsgn. L = 13.25 ft	2	0.247	0.043		-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 32.67 ft	1	0.303	0.058	22.16	-11.15	22.16	122.08	73.10	1.00	1.00	3.70	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 32.67 ft	1	0.262	0.061	19.17	-18.07	19.17	122.08	73.10	1.00	1.00	3.91	95.94	63.96
Dsgn. L = 13.25 ft	2	0.247	0.043		-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
+D+0.750L+0.750S+0.750W+H, LL Coml													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750L+0.750S+0.750W+H, LL Coml													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750L+0.750S+0.750W+H, LL Coml													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750Lr+0.750L+0.5250E+H, LL Con													
Dsgn. L = 32.67 ft	1	0.247	0.043	9.12	-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
Dsgn. L = 13.25 ft	2	0.247	0.043		-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
+D+0.750Lr+0.750L+0.5250E+H, LL Con													
Dsgn. L = 32.67 ft	1	0.303	0.058	22.16	-11.15	22.16	122.08	73.10	1.00	1.00	3.70	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750Lr+0.750L+0.5250E+H, LL Con													
Dsgn. L = 32.67 ft	1	0.262	0.061	19.17	-18.07	19.17	122.08	73.10	1.00	1.00	3.91	95.94	63.96
Dsgn. L = 13.25 ft	2	0.247	0.043		-18.07	18.07	122.08	73.10	1.00	1.00	2.73	95.94	63.96
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.162	0.038	11.83	-11.15	11.83	122.08	73.10	1.00	1.00	2.42	95.94	63.96
Dsgn. L = 13.25 ft	2	0.153	0.026		-11.15	11.15	122.08	73.10	1.00	1.00	1.68	95.94	63.96
+0.60D+W+H													
Dsgn. L = 32.67 ft	1	0.097	0.023	7.10	-6.69	7.10	122.08	73.10	1.00	1.00	1.45	95.94	63.96
Dsgn. L = 13.25 ft	2	0.092	0.016		-6.69	6.69	122.08	73.10	1.00	1.00	1.01	95.94	63.96
+0.60D+0.70E+H													
Dsgn. L = 32.67 ft	1	0.097	0.023	7.10	-6.69	7.10	122.08	73.10	1.00	1.00	1.45	95.94	63.96
Dsgn. L = 13.25 ft	2	0.092	0.016		-6.69	6.69	122.08	73.10	1.00	1.00	1.01	95.94	63.96

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

DESCRIPTION: Roof Beam B1

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	1.0392	15.812		0.0000	0.000
	2	0.0000	15.812	+D+Lr+H	-0.9052	13.250

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	3.449	7.489	
Overall MINimum	-0.282	1.673	
D Only	1.734	4.100	
+D+L+H, LL Comb Run (*L)	1.734	4.100	
+D+L+H, LL Comb Run (L*)	1.734	4.100	
+D+L+H, LL Comb Run (LL)	1.734	4.100	
+D+Lr+H, LL Comb Run (*L)	1.452	5.774	
+D+Lr+H, LL Comb Run (L*)	3.449	5.816	
+D+Lr+H, LL Comb Run (LL)	3.167	7.489	
+D+S+H	1.734	4.100	
+D+0.750Lr+0.750L+H, LL Comb Run (*	1.523	5.355	
+D+0.750Lr+0.750L+H, LL Comb Run (L	3.020	5.387	
+D+0.750Lr+0.750L+H, LL Comb Run (L	2.809	6.642	
+D+0.750L+0.750S+H, LL Comb Run (*L	1.734	4.100	
+D+0.750L+0.750S+H, LL Comb Run (L*	1.734	4.100	
+D+0.750L+0.750S+H, LL Comb Run (LL	1.734	4.100	
+D+W+H	1.734	4.100	
+D+0.70E+H	1.734	4.100	
+D+0.750Lr+0.750L+0.750W+H, LL Com	1.523	5.355	
+D+0.750Lr+0.750L+0.750W+H, LL Com	3.020	5.387	
+D+0.750Lr+0.750L+0.750W+H, LL Com	2.809	6.642	
+D+0.750L+0.750S+0.750W+H, LL Comb	1.734	4.100	
+D+0.750L+0.750S+0.750W+H, LL Comb	1.734	4.100	
+D+0.750L+0.750S+0.750W+H, LL Comb	1.734	4.100	
+D+0.750Lr+0.750L+0.5250E+H, LL Com	1.523	5.355	
+D+0.750Lr+0.750L+0.5250E+H, LL Com	3.020	5.387	
+D+0.750Lr+0.750L+0.5250E+H, LL Com	2.809	6.642	
+D+0.750L+0.750S+0.5250E+H, LL Com	1.734	4.100	
+D+0.750L+0.750S+0.5250E+H, LL Com	1.734	4.100	
+D+0.750L+0.750S+0.5250E+H, LL Com	1.734	4.100	
+0.60D+W+H	1.040	2.460	
+0.60D+0.70E+H	1.040	2.460	
D Only	1.734	4.100	
Lr Only, LL Comb Run (*L)	-0.282	1.673	
Lr Only, LL Comb Run (L*)	1.715	1.715	
Lr Only, LL Comb Run (LL)	1.433	3.389	
L Only, LL Comb Run (*L)			
L Only, LL Comb Run (L*)			
L Only, LL Comb Run (LL)			
S Only			
W Only			
E Only			
H Only			

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.2.24 .
Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

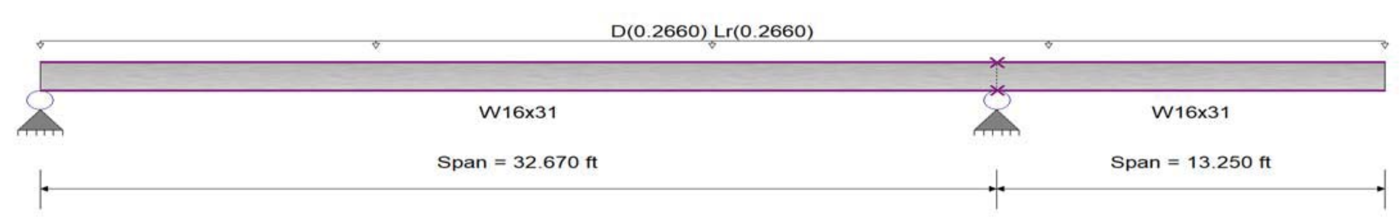
DESCRIPTION: Roof Beam B2

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.2660, Lr = 0.2660 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.465 : 1	Maximum Shear Stress Ratio =	0.122 : 1
Section used for this span	W16x31	Section used for this span	W16x31
Ma : Applied	62.650 k-ft	Va : Applied	10.711 k
Mn / Omega : Allowable	134.731 k-ft	Vn/Omega : Allowable	87.450 k
Load Combination	+D+Lr+H, LL Comb Run (L*)	Load Combination	+D+Lr+H, LL Comb Run (LL)
Location of maximum on span	14.898 ft	Location of maximum on span	32.670 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.698 in	Ratio =	455 >=360
Max Upward Transient Deflection	-0.814 in	Ratio =	390 >=360
Max Downward Total Deflection	1.059 in	Ratio =	370 >=180
Max Upward Total Deflection	-0.943 in	Ratio =	337 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 32.67 ft	1	0.367	0.085	18.77	-49.43	49.43	225.00	134.73	1.00	1.00	7.46	131.18	87.45
Dsgn. L = 13.25 ft	2	0.367	0.085		-49.43	49.43	225.00	134.73	1.00	1.00	7.46	131.18	87.45
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 32.67 ft	1	0.465	0.114	62.65	-26.08	62.65	225.00	134.73	1.00	1.00	10.00	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 32.67 ft	1	0.389	0.122	52.44	-49.43	52.44	225.00	134.73	1.00	1.00	10.71	131.18	87.45
Dsgn. L = 13.25 ft	2	0.367	0.085		-49.43	49.43	225.00	134.73	1.00	1.00	7.46	131.18	87.45
+D+S+H													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45

DESCRIPTION: Roof Beam B2

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750Lr+0.750L+H, LL Comb Run (*													
Dsgn. L = 32.67 ft	1	0.324	0.075	20.84	-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
Dsgn. L = 13.25 ft	2	0.324	0.075		-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
+D+0.750Lr+0.750L+H, LL Comb Run (L													
Dsgn. L = 32.67 ft	1	0.400	0.102	53.85	-26.08	53.85	225.00	134.73	1.00	1.00	8.91	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750Lr+0.750L+H, LL Comb Run (L													
Dsgn. L = 32.67 ft	1	0.343	0.108	46.25	-43.59	46.25	225.00	134.73	1.00	1.00	9.45	131.18	87.45
Dsgn. L = 13.25 ft	2	0.324	0.075		-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
+D+0.750L+0.750S+H, LL Comb Run (*L													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750L+0.750S+H, LL Comb Run (L*													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750L+0.750S+H, LL Comb Run (LL													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+W+H													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.70E+H													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 32.67 ft	1	0.324	0.075	20.84	-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
Dsgn. L = 13.25 ft	2	0.324	0.075		-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 32.67 ft	1	0.400	0.102	53.85	-26.08	53.85	225.00	134.73	1.00	1.00	8.91	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 32.67 ft	1	0.343	0.108	46.25	-43.59	46.25	225.00	134.73	1.00	1.00	9.45	131.18	87.45
Dsgn. L = 13.25 ft	2	0.324	0.075		-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
+D+0.750L+0.750S+0.750W+H, LL Comb													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750L+0.750S+0.750W+H, LL Comb													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750L+0.750S+0.750W+H, LL Comb													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750Lr+0.750L+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.324	0.075	20.84	-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
Dsgn. L = 13.25 ft	2	0.324	0.075		-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
+D+0.750Lr+0.750L+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.400	0.102	53.85	-26.08	53.85	225.00	134.73	1.00	1.00	8.91	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750Lr+0.750L+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.343	0.108	46.25	-43.59	46.25	225.00	134.73	1.00	1.00	9.45	131.18	87.45
Dsgn. L = 13.25 ft	2	0.324	0.075		-43.59	43.59	225.00	134.73	1.00	1.00	6.58	131.18	87.45
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 32.67 ft	1	0.205	0.065	27.67	-26.08	27.67	225.00	134.73	1.00	1.00	5.65	131.18	87.45
Dsgn. L = 13.25 ft	2	0.194	0.045		-26.08	26.08	225.00	134.73	1.00	1.00	3.94	131.18	87.45
+0.60D+W+H													
Dsgn. L = 32.67 ft	1	0.123	0.039	16.60	-15.65	16.60	225.00	134.73	1.00	1.00	3.39	131.18	87.45
Dsgn. L = 13.25 ft	2	0.116	0.027		-15.65	15.65	225.00	134.73	1.00	1.00	2.36	131.18	87.45
+0.60D+0.70E+H													
Dsgn. L = 32.67 ft	1	0.123	0.039	16.60	-15.65	16.60	225.00	134.73	1.00	1.00	3.39	131.18	87.45
Dsgn. L = 13.25 ft	2	0.116	0.027		-15.65	15.65	225.00	134.73	1.00	1.00	2.36	131.18	87.45

Steel Beam

DESCRIPTION: Roof Beam B2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	1.0594	15.812		0.0000	0.000
	2	0.0000	15.812	+D+Lr+H	-0.9431	13.250

Vertical Reactions

Support notation : Far left is #1   Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	8.400	18.172	
Overall MINimum	-0.715	4.239	
D Only	4.055	9.587	
+D+L+H, LL Comb Run (*L)	4.055	9.587	
+D+L+H, LL Comb Run (L*)	4.055	9.587	
+D+L+H, LL Comb Run (LL)	4.055	9.587	
+D+Lr+H, LL Comb Run (*L)	3.340	13.827	
+D+Lr+H, LL Comb Run (L*)	8.400	13.932	
+D+Lr+H, LL Comb Run (LL)	7.685	18.172	
+D+S+H	4.055	9.587	
+D+0.750Lr+0.750L+H, LL Comb Run (*	3.519	12.767	
+D+0.750Lr+0.750L+H, LL Comb Run (L	7.313	12.846	
+D+0.750Lr+0.750L+H, LL Comb Run (L	6.777	16.026	
+D+0.750L+0.750S+H, LL Comb Run (*L	4.055	9.587	
+D+0.750L+0.750S+H, LL Comb Run (L*	4.055	9.587	
+D+0.750L+0.750S+H, LL Comb Run (LL	4.055	9.587	
+D+W+H	4.055	9.587	
+D+0.70E+H	4.055	9.587	
+D+0.750Lr+0.750L+0.750W+H, LL Com	3.519	12.767	
+D+0.750Lr+0.750L+0.750W+H, LL Com	7.313	12.846	
+D+0.750Lr+0.750L+0.750W+H, LL Com	6.777	16.026	
+D+0.750L+0.750S+0.750W+H, LL Comt	4.055	9.587	
+D+0.750L+0.750S+0.750W+H, LL Comt	4.055	9.587	
+D+0.750L+0.750S+0.750W+H, LL Comt	4.055	9.587	
+D+0.750Lr+0.750L+0.5250E+H, LL Cor	3.519	12.767	
+D+0.750Lr+0.750L+0.5250E+H, LL Cor	7.313	12.846	
+D+0.750Lr+0.750L+0.5250E+H, LL Cor	6.777	16.026	
+D+0.750L+0.750S+0.5250E+H, LL Com	4.055	9.587	
+D+0.750L+0.750S+0.5250E+H, LL Com	4.055	9.587	
+D+0.750L+0.750S+0.5250E+H, LL Com	4.055	9.587	
+0.60D+W+H	2.433	5.752	
+0.60D+0.70E+H	2.433	5.752	
D Only	4.055	9.587	
Lr Only, LL Comb Run (*L)	-0.715	4.239	
Lr Only, LL Comb Run (L*)	4.345	4.345	
Lr Only, LL Comb Run (LL)	3.630	8.584	
L Only, LL Comb Run (*L)			
L Only, LL Comb Run (L*)			
L Only, LL Comb Run (LL)			
S Only			
W Only			
E Only			
H Only			

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

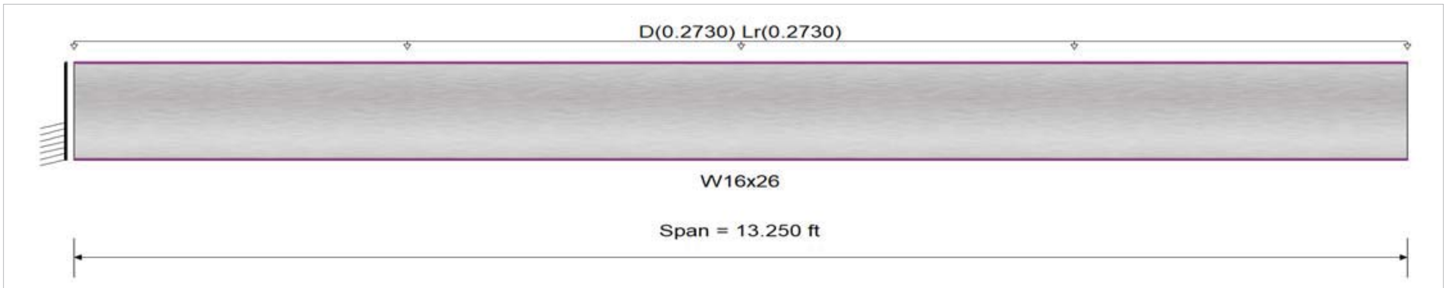
DESCRIPTION: Roof Beam B3

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Loads on all spans...
Uniform Load on ALL spans : D = 0.2730, Lr = 0.2730 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.455** : 1	Maximum Shear Stress Ratio =	**0.108** : 1
Section used for this span	**W16x26**	Section used for this span	**W16x26**
Ma : Applied	50.223 k-ft	Va : Applied	7.581 k
Mn / Omega : Allowable	110.279 k-ft	Vn/Omega : Allowable	70.509 k
Load Combination	+D+Lr+H	Load Combination	+D+Lr+H
Location of maximum on span	0.000 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.208 in	Ratio =	1,530 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.436 in	Ratio =	730 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 13.25 ft	1	0.238	0.056		-26.26	26.26	184.17	110.28	1.00	1.00	3.96	117.75	70.51
+D+L+H													
Dsgn. L = 13.25 ft	1	0.238	0.056		-26.26	26.26	184.17	110.28	1.00	1.00	3.96	117.75	70.51
+D+Lr+H													
Dsgn. L = 13.25 ft	1	0.455	0.108		-50.22	50.22	184.17	110.28	1.00	1.00	7.58	117.75	70.51
+D+S+H													
Dsgn. L = 13.25 ft	1	0.238	0.056		-26.26	26.26	184.17	110.28	1.00	1.00	3.96	117.75	70.51
+D+0.750Lr+0.750L+H													
Dsgn. L = 13.25 ft	1	0.401	0.095		-44.23	44.23	184.17	110.28	1.00	1.00	6.68	117.75	70.51
+D+0.750L+0.750S+H													
Dsgn. L = 13.25 ft	1	0.238	0.056		-26.26	26.26	184.17	110.28	1.00	1.00	3.96	117.75	70.51
+D+W+H													
Dsgn. L = 13.25 ft	1	0.238	0.056		-26.26	26.26	184.17	110.28	1.00	1.00	3.96	117.75	70.51
+D+0.70E+H													
Dsgn. L = 13.25 ft	1	0.238	0.056		-26.26	26.26	184.17	110.28	1.00	1.00	3.96	117.75	70.51
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 13.25 ft	1	0.401	0.095		-44.23	44.23	184.17	110.28	1.00	1.00	6.68	117.75	70.51
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 13.25 ft	1	0.238	0.056		-26.26	26.26	184.17	110.28	1.00	1.00	3.96	117.75	70.51
+D+0.750Lr+0.750L+0.5250E+H													
Dsgn. L = 13.25 ft	1	0.401	0.095		-44.23	44.23	184.17	110.28	1.00	1.00	6.68	117.75	70.51
+D+0.750L+0.750S+0.5250E+H													

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

DESCRIPTION: Roof Beam B3

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 13.25 ft	1	0.238	0.056		-26.26	26.26	184.17	110.28	1.00	1.00	3.96	117.75	70.51
+0.60D+W+H													
Dsgn. L = 13.25 ft	1	0.143	0.034		-15.76	15.76	184.17	110.28	1.00	1.00	2.38	117.75	70.51
+0.60D+0.70E+H													
Dsgn. L = 13.25 ft	1	0.143	0.034		-15.76	15.76	184.17	110.28	1.00	1.00	2.38	117.75	70.51

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.4355	13.250		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.581	
Overall MINimum	2.378	
D Only	3.964	
+D+L+H	3.964	
+D+Lr+H	7.581	
+D+S+H	3.964	
+D+0.750Lr+0.750L+H	6.677	
+D+0.750L+0.750S+H	3.964	
+D+W+H	3.964	
+D+0.70E+H	3.964	
+D+0.750Lr+0.750L+0.750W+H	6.677	
+D+0.750L+0.750S+0.750W+H	3.964	
+D+0.750Lr+0.750L+0.5250E+H	6.677	
+D+0.750L+0.750S+0.5250E+H	3.964	
+0.60D+W+H	2.378	
+0.60D+0.70E+H	2.378	
D Only	3.964	
Lr Only	3.617	
L Only		
S Only		
W Only		
E Only		
H Only		

Steel Beam

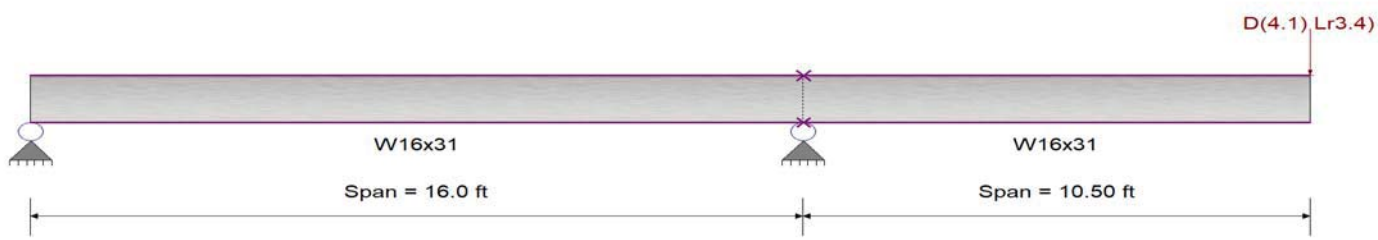
DESCRIPTION: Roof Beam B4

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load(s) for Span Number 2
Point Load : D = 4.10, Lr = 3.40 k @ 10.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.597 : 1	Maximum Shear Stress Ratio =	0.089 : 1
Section used for this span	W16x31	Section used for this span	W16x31
Ma : Applied	80.463 k-ft	Va : Applied	7.826 k
Mn / Omega : Allowable	134.731 k-ft	Vn/Omega : Allowable	87.450 k
Load Combination	+D+Lr+H, LL Comb Run (*L)	Load Combination	+D+Lr+H, LL Comb Run (*L)
Location of maximum on span	16.000 ft	Location of maximum on span	16.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.526 in	Ratio =	479 >=360
Max Upward Transient Deflection	-0.094 in	Ratio =	2,050 >=360
Max Downward Total Deflection	1.173 in	Ratio =	215 >=180
Max Upward Total Deflection	-0.207 in	Ratio =	928 >=180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 16.00 ft	1	0.597	0.089		-80.46	80.46	225.00	134.73	1.00	1.00	7.83	131.18	87.45
Dsgn. L = 10.50 ft	2	0.597	0.089		-80.46	80.46	225.00	134.73	1.00	1.00	7.83	131.18	87.45
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 16.00 ft	1	0.597	0.089		-80.46	80.46	225.00	134.73	1.00	1.00	7.83	131.18	87.45
Dsgn. L = 10.50 ft	2	0.597	0.089		-80.46	80.46	225.00	134.73	1.00	1.00	7.83	131.18	87.45
+D+S+H													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

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Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Roof Beam B4

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750Lr+0.750L+H, LL Comb Run (*													
Dsgn. L = 16.00 ft	1	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
Dsgn. L = 10.50 ft	2	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
+D+0.750Lr+0.750L+H, LL Comb Run (L													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750Lr+0.750L+H, LL Comb Run (L													
Dsgn. L = 16.00 ft	1	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
Dsgn. L = 10.50 ft	2	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
+D+0.750L+0.750S+H, LL Comb Run (*L													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750L+0.750S+H, LL Comb Run (L*													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750L+0.750S+H, LL Comb Run (LL													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+W+H													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.70E+H													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 16.00 ft	1	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
Dsgn. L = 10.50 ft	2	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750Lr+0.750L+0.750W+H, LL Com													
Dsgn. L = 16.00 ft	1	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
Dsgn. L = 10.50 ft	2	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
+D+0.750L+0.750S+0.750W+H, LL Comt													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750L+0.750S+0.750W+H, LL Comt													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750L+0.750S+0.750W+H, LL Comt													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750Lr+0.750L+0.5250E+H, LL Con													
Dsgn. L = 16.00 ft	1	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
Dsgn. L = 10.50 ft	2	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
+D+0.750Lr+0.750L+0.5250E+H, LL Con													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750Lr+0.750L+0.5250E+H, LL Con													
Dsgn. L = 16.00 ft	1	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
Dsgn. L = 10.50 ft	2	0.531	0.080		-71.54	71.54	225.00	134.73	1.00	1.00	6.98	131.18	87.45
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+D+0.750L+0.750S+0.5250E+H, LL Com													
Dsgn. L = 16.00 ft	1	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
Dsgn. L = 10.50 ft	2	0.332	0.051		-44.76	44.76	225.00	134.73	1.00	1.00	4.43	131.18	87.45
+0.60D+W+H													
Dsgn. L = 16.00 ft	1	0.199	0.030		-26.86	26.86	225.00	134.73	1.00	1.00	2.66	131.18	87.45
Dsgn. L = 10.50 ft	2	0.199	0.030		-26.86	26.86	225.00	134.73	1.00	1.00	2.66	131.18	87.45
+0.60D+0.70E+H													
Dsgn. L = 16.00 ft	1	0.199	0.030		-26.86	26.86	225.00	134.73	1.00	1.00	2.66	131.18	87.45
Dsgn. L = 10.50 ft	2	0.199	0.030		-26.86	26.86	225.00	134.73	1.00	1.00	2.66	131.18	87.45

Steel Beam

DESCRIPTION: Roof Beam B4

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+Lr+H	-0.2069	9.280
+D+Lr+H	2	1.1731	10.500		0.0000	9.280

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-4.780	13.104	
Overall MINimum	-1.529	4.484	
D Only	-2.549	7.473	
+D+L+H, LL Comb Run (*L)	-2.549	7.473	
+D+L+H, LL Comb Run (L*)	-2.549	7.473	
+D+L+H, LL Comb Run (LL)	-2.549	7.473	
+D+Lr+H, LL Comb Run (*L)	-4.780	13.104	
+D+Lr+H, LL Comb Run (L*)	-2.549	7.473	
+D+Lr+H, LL Comb Run (LL)	-4.780	13.104	
+D+S+H	-2.549	7.473	
+D+0.750Lr+0.750L+H, LL Comb Run (*	-4.223	11.696	
+D+0.750Lr+0.750L+H, LL Comb Run (L	-2.549	7.473	
+D+0.750Lr+0.750L+H, LL Comb Run (L	-4.223	11.696	
+D+0.750L+0.750S+H, LL Comb Run (*L	-2.549	7.473	
+D+0.750L+0.750S+H, LL Comb Run (L*	-2.549	7.473	
+D+0.750L+0.750S+H, LL Comb Run (LL	-2.549	7.473	
+D+W+H	-2.549	7.473	
+D+0.70E+H	-2.549	7.473	
+D+0.750Lr+0.750L+0.750W+H, LL Com	-4.223	11.696	
+D+0.750Lr+0.750L+0.750W+H, LL Com	-2.549	7.473	
+D+0.750Lr+0.750L+0.750W+H, LL Com	-4.223	11.696	
+D+0.750L+0.750S+0.750W+H, LL Comt	-2.549	7.473	
+D+0.750L+0.750S+0.750W+H, LL Comt	-2.549	7.473	
+D+0.750L+0.750S+0.750W+H, LL Comt	-2.549	7.473	
+D+0.750Lr+0.750L+0.5250E+H, LL Cor	-4.223	11.696	
+D+0.750Lr+0.750L+0.5250E+H, LL Cor	-2.549	7.473	
+D+0.750Lr+0.750L+0.5250E+H, LL Cor	-4.223	11.696	
+D+0.750L+0.750S+0.5250E+H, LL Com	-2.549	7.473	
+D+0.750L+0.750S+0.5250E+H, LL Com	-2.549	7.473	
+D+0.750L+0.750S+0.5250E+H, LL Com	-2.549	7.473	
+0.60D+W+H	-1.529	4.484	
+0.60D+0.70E+H	-1.529	4.484	
D Only	-2.549	7.473	
Lr Only, LL Comb Run (*L)	-2.231	5.631	
Lr Only, LL Comb Run (L*)			
Lr Only, LL Comb Run (LL)	-2.231	5.631	
L Only, LL Comb Run (*L)			
L Only, LL Comb Run (L*)			
L Only, LL Comb Run (LL)			
S Only			
W Only			
E Only			
H Only			

B5

SPAN 22'

$w_D = 20psf(1') + 10psf(6') = 80plf$

$w_L = 20psf(1') = 20plf$

$\boxed{\text{USE } 5\tfrac{1}{8} \times 12 \text{ GLB}}$ REF OUTPUT

B6

SPAN = 19.5'

TRIB WIDTH = 21'

$\boxed{\text{USE } 5\tfrac{1}{8} \times 16.5 \text{ GLB}}$

REF OUTPUT

B7

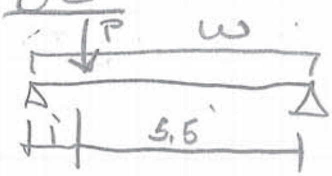
SPAN 6.5'

TRIB WIDTH = 9'

$\boxed{\text{USE (2) } 2 \times 8}$

REF OUTPUT

B8



$w_D = w_L = 20psf(13.33/2) = 133plf$

$P = R_{B9}$ $P_D = P_L = 5.37^K$

$\boxed{\text{USE } 5\tfrac{1}{8} \times 12 \text{ GLB}}$ REF OUTPUT

B9

Same as B6

Wood Beam

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.2.24 .
Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Roof Beam B5

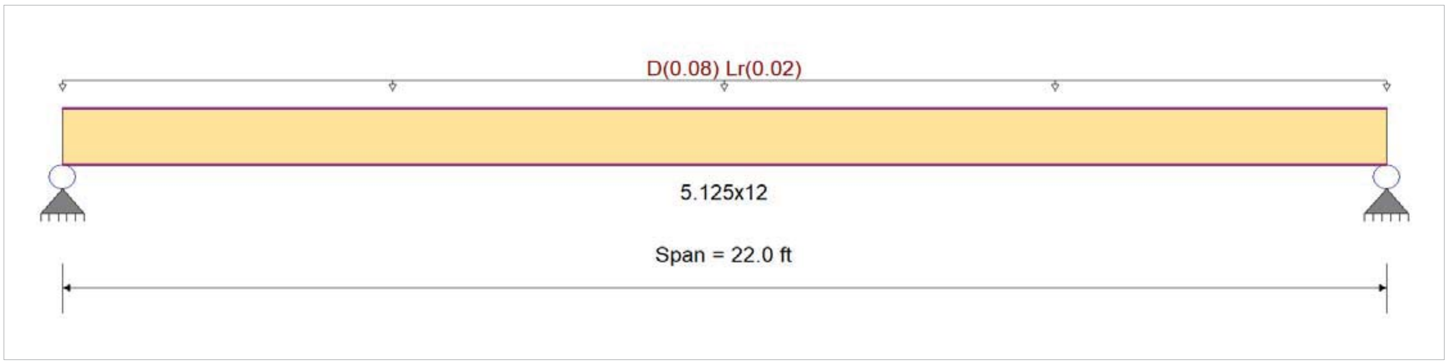
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-05	Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Wood Species	: DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Wood Grade	: 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0 ksi
		Ft	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.080, Lr = 0.020 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.220** : 1	Maximum Shear Stress Ratio	=	**0.082** : 1
Section used for this span		**5.125x12**	Section used for this span		**5.125x12**
	=	472.20 psi		=	19.58 psi
	=	2,149.98 psi		=	238.50 psi
Load Combination		D Only	Load Combination		D Only
Location of maximum on span	=	11.000 ft	Location of maximum on span	=	21.036 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.080 in	Ratio =	3307 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.399 in	Ratio =	661 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C d	C F/V	C i	C r	C m	C t	C L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.220	0.082	0.90	0.995	1.00	1.00	1.00	1.00	1.00	4.84	472.20	2149.98	0.80	19.58	238.50
+D+L+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.198	0.074	1.00	0.995	1.00	1.00	1.00	1.00	1.00	4.84	472.20	2388.86	0.80	19.58	265.00
+D+Lr+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.198	0.074	1.25	0.995	1.00	1.00	1.00	1.00	1.00	6.05	590.24	2986.08	1.00	24.48	331.25
+D+S+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.172	0.064	1.15	0.995	1.00	1.00	1.00	1.00	1.00	4.84	472.20	2747.19	0.80	19.58	304.75
+D+0.750Lr+0.750L+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.188	0.070	1.25	0.995	1.00	1.00	1.00	1.00	1.00	5.75	560.73	2986.08	0.95	23.26	331.25
+D+0.750L+0.750S+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.172	0.064	1.15	0.995	1.00	1.00	1.00	1.00	1.00	4.84	472.20	2747.19	0.80	19.58	304.75
+D+W+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.124	0.046	1.60	0.995	1.00	1.00	1.00	1.00	1.00	4.84	472.20	3822.18	0.80	19.58	424.00

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: Roof Beam B5

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.124	0.046	1.60	0.995	1.00	1.00	1.00	1.00	1.00	4.84	472.20	3822.18	0.80	19.58	424.00
+D+0.750Lr+0.750L+0.750W+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.147	0.055	1.60	0.995	1.00	1.00	1.00	1.00	1.00	5.75	560.73	3822.18	0.95	23.26	424.00
+D+0.750L+0.750S+0.750W+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.124	0.046	1.60	0.995	1.00	1.00	1.00	1.00	1.00	4.84	472.20	3822.18	0.80	19.58	424.00
+D+0.750Lr+0.750L+0.5250E+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.147	0.055	1.60	0.995	1.00	1.00	1.00	1.00	1.00	5.75	560.73	3822.18	0.95	23.26	424.00
+D+0.750L+0.750S+0.5250E+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.124	0.046	1.60	0.995	1.00	1.00	1.00	1.00	1.00	4.84	472.20	3822.18	0.80	19.58	424.00
+0.60D+W+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.074	0.028	1.60	0.995	1.00	1.00	1.00	1.00	1.00	2.90	283.32	3822.18	0.48	11.75	424.00
+0.60D+0.70E+H					0.995	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.074	0.028	1.60	0.995	1.00	1.00	1.00	1.00	1.00	2.90	283.32	3822.18	0.48	11.75	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.3991	11.080		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.100	1.100
Overall MINimum	0.220	0.220
D Only	0.880	0.880
+D+L+H	0.880	0.880
+D+Lr+H	1.100	1.100
+D+S+H	0.880	0.880
+D+0.750Lr+0.750L+H	1.045	1.045
+D+0.750L+0.750S+H	0.880	0.880
+D+W+H	0.880	0.880
+D+0.70E+H	0.880	0.880
+D+0.750Lr+0.750L+0.750W+H	1.045	1.045
+D+0.750L+0.750S+0.750W+H	0.880	0.880
+D+0.750Lr+0.750L+0.5250E+H	1.045	1.045
+D+0.750L+0.750S+0.5250E+H	0.880	0.880
+0.60D+W+H	0.528	0.528
+0.60D+0.70E+H	0.528	0.528
D Only	0.880	0.880
Lr Only	0.220	0.220
L Only		
S Only		
W Only		
E Only		
H Only		

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
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Wood Beam

Lic. # : KW-06002046 **BARKER DROTTAR ASSOCIATES LLC**

DESCRIPTION: Roof Beam B6

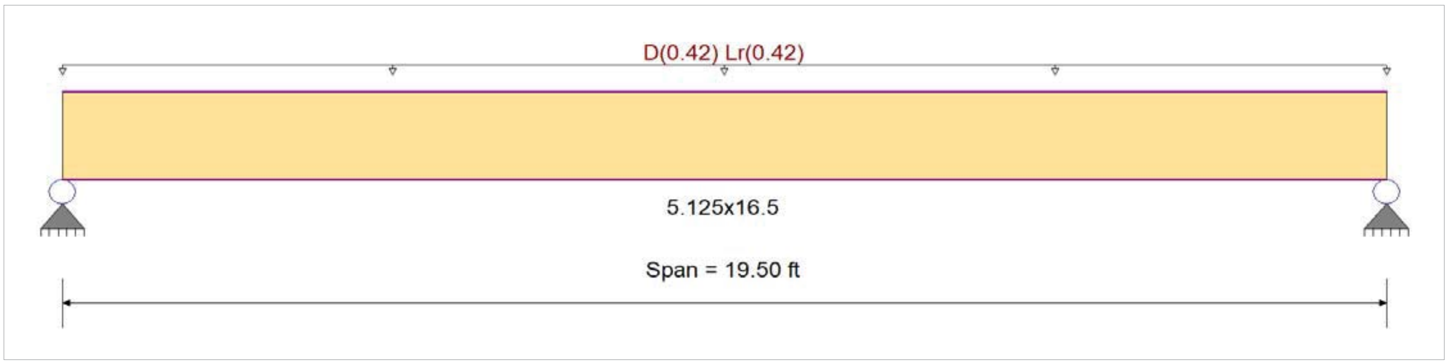
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-05	Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Wood Species	: DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Wood Grade	: 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0 ksi
		Ft	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 21.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.704** : 1	Maximum Shear Stress Ratio	=	**0.378** : 1
Section used for this span		**5.125x16.5**	Section used for this span		**5.125x16.5**
	=	2,060.29 psi		=	125.13 psi
	=	2,927.58 psi		=	331.25 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	9.750 ft	Location of maximum on span	=	18.148 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.398 in	Ratio =	587 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.796 in	Ratio =	293 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.489	0.262	0.90	0.976	1.00	1.00	1.00	1.00	1.00	19.96	1,030.15	2107.86	3.53	62.56	238.50
+D+L+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.440	0.236	1.00	0.976	1.00	1.00	1.00	1.00	1.00	19.96	1,030.15	2342.07	3.53	62.56	265.00
+D+Lr+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.704	0.378	1.25	0.976	1.00	1.00	1.00	1.00	1.00	39.93	2,060.29	2927.58	7.05	125.13	331.25
+D+S+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.382	0.205	1.15	0.976	1.00	1.00	1.00	1.00	1.00	19.96	1,030.15	2693.38	3.53	62.56	304.75
+D+0.750Lr+0.750L+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.616	0.331	1.25	0.976	1.00	1.00	1.00	1.00	1.00	34.94	1,802.76	2927.58	6.17	109.49	331.25
+D+0.750L+0.750S+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.382	0.205	1.15	0.976	1.00	1.00	1.00	1.00	1.00	19.96	1,030.15	2693.38	3.53	62.56	304.75
+D+W+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.275	0.148	1.60	0.976	1.00	1.00	1.00	1.00	1.00	19.96	1,030.15	3747.31	3.53	62.56	424.00

Wood Beam

DESCRIPTION: Roof Beam B6

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.275	0.148	1.60	0.976	1.00	1.00	1.00	1.00	1.00	19.96	1,030.15	3747.31	3.53	62.56	424.00
+D+0.750Lr+0.750L+0.750W+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.481	0.258	1.60	0.976	1.00	1.00	1.00	1.00	1.00	34.94	1,802.76	3747.31	6.17	109.49	424.00
+D+0.750L+0.750S+0.750W+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.275	0.148	1.60	0.976	1.00	1.00	1.00	1.00	1.00	19.96	1,030.15	3747.31	3.53	62.56	424.00
+D+0.750Lr+0.750L+0.5250E+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.481	0.258	1.60	0.976	1.00	1.00	1.00	1.00	1.00	34.94	1,802.76	3747.31	6.17	109.49	424.00
+D+0.750L+0.750S+0.5250E+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.275	0.148	1.60	0.976	1.00	1.00	1.00	1.00	1.00	19.96	1,030.15	3747.31	3.53	62.56	424.00
+0.60D+W+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.165	0.089	1.60	0.976	1.00	1.00	1.00	1.00	1.00	11.98	618.09	3747.31	2.12	37.54	424.00
+0.60D+0.70E+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.165	0.089	1.60	0.976	1.00	1.00	1.00	1.00	1.00	11.98	618.09	3747.31	2.12	37.54	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.7960	9.821		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.190	8.190
Overall MINimum	4.095	4.095
D Only	4.095	4.095
+D+L+H	4.095	4.095
+D+Lr+H	8.190	8.190
+D+S+H	4.095	4.095
+D+0.750Lr+0.750L+H	7.166	7.166
+D+0.750L+0.750S+H	4.095	4.095
+D+W+H	4.095	4.095
+D+0.70E+H	4.095	4.095
+D+0.750Lr+0.750L+0.750W+H	7.166	7.166
+D+0.750L+0.750S+0.750W+H	4.095	4.095
+D+0.750Lr+0.750L+0.5250E+H	7.166	7.166
+D+0.750L+0.750S+0.5250E+H	4.095	4.095
+0.60D+W+H	2.457	2.457
+0.60D+0.70E+H	2.457	2.457
D Only	4.095	4.095
Lr Only	4.095	4.095
L Only		
S Only		
W Only		
E Only		
H Only		

Barker Structural
5960 S. Las Vegas Blvd Ste 300
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Wood Beam

DESCRIPTION: Roof Beam B7

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

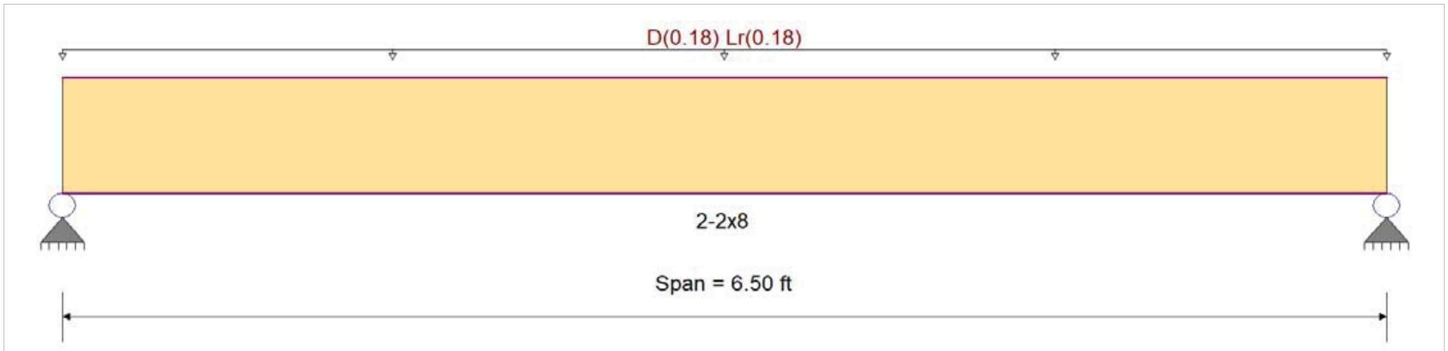
Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-05

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	875.0 psi	*E : Modulus of Elasticity*		
Fb -	875.0 psi	Ebend- xx	1,300.0 ksi	
Fc - Prll	600.0 psi	Eminbend - xx	470.0 ksi	
Fc - Perp	625.0 psi			
Fv	170.0 psi			
Ft	425.0 psi	Density	31.210 pcf	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 9.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.661**: 1	Maximum Shear Stress Ratio	=	**0.310** : 1
Section used for this span		**2-2x8**	Section used for this span		**2-2x8**
	=	868.11 psi		=	65.97 psi
	=	1,312.50 psi		=	212.50 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	3.250 ft	Location of maximum on span	=	5.907 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.059 in	Ratio =	1328 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.117 in	Ratio =	664 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.459	0.216	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.95	434.05	945.00	0.48	32.98	153.00
+D+L+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.413	0.194	1.00	1.200	1.00	1.00	1.00	1.00	1.00	0.95	434.05	1050.00	0.48	32.98	170.00
+D+Lr+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.661	0.310	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.90	868.11	1312.50	0.96	65.97	212.50
+D+S+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.359	0.169	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.95	434.05	1207.50	0.48	32.98	195.50
+D+0.750Lr+0.750L+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.579	0.272	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.66	759.60	1312.50	0.84	57.72	212.50
+D+0.750L+0.750S+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.359	0.169	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.95	434.05	1207.50	0.48	32.98	195.50
+D+W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.258	0.121	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.95	434.05	1680.00	0.48	32.98	272.00

Barker Structural
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Wood Beam

Lic. # : KW-06002046 BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Roof Beam B7

Load Combination Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.70E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.258	0.121	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.95	434.05	1680.00	0.48	32.98	272.00
+D+0.750Lr+0.750L+0.750W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.452	0.212	1.60	1.200	1.00	1.00	1.00	1.00	1.00	1.66	759.60	1680.00	0.84	57.72	272.00
+D+0.750L+0.750S+0.750W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.258	0.121	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.95	434.05	1680.00	0.48	32.98	272.00
+D+0.750Lr+0.750L+0.5250E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.452	0.212	1.60	1.200	1.00	1.00	1.00	1.00	1.00	1.66	759.60	1680.00	0.84	57.72	272.00
+D+0.750L+0.750S+0.5250E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.258	0.121	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.95	434.05	1680.00	0.48	32.98	272.00
+0.60D+W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.155	0.073	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.57	260.43	1680.00	0.29	19.79	272.00
+0.60D+0.70E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.155	0.073	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.57	260.43	1680.00	0.29	19.79	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.1174	3.274		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.170	1.170
Overall MINimum	0.585	0.585
D Only	0.585	0.585
+D+L+H	0.585	0.585
+D+Lr+H	1.170	1.170
+D+S+H	0.585	0.585
+D+0.750Lr+0.750L+H	1.024	1.024
+D+0.750L+0.750S+H	0.585	0.585
+D+W+H	0.585	0.585
+D+0.70E+H	0.585	0.585
+D+0.750Lr+0.750L+0.750W+H	1.024	1.024
+D+0.750L+0.750S+0.750W+H	0.585	0.585
+D+0.750Lr+0.750L+0.5250E+H	1.024	1.024
+D+0.750L+0.750S+0.5250E+H	0.585	0.585
+0.60D+W+H	0.351	0.351
+0.60D+0.70E+H	0.351	0.351
D Only	0.585	0.585
Lr Only	0.585	0.585
L Only		
S Only		
W Only		
E Only		
H Only		

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: Roof Beam B8

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-05

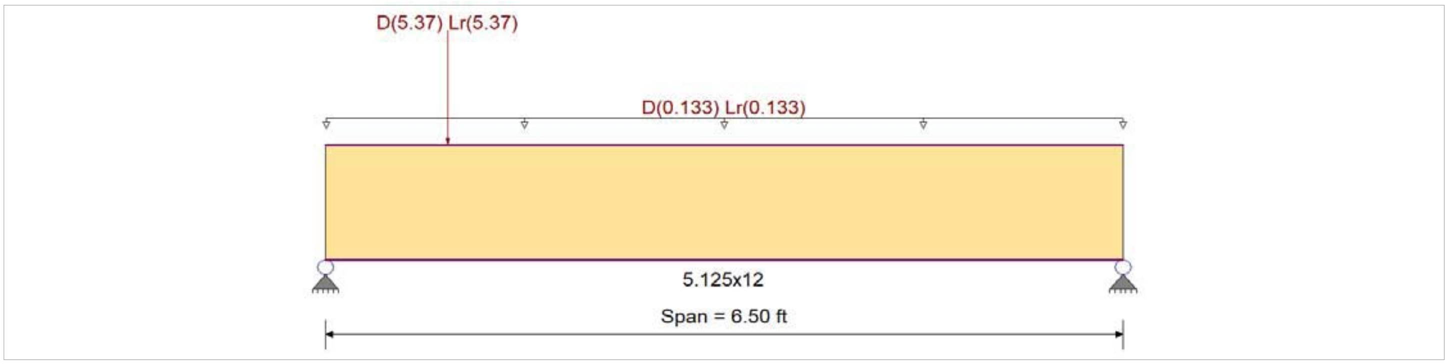
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0	psi
Fb -	1,850.0	psi
Fc - Prll	1,650.0	psi
Fc - Perp	650.0	psi
Fv	265.0	psi
Ft	1,100.0	psi

E : Modulus of Elasticity

Ebend- xx	1,800.0	ksi
Eminbend - xx	950.0	ksi
Ebend- yy	1,600.0	ksi
Eminbend - yy	850.0	ksi
Density	31.210	pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.1330, Lr = 0.1330 , Tributary Width = 1.0 ft
Point Load : D = 5.370, Lr = 5.370 k @ 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.319** : 1	Maximum Shear Stress Ratio	=	**0.713** : 1
Section used for this span		**5.125x12**	Section used for this span		**5.125x12**
	=	955.90 psi		=	236.27 psi
	=	3,000.00 psi		=	331.25 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	1.020 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.022 in	Ratio =	3486 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.045 in	Ratio =	1743 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.221	0.495	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.90	477.95	2160.00	4.84	118.14	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.199	0.446	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.90	477.95	2400.00	4.84	118.14	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.319	0.713	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.80	955.90	3000.00	9.69	236.27	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.173	0.388	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.90	477.95	2760.00	4.84	118.14	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.279	0.624	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.57	836.41	3000.00	8.48	206.74	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.173	0.388	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.90	477.95	2760.00	4.84	118.14	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Wood Beam

Lic. # : KW-06002046 BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Roof Beam B8

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
Length = 6.50 ft	1	0.124	0.279	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.90	477.95	3840.00	4.84	118.14	424.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.124	0.279	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.90	477.95	3840.00	4.84	118.14	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.218	0.488	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.57	836.41	3840.00	8.48	206.74	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.124	0.279	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.90	477.95	3840.00	4.84	118.14	424.00
+D+0.750Lr+0.750L+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.218	0.488	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.57	836.41	3840.00	8.48	206.74	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.124	0.279	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.90	477.95	3840.00	4.84	118.14	424.00
+0.60D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.075	0.167	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.94	286.77	3840.00	2.91	70.88	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.50 ft	1	0.075	0.167	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.94	286.77	3840.00	2.91	70.88	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0447	2.894		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.952	2.517
Overall MINimum	4.976	1.258
D Only	4.976	1.258
+D+L+H	4.976	1.258
+D+Lr+H	9.952	2.517
+D+S+H	4.976	1.258
+D+0.750Lr+0.750L+H	8.708	2.202
+D+0.750L+0.750S+H	4.976	1.258
+D+W+H	4.976	1.258
+D+0.70E+H	4.976	1.258
+D+0.750Lr+0.750L+0.750W+H	8.708	2.202
+D+0.750L+0.750S+0.750W+H	4.976	1.258
+D+0.750Lr+0.750L+0.5250E+H	8.708	2.202
+D+0.750L+0.750S+0.5250E+H	4.976	1.258
+0.60D+W+H	2.986	0.755
+0.60D+0.70E+H	2.986	0.755
D Only	4.976	1.258
Lr Only	4.976	1.258
L Only		
S Only		
W Only		
E Only		
H Only		

BARKER STRUCTURAL

Project: 31 Water St Mixed Use | Job No. 218029
Date 3/27/2020 | Sheet No. 24
By | Chkd KG

JOISTS J1

SPAN = 10' TRIB WIDTH = 2'

$\boxed{\text{USE 2x8 @ 24" OC.}}$ REF OUTPUT

JOISTS J2

SPAN 16'

$\boxed{\text{USE 2x12 @ 24" OC}}$ REF OUTPUT

JOISTS J3

Replaced with Trusses

JOISTS J4

SPAN = 11.33'

$\boxed{\text{USE 2x8 @ 24" OC.}}$ REF OUTPUT

J5

Replaced with Trusses

J6

Replaced with Trusses

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .
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Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Roof Joists J1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-05

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

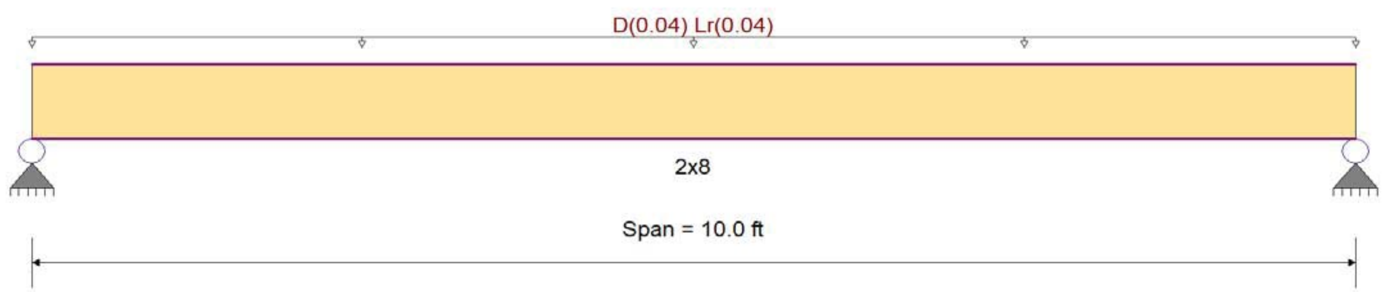
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	750.0	psi
Fb -	750.0	psi
Fc - Prll	700.0	psi
Fc - Perp	625.0	psi
Fv	170.0	psi
Ft	475.0	psi

E : Modulus of Elasticity

Ebend- xx	1,300.0	ksi
Eminbend - xx	470.0	ksi
Density	31.210	pcf

Repetitive Member Stress Increase



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.706** : 1	Maximum Shear Stress Ratio	=	**0.229** : 1
Section used for this span		**2x8**	Section used for this span		**2x8**
	=	913.20 psi		=	48.73 psi
	=	1,293.75 psi		=	212.50 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.146 in	Ratio =	820 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.292 in	Ratio =	410 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.490	0.159	0.90	1.200	1.00	1.15	1.00	1.00	1.00	0.50	456.60	931.50	0.18	24.36	153.00
+D+L+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.441	0.143	1.00	1.200	1.00	1.15	1.00	1.00	1.00	0.50	456.60	1035.00	0.18	24.36	170.00
+D+Lr+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.706	0.229	1.25	1.200	1.00	1.15	1.00	1.00	1.00	1.00	913.20	1293.75	0.35	48.73	212.50
+D+S+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.384	0.125	1.15	1.200	1.00	1.15	1.00	1.00	1.00	0.50	456.60	1190.25	0.18	24.36	195.50
+D+0.750Lr+0.750L+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.618	0.201	1.25	1.200	1.00	1.15	1.00	1.00	1.00	0.88	799.05	1293.75	0.31	42.64	212.50
+D+0.750L+0.750S+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.384	0.125	1.15	1.200	1.00	1.15	1.00	1.00	1.00	0.50	456.60	1190.25	0.18	24.36	195.50
+D+W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.276	0.090	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.50	456.60	1656.00	0.18	24.36	272.00

Wood Beam

DESCRIPTION: Roof Joists J1

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.276	0.090	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.50	456.60	1656.00	0.18	24.36	272.00
+D+0.750Lr+0.750L+0.750W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.483	0.157	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.88	799.05	1656.00	0.31	42.64	272.00
+D+0.750L+0.750S+0.750W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.276	0.090	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.50	456.60	1656.00	0.18	24.36	272.00
+D+0.750Lr+0.750L+0.5250E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.483	0.157	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.88	799.05	1656.00	0.31	42.64	272.00
+D+0.750L+0.750S+0.5250E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.276	0.090	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.50	456.60	1656.00	0.18	24.36	272.00
+0.60D+W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.165	0.054	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.30	273.96	1656.00	0.11	14.62	272.00
+0.60D+0.70E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.165	0.054	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.30	273.96	1656.00	0.11	14.62	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.2924	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.400	0.400
Overall MINimum	0.200	0.200
D Only	0.200	0.200
+D+L+H	0.200	0.200
+D+Lr+H	0.400	0.400
+D+S+H	0.200	0.200
+D+0.750Lr+0.750L+H	0.350	0.350
+D+0.750L+0.750S+H	0.200	0.200
+D+W+H	0.200	0.200
+D+0.70E+H	0.200	0.200
+D+0.750Lr+0.750L+0.750W+H	0.350	0.350
+D+0.750L+0.750S+0.750W+H	0.200	0.200
+D+0.750Lr+0.750L+0.5250E+H	0.350	0.350
+D+0.750L+0.750S+0.5250E+H	0.200	0.200
+0.60D+W+H	0.120	0.120
+0.60D+0.70E+H	0.120	0.120
D Only	0.200	0.200
Lr Only	0.200	0.200
L Only		
S Only		
W Only		
E Only		
H Only		

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .

Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

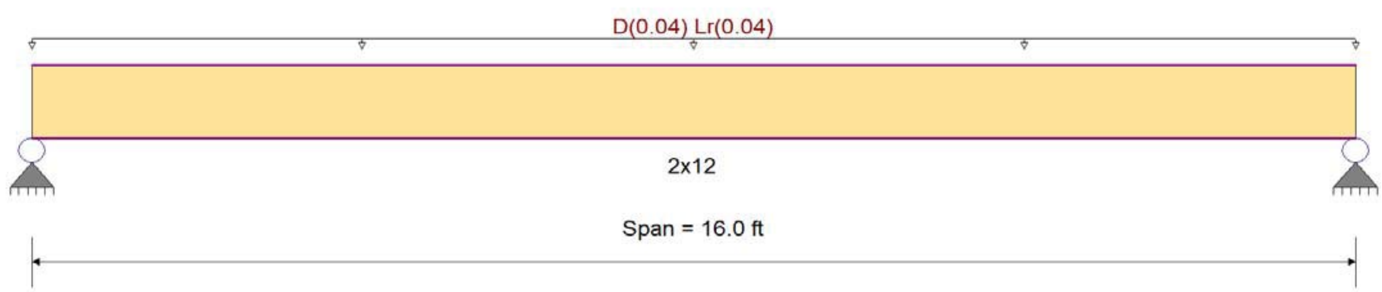
DESCRIPTION: Roof Joists J2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	750.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-05	Fb -	750.0 psi	Ebend- xx	1,300.0 ksi
		Fc - Prll	700.0 psi	Eminbend - xx	470.0 ksi
Wood Species	: Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade	: No.2	Fv	170.0 psi		
		Ft	475.0 psi	Density	31.210 pcf
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.901**: 1	Maximum Shear Stress Ratio	=	**0.236** : 1
Section used for this span		**2x12**	Section used for this span		**2x12**
	=	970.90 psi		=	50.24 psi
	=	1,078.13 psi		=	212.50 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	8.000 ft	Location of maximum on span	=	15.066 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.256 in	Ratio =	748 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.513 in	Ratio =	374 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.625	0.164	0.90	1.000	1.00	1.15	1.00	1.00	1.00	1.28	485.45	776.25	0.28	25.12	153.00
+D+L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.563	0.148	1.00	1.000	1.00	1.15	1.00	1.00	1.00	1.28	485.45	862.50	0.28	25.12	170.00
+D+Lr+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.901	0.236	1.25	1.000	1.00	1.15	1.00	1.00	1.00	2.56	970.90	1078.13	0.57	50.24	212.50
+D+S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.489	0.129	1.15	1.000	1.00	1.15	1.00	1.00	1.00	1.28	485.45	991.88	0.28	25.12	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.788	0.207	1.25	1.000	1.00	1.15	1.00	1.00	1.00	2.24	849.54	1078.13	0.49	43.96	212.50
+D+0.750L+0.750S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.489	0.129	1.15	1.000	1.00	1.15	1.00	1.00	1.00	1.28	485.45	991.88	0.28	25.12	195.50
+D+W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.352	0.092	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.28	485.45	1380.00	0.28	25.12	272.00

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: Roof Joists J2

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.70E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.352	0.092	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.28	485.45	1380.00	0.28	25.12	272.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.616	0.162	1.60	1.000	1.00	1.15	1.00	1.00	1.00	2.24	849.54	1380.00	0.49	43.96	272.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.352	0.092	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.28	485.45	1380.00	0.28	25.12	272.00
+D+0.750Lr+0.750L+0.5250E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.616	0.162	1.60	1.000	1.00	1.15	1.00	1.00	1.00	2.24	849.54	1380.00	0.49	43.96	272.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.352	0.092	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.28	485.45	1380.00	0.28	25.12	272.00
+0.60D+W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.211	0.055	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.77	291.27	1380.00	0.17	15.07	272.00
+0.60D+0.70E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.211	0.055	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.77	291.27	1380.00	0.17	15.07	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.5128	8.058		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.640	0.640
Overall MINimum	0.320	0.320
D Only	0.320	0.320
+D+L+H	0.320	0.320
+D+Lr+H	0.640	0.640
+D+S+H	0.320	0.320
+D+0.750Lr+0.750L+H	0.560	0.560
+D+0.750L+0.750S+H	0.320	0.320
+D+W+H	0.320	0.320
+D+0.70E+H	0.320	0.320
+D+0.750Lr+0.750L+0.750W+H	0.560	0.560
+D+0.750L+0.750S+0.750W+H	0.320	0.320
+D+0.750Lr+0.750L+0.5250E+H	0.560	0.560
+D+0.750L+0.750S+0.5250E+H	0.320	0.320
+0.60D+W+H	0.192	0.192
+0.60D+0.70E+H	0.192	0.192
D Only	0.320	0.320
Lr Only	0.320	0.320
L Only		
S Only		
W Only		
E Only		
H Only		

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

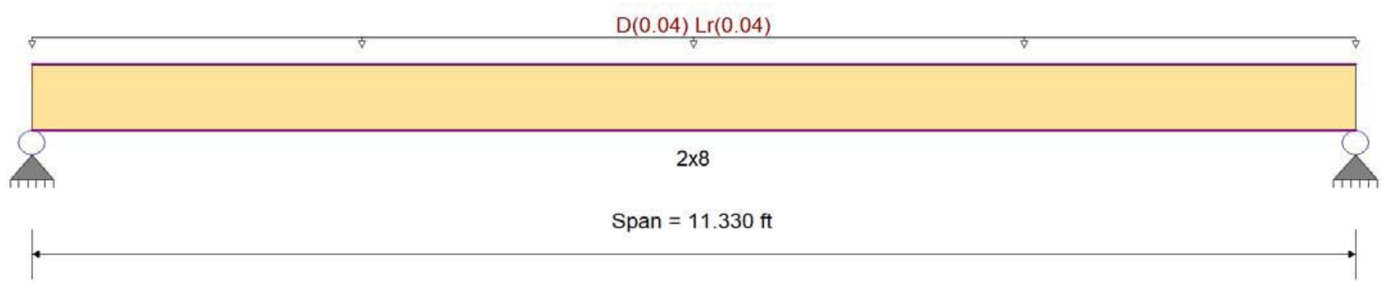
DESCRIPTION: Roof Joists J4

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	750.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-05	Fb -	750.0 psi	Ebend- xx	1,300.0 ksi
		Fc - Prll	700.0 psi	Eminbend - xx	470.0 ksi
Wood Species	: Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade	: No.2	Fv	170.0 psi		
		Ft	475.0 psi	Density	31.210 pcf
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.020, Lr = 0.020 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.906**: 1	Maximum Shear Stress Ratio	=	**0.264** : 1
Section used for this span		**2x8**	Section used for this span		**2x8**
	=	1,172.26 psi		=	56.12 psi
	=	1,293.75 psi		=	212.50 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	5.665 ft	Location of maximum on span	=	10.751 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.241 in	Ratio =	564 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.482 in	Ratio =	282 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.629	0.183	0.90	1.200	1.00	1.15	1.00	1.00	1.00	0.64	586.13	931.50	0.20	28.06	153.00
+D+L+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.566	0.165	1.00	1.200	1.00	1.15	1.00	1.00	1.00	0.64	586.13	1035.00	0.20	28.06	170.00
+D+Lr+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.906	0.264	1.25	1.200	1.00	1.15	1.00	1.00	1.00	1.28	1,172.26	1293.75	0.41	56.12	212.50
+D+S+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.492	0.144	1.15	1.200	1.00	1.15	1.00	1.00	1.00	0.64	586.13	1190.25	0.20	28.06	195.50
+D+0.750Lr+0.750L+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.793	0.231	1.25	1.200	1.00	1.15	1.00	1.00	1.00	1.12	1,025.73	1293.75	0.36	49.11	212.50
+D+0.750L+0.750S+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.492	0.144	1.15	1.200	1.00	1.15	1.00	1.00	1.00	0.64	586.13	1190.25	0.20	28.06	195.50
+D+W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.354	0.103	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.64	586.13	1656.00	0.20	28.06	272.00

BARKER STRUCTURAL
Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: Roof Joists J4

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.354	0.103	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.64	586.13	1656.00	0.20	28.06	272.00
+D+0.750Lr+0.750L+0.750W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.619	0.181	1.60	1.200	1.00	1.15	1.00	1.00	1.00	1.12	1,025.73	1656.00	0.36	49.11	272.00
+D+0.750L+0.750S+0.750W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.354	0.103	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.64	586.13	1656.00	0.20	28.06	272.00
+D+0.750Lr+0.750L+0.5250E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.619	0.181	1.60	1.200	1.00	1.15	1.00	1.00	1.00	1.12	1,025.73	1656.00	0.36	49.11	272.00
+D+0.750L+0.750S+0.5250E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.354	0.103	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.64	586.13	1656.00	0.20	28.06	272.00
+0.60D+W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.212	0.062	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.39	351.68	1656.00	0.12	16.84	272.00
+0.60D+0.70E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.330 ft	1	0.212	0.062	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.39	351.68	1656.00	0.12	16.84	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.4818	5.706		0.0000	0.000

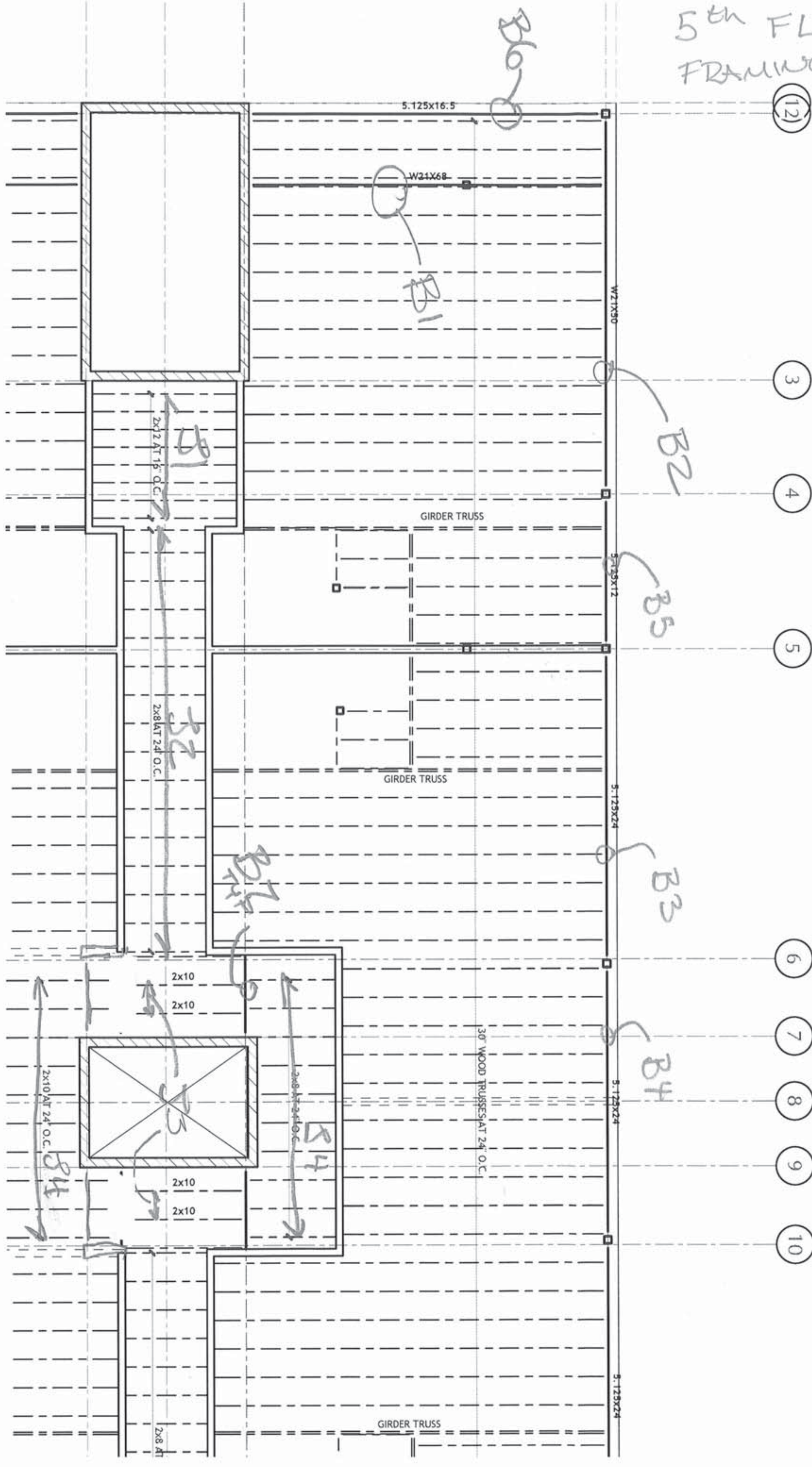
Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.453	0.453
Overall MINimum	0.227	0.227
D Only	0.227	0.227
+D+L+H	0.227	0.227
+D+Lr+H	0.453	0.453
+D+S+H	0.227	0.227
+D+0.750Lr+0.750L+H	0.397	0.397
+D+0.750L+0.750S+H	0.227	0.227
+D+W+H	0.227	0.227
+D+0.70E+H	0.227	0.227
+D+0.750Lr+0.750L+0.750W+H	0.397	0.397
+D+0.750L+0.750S+0.750W+H	0.227	0.227
+D+0.750Lr+0.750L+0.5250E+H	0.397	0.397
+D+0.750L+0.750S+0.5250E+H	0.227	0.227
+0.60D+W+H	0.136	0.136
+0.60D+0.70E+H	0.136	0.136
D Only	0.227	0.227
Lr Only	0.227	0.227
L Only		
S Only		
W Only		
E Only		
H Only		

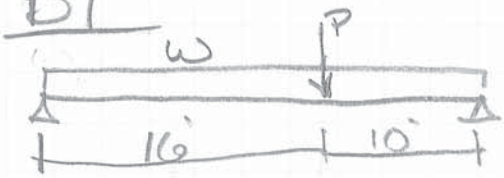
5th FL.
FRAMING PLAN



5th FLOOR FRAMING

DL = 30 psf LL = 40 psf
LL = 60 psf (BALCONY - USED THROUGHOUT 5th FLOOR)

B1



$w_D = 30psf(2') = 60plf$
$w_L = 60psf(2') = 120plf$

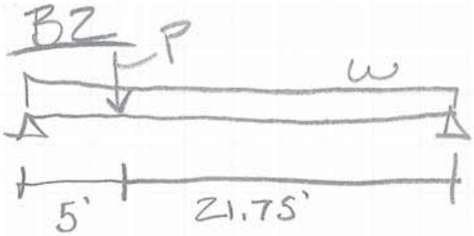
P = REACTION OF ROOF BEAMS B2 & B4

$P_D = 9{,}587 + 7{,}473 = 17.06^K$
$P_L = 8{,}584 + 5{,}631 = 14.22^K$

$\boxed{\text{USE W21x68}}$

REF OUTPUT

B2



$W_D = 30psf(26.25/2) + 10(8') = 474plf$
$W_L = 60psf(26.25/2) = 788plf$

$P = R_{B1}$ $P_D = 11.15^K$ $P_{Lr} = 8.64^K$ $P_L = 1.56^K$

$\boxed{\text{USE W21x50}}$ REF OUTPUT

B3

SPAN = 22' $W_D = 30psf(28.5/2) + 10(8) = 508plf$
$W_L = 60psf(28.5/2) = 855plf$

$\boxed{\text{USE 5 1/8 x 24 GLB}}$

B4

SPAN = 19.33' $W_D = 30(19.5/2) + 10(8) = 293plf$
$W_L = 100(19.5/2) = 975plf$

FOR GYM

$\boxed{\text{USE 5 1/8 x 24 GLB}}$ REF OUTPUT

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

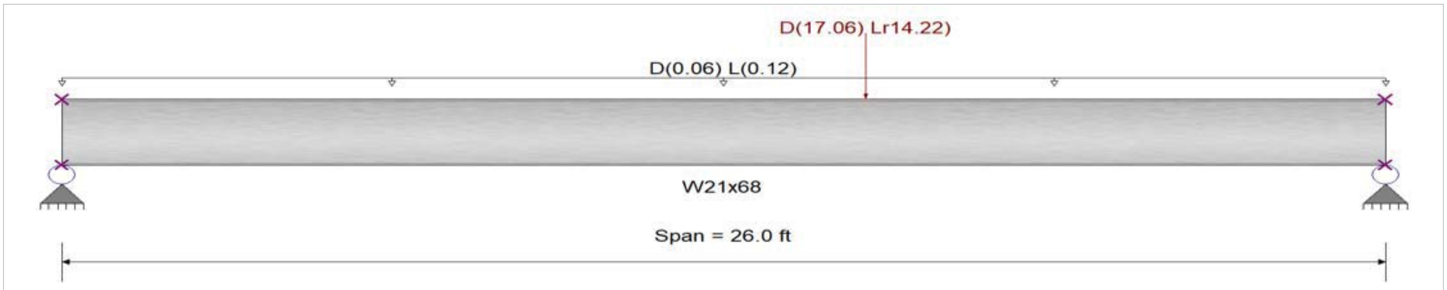
DESCRIPTION: 5th Floor Beam B1

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.060, L = 0.120 k/ft, Tributary Width = 1.0 ft

Point Load : D = 17.060, Lr = 14.220 k @ 15.80 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.955** : 1	Maximum Shear Stress Ratio =	**0.109** : 1
Section used for this span	**W21x68**	Section used for this span	**W21x68**
Ma : Applied	198.284 k-ft	Va : Applied	19.789 k
Mn / Omega : Allowable	207.531 k-ft	Vn/Omega : Allowable	181.460 k
Load Combination	+D+Lr+H	Load Combination	+D+Lr+H
Location of maximum on span	15.823ft	Location of maximum on span	26.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.198 in	Ratio =	1,576 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.450 in	Ratio =	694 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 26.00 ft	1	0.535	0.061	110.34		110.34	344.58	206.33	1.38	1.00	11.15	272.19	181.46
+D+L+H													
Dsgn. L = 26.00 ft	1	0.594	0.070	120.00		120.00	337.58	202.14	1.35	1.00	12.71	272.19	181.46
+D+Lr+H													
Dsgn. L = 26.00 ft	1	0.955	0.109	198.28		198.28	346.58	207.53	1.39	1.00	19.79	272.19	181.46
+D+S+H													
Dsgn. L = 26.00 ft	1	0.535	0.061	110.34		110.34	344.58	206.33	1.38	1.00	11.15	272.19	181.46
+D+0.750Lr+0.750L+H													
Dsgn. L = 26.00 ft	1	0.895	0.104	183.54		183.54	342.58	205.14	1.37	1.00	18.80	272.19	181.46
+D+0.750L+0.750S+H													
Dsgn. L = 26.00 ft	1	0.579	0.068	117.59		117.59	339.08	203.04	1.36	1.00	12.32	272.19	181.46
+D+W+H													
Dsgn. L = 26.00 ft	1	0.535	0.061	110.34		110.34	344.58	206.33	1.38	1.00	11.15	272.19	181.46
+D+0.70E+H													
Dsgn. L = 26.00 ft	1	0.535	0.061	110.34		110.34	344.58	206.33	1.38	1.00	11.15	272.19	181.46
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 26.00 ft	1	0.895	0.104	183.54		183.54	342.58	205.14	1.37	1.00	18.80	272.19	181.46
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 26.00 ft	1	0.579	0.068	117.59		117.59	339.08	203.04	1.36	1.00	12.32	272.19	181.46
+D+0.750Lr+0.750L+0.5250E+H													

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

DESCRIPTION: 5th Floor Beam B1

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 26.00 ft	1	0.895	0.104	183.54		183.54	342.58	205.14	1.37	1.00	18.80	272.19	181.46
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 26.00 ft	1	0.579	0.068	117.59		117.59	339.08	203.04	1.36	1.00	12.32	272.19	181.46
+0.60D+W+H													
Dsgn. L = 26.00 ft	1	0.321	0.037	66.20		66.20	344.58	206.33	1.38	1.00	6.69	272.19	181.46
+0.60D+0.70E+H													
Dsgn. L = 26.00 ft	1	0.321	0.037	66.20		66.20	344.58	206.33	1.38	1.00	6.69	272.19	181.46

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.4497	13.817		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	13.051	19.789
Overall MINimum	1.560	1.560
D Only	7.473	11.147
+D+L+H	9.033	12.707
+D+Lr+H	13.051	19.789
+D+S+H	7.473	11.147
+D+0.750Lr+0.750L+H	12.827	18.798
+D+0.750L+0.750S+H	8.643	12.317
+D+W+H	7.473	11.147
+D+0.70E+H	7.473	11.147
+D+0.750Lr+0.750L+0.750W+H	12.827	18.798
+D+0.750L+0.750S+0.750W+H	8.643	12.317
+D+0.750Lr+0.750L+0.5250E+H	12.827	18.798
+D+0.750L+0.750S+0.5250E+H	8.643	12.317
+0.60D+W+H	4.484	6.688
+0.60D+0.70E+H	4.484	6.688
D Only	7.473	11.147
Lr Only	5.579	8.641
L Only	1.560	1.560
S Only		
W Only		
E Only		
H Only		

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

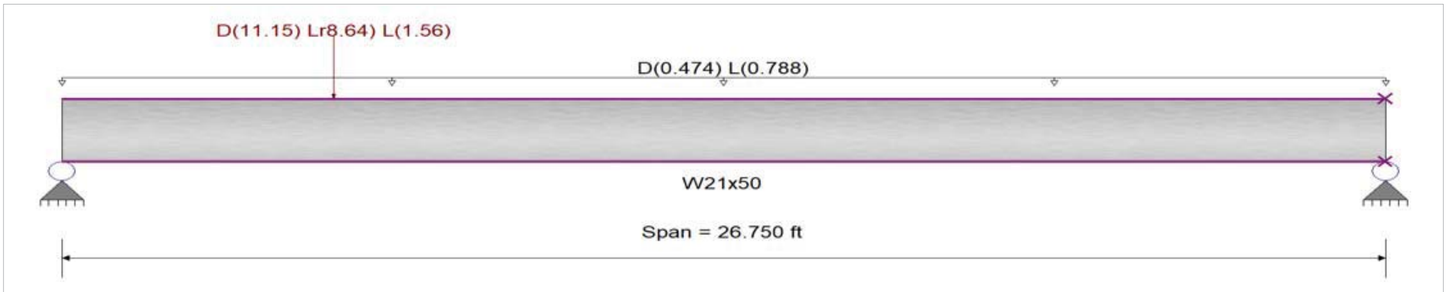
DESCRIPTION: 5th Floor Beams B2

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.4740, L = 0.7880 k/ft, Tributary Width = 1.0 ft

Point Load : D = 11.150, Lr = 8.640, L = 1.560 k @ 5.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.561** : 1	Maximum Shear Stress Ratio =	**0.185** : 1
Section used for this span	**W21x50**	Section used for this span	**W21x50**
Ma : Applied	153.973 k-ft	Va : Applied	29.179 k
Mn / Omega : Allowable	274.451 k-ft	Vn/Omega : Allowable	158.080 k
Load Combination	+D+0.750Lr+0.750L+H	Load Combination	+D+0.750Lr+0.750L+H
Location of maximum on span	9.783ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.342 in	Ratio =	939	>=360
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360
Max Downward Total Deflection	0.700 in	Ratio =	459	>=180
Max Upward Total Deflection	0.000 in	Ratio =	0	<180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 26.75 ft	1	0.286	0.096	78.60		78.60	458.33	274.45	1.00	1.00	15.20	237.12	158.08
+D+L+H													
Dsgn. L = 26.75 ft	1	0.549	0.171	150.54		150.54	458.33	274.45	1.00	1.00	26.98	237.12	158.08
+D+Lr+H													
Dsgn. L = 26.75 ft	1	0.416	0.140	114.16		114.16	458.33	274.45	1.00	1.00	22.06	237.12	158.08
+D+S+H													
Dsgn. L = 26.75 ft	1	0.286	0.096	78.60		78.60	458.33	274.45	1.00	1.00	15.20	237.12	158.08
+D+0.750Lr+0.750L+H													
Dsgn. L = 26.75 ft	1	0.561	0.185	153.97		153.97	458.33	274.45	1.00	1.00	29.18	237.12	158.08
+D+0.750L+0.750S+H													
Dsgn. L = 26.75 ft	1	0.482	0.152	132.15		132.15	458.33	274.45	1.00	1.00	24.03	237.12	158.08
+D+W+H													
Dsgn. L = 26.75 ft	1	0.286	0.096	78.60		78.60	458.33	274.45	1.00	1.00	15.20	237.12	158.08
+D+0.70E+H													
Dsgn. L = 26.75 ft	1	0.286	0.096	78.60		78.60	458.33	274.45	1.00	1.00	15.20	237.12	158.08
+D+0.750Lr+0.750L+0.750W+H													
Dsgn. L = 26.75 ft	1	0.561	0.185	153.97		153.97	458.33	274.45	1.00	1.00	29.18	237.12	158.08
+D+0.750L+0.750S+0.750W+H													
Dsgn. L = 26.75 ft	1	0.482	0.152	132.15		132.15	458.33	274.45	1.00	1.00	24.03	237.12	158.08
+D+0.750Lr+0.750L+0.5250E+H													

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Beam

Lic. # : KW-06002046 BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: 5th Floor Beams B2

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
Dsgn. L = 26.75 ft	1	0.561	0.185	153.97		153.97	458.33	274.45	1.00	1.00	29.18	237.12	158.08
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 26.75 ft	1	0.482	0.152	132.15		132.15	458.33	274.45	1.00	1.00	24.03	237.12	158.08
+0.60D+W+H													
Dsgn. L = 26.75 ft	1	0.172	0.058	47.16		47.16	458.33	274.45	1.00	1.00	9.12	237.12	158.08
+0.60D+0.70E+H													
Dsgn. L = 26.75 ft	1	0.172	0.058	47.16		47.16	458.33	274.45	1.00	1.00	9.12	237.12	158.08

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L+0.5250E+H	1	0.6996	12.764		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	29.179	19.493
Overall MINimum	6.864	1.776
D Only	15.197	8.632
+D+L+H	26.976	19.493
+D+Lr+H	22.061	10.409
+D+S+H	15.197	8.632
+D+0.750Lr+0.750L+H	29.179	18.110
+D+0.750L+0.750S+H	24.031	16.777
+D+W+H	15.197	8.632
+D+0.70E+H	15.197	8.632
+D+0.750Lr+0.750L+0.750W+H	29.179	18.110
+D+0.750L+0.750S+0.750W+H	24.031	16.777
+D+0.750Lr+0.750L+0.5250E+H	29.179	18.110
+D+0.750L+0.750S+0.5250E+H	24.031	16.777
+0.60D+W+H	9.118	5.179
+0.60D+0.70E+H	9.118	5.179
D Only	15.197	8.632
Lr Only	6.864	1.776
L Only	11.779	10.860
S Only		
W Only		
E Only		
H Only		

Wood Beam

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Lic. # : KW-06002046 BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: 5th Floor Beams B3

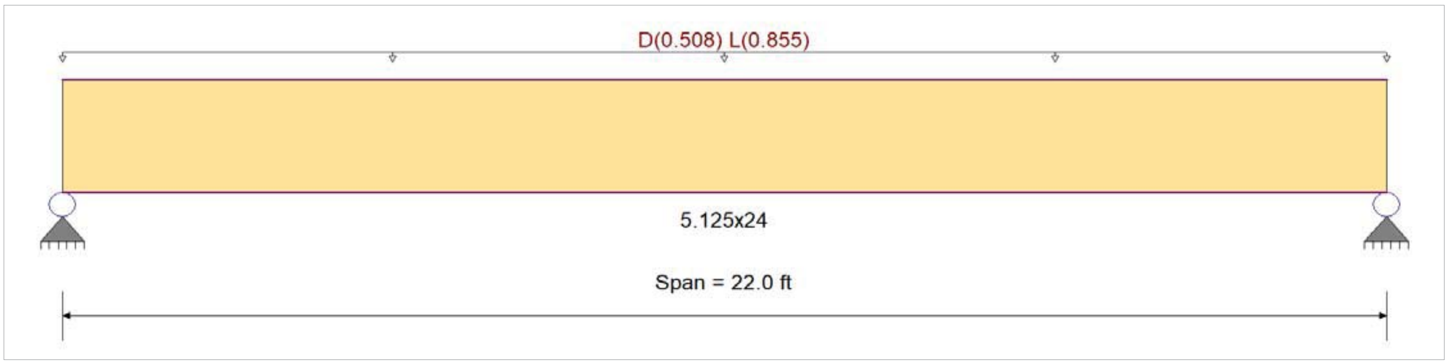
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-05	Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Wood Species	: DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Wood Grade	: 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0 ksi
		Ft	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.5080, L = 0.8550 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.902** 1	Maximum Shear Stress Ratio	=	**0.569** : 1
Section used for this span		**5.125x24**	Section used for this span		**5.125x24**
	=	2,011.26 psi		=	150.81 psi
	=	2,228.89 psi		=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	11.000 ft	Location of maximum on span	=	20.073 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.427 in	Ratio =	618 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.680 in	Ratio =	388 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.374	0.236	0.90	0.929	1.00	1.00	1.00	1.00	1.00	30.73	749.61	2006.00	4.61	56.21	238.50
+D+L+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.902	0.569	1.00	0.929	1.00	1.00	1.00	1.00	1.00	82.46	2,011.26	2228.89	12.37	150.81	265.00
+D+Lr+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.269	0.170	1.25	0.929	1.00	1.00	1.00	1.00	1.00	30.73	749.61	2786.11	4.61	56.21	331.25
+D+S+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.292	0.184	1.15	0.929	1.00	1.00	1.00	1.00	1.00	30.73	749.61	2563.22	4.61	56.21	304.75
+D+0.750Lr+0.750L+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.609	0.384	1.25	0.929	1.00	1.00	1.00	1.00	1.00	69.53	1,695.84	2786.11	10.43	127.16	331.25
+D+0.750L+0.750S+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.662	0.417	1.15	0.929	1.00	1.00	1.00	1.00	1.00	69.53	1,695.84	2563.22	10.43	127.16	304.75
+D+W+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.210	0.133	1.60	0.929	1.00	1.00	1.00	1.00	1.00	30.73	749.61	3566.22	4.61	56.21	424.00

Wood Beam

DESCRIPTION: 5th Floor Beams B3

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.70E+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.210	0.133	1.60	0.929	1.00	1.00	1.00	1.00	1.00	30.73	749.61	3566.22	4.61	56.21	424.00
+D+0.750Lr+0.750L+0.750W+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.476	0.300	1.60	0.929	1.00	1.00	1.00	1.00	1.00	69.53	1,695.84	3566.22	10.43	127.16	424.00
+D+0.750L+0.750S+0.750W+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.476	0.300	1.60	0.929	1.00	1.00	1.00	1.00	1.00	69.53	1,695.84	3566.22	10.43	127.16	424.00
+D+0.750Lr+0.750L+0.5250E+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.476	0.300	1.60	0.929	1.00	1.00	1.00	1.00	1.00	69.53	1,695.84	3566.22	10.43	127.16	424.00
+D+0.750L+0.750S+0.5250E+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.476	0.300	1.60	0.929	1.00	1.00	1.00	1.00	1.00	69.53	1,695.84	3566.22	10.43	127.16	424.00
+0.60D+W+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.126	0.080	1.60	0.929	1.00	1.00	1.00	1.00	1.00	18.44	449.77	3566.22	2.77	33.72	424.00
+0.60D+0.70E+H					0.929	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 22.0 ft	1	0.126	0.080	1.60	0.929	1.00	1.00	1.00	1.00	1.00	18.44	449.77	3566.22	2.77	33.72	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.6800	11.080		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	14.993	14.993
Overall MINimum	9.405	9.405
D Only	5.588	5.588
+D+L+H	14.993	14.993
+D+Lr+H	5.588	5.588
+D+S+H	5.588	5.588
+D+0.750Lr+0.750L+H	12.642	12.642
+D+0.750L+0.750S+H	12.642	12.642
+D+W+H	5.588	5.588
+D+0.70E+H	5.588	5.588
+D+0.750Lr+0.750L+0.750W+H	12.642	12.642
+D+0.750L+0.750S+0.750W+H	12.642	12.642
+D+0.750Lr+0.750L+0.5250E+H	12.642	12.642
+D+0.750L+0.750S+0.5250E+H	12.642	12.642
+0.60D+W+H	3.353	3.353
+0.60D+0.70E+H	3.353	3.353
D Only	5.588	5.588
Lr Only		
L Only	9.405	9.405
S Only		
W Only		
E Only		
H Only		

Wood Beam

DESCRIPTION: 5th Floor Beams B4

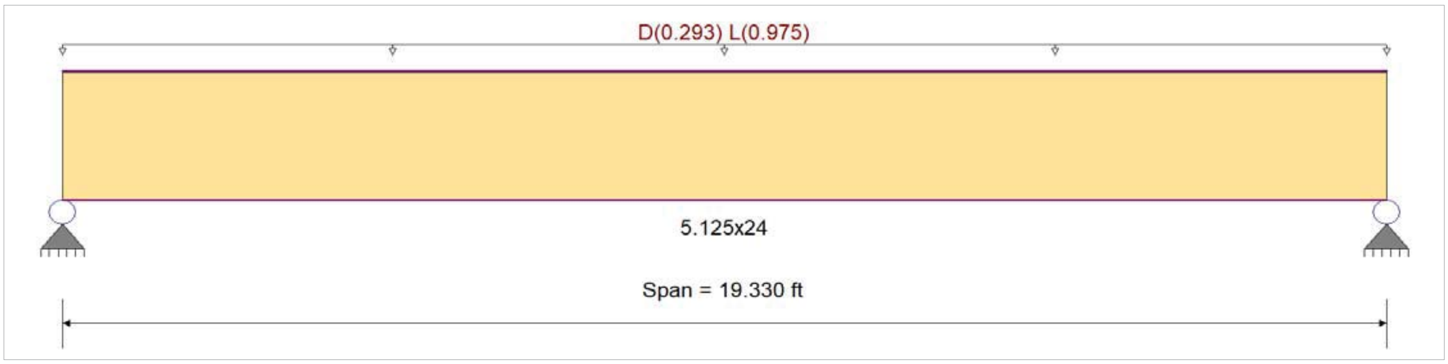
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-05	Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Wood Species	: DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Wood Grade	: 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0 ksi
		Ft	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.2930, L = 0.9750 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.640** : 1	Maximum Shear Stress Ratio	=	**0.449** : 1
Section used for this span		**5.125x24**	Section used for this span		**5.125x24**
	=	1,444.47 psi		=	118.91 psi
	=	2,257.91 psi		=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	9.665 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.290 in	Ratio =	800 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.377 in	Ratio =	615 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.164	0.115	0.90	0.941	1.00	1.00	1.00	1.00	1.00	13.68	333.78	2032.12	2.25	27.48	238.50
+D+L+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.640	0.449	1.00	0.941	1.00	1.00	1.00	1.00	1.00	59.22	1,444.47	2257.91	9.75	118.91	265.00
+D+Lr+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.118	0.083	1.25	0.941	1.00	1.00	1.00	1.00	1.00	13.68	333.78	2822.39	2.25	27.48	331.25
+D+S+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.129	0.090	1.15	0.941	1.00	1.00	1.00	1.00	1.00	13.68	333.78	2596.60	2.25	27.48	304.75
+D+0.750Lr+0.750L+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.413	0.290	1.25	0.941	1.00	1.00	1.00	1.00	1.00	47.84	1,166.80	2822.39	7.88	96.05	331.25
+D+0.750L+0.750S+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.449	0.315	1.15	0.941	1.00	1.00	1.00	1.00	1.00	47.84	1,166.80	2596.60	7.88	96.05	304.75
+D+W+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.092	0.065	1.60	0.941	1.00	1.00	1.00	1.00	1.00	13.68	333.78	3612.66	2.25	27.48	424.00

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: 5th Floor Beams B4

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.092	0.065	1.60	0.941	1.00	1.00	1.00	1.00	1.00	13.68	333.78	3612.66	2.25	27.48	424.00
+D+0.750Lr+0.750L+0.750W+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.323	0.227	1.60	0.941	1.00	1.00	1.00	1.00	1.00	47.84	1,166.80	3612.66	7.88	96.05	424.00
+D+0.750L+0.750S+0.750W+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.323	0.227	1.60	0.941	1.00	1.00	1.00	1.00	1.00	47.84	1,166.80	3612.66	7.88	96.05	424.00
+D+0.750Lr+0.750L+0.5250E+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.323	0.227	1.60	0.941	1.00	1.00	1.00	1.00	1.00	47.84	1,166.80	3612.66	7.88	96.05	424.00
+D+0.750L+0.750S+0.5250E+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.323	0.227	1.60	0.941	1.00	1.00	1.00	1.00	1.00	47.84	1,166.80	3612.66	7.88	96.05	424.00
+0.60D+W+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.055	0.039	1.60	0.941	1.00	1.00	1.00	1.00	1.00	8.21	200.27	3612.66	1.35	16.49	424.00
+0.60D+0.70E+H					0.941	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.330 ft	1	0.055	0.039	1.60	0.941	1.00	1.00	1.00	1.00	1.00	8.21	200.27	3612.66	1.35	16.49	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3770	9.736		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	12.255	12.255
Overall MINimum	9.423	9.423
D Only	2.832	2.832
+D+L+H	12.255	12.255
+D+Lr+H	2.832	2.832
+D+S+H	2.832	2.832
+D+0.750Lr+0.750L+H	9.899	9.899
+D+0.750L+0.750S+H	9.899	9.899
+D+W+H	2.832	2.832
+D+0.70E+H	2.832	2.832
+D+0.750Lr+0.750L+0.750W+H	9.899	9.899
+D+0.750L+0.750S+0.750W+H	9.899	9.899
+D+0.750Lr+0.750L+0.5250E+H	9.899	9.899
+D+0.750L+0.750S+0.5250E+H	9.899	9.899
+0.60D+W+H	1.699	1.699
+0.60D+0.70E+H	1.699	1.699
D Only	2.832	2.832
Lr Only		
L Only	9.423	9.423
S Only		
W Only		
E Only		
H Only		

B5
SPAN = 11' ω_D & ω_L SAME AS B3 (CONSERVATIVE)

$\boxed{\text{USE } 5\tfrac{1}{8} \times 12 \text{ GLB}}$ REF OUTPUT

B6

SPAN = 26' $\omega_D = 30psf(2') + 8(10) = 140plf$
$\omega_L = 60psf(2') = 120plf$

$\boxed{\text{USE } 5\tfrac{1}{8} \times 16.5 \text{ GLB}}$ REF OUTPUT

CORRIDOR JOISTS
$\omega_D = 30(2) = 60$ $\omega_L = 80psf(2) = 160plf$

J1 SPAN = 10.83'   SPACED @ 16" O.C.
$\omega_D = 30(1.33) = 40plf$ $\omega_L = 80(1.33) = 107plf$

$\boxed{\text{USE 2x12 @ 16" OC}}$ REF OUTPUT

J2
SPAN = 6' $\boxed{\text{USE 2x8 @ 24" OC}}$ REF OUTPUT

J3
SPAN = 11.67'   SPACED @ 16" OC. $\omega_D = 40plf$ $\omega_L = 107plf$

$\boxed{\text{USE 2x12 @ 16" OC}}$ REF OUTPUT

J4
SPAN = 6.67' $\boxed{\text{USE 2x8 @ 24" OC}}$ REF OUTPUT

BEAM B7
SPAN = 6' $\omega_D = 30(18/2) = 270plf$ $\omega_L = 100(18/2) = 900plf$

$\boxed{\text{USE (3) 2x12}}$ REF OUTPUT

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .
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Lic. # : KW-06002046 BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: 5th Floor Beams B5

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-05

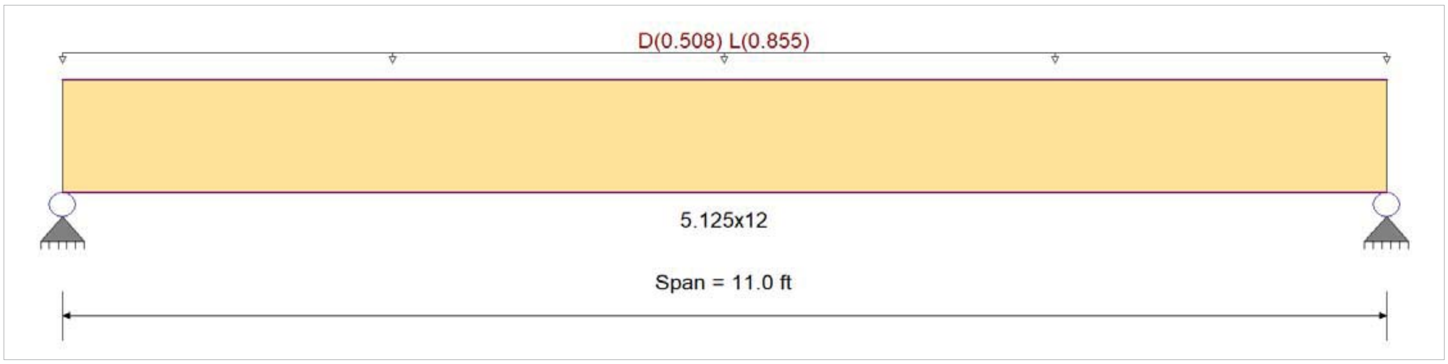
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0	psi
Fb -	1,850.0	psi
Fc - Prll	1,650.0	psi
Fc - Perp	650.0	psi
Fv	265.0	psi
Ft	1,100.0	psi

E : Modulus of Elasticity

Ebend- xx	1,800.0	ksi
Eminbend - xx	950.0	ksi
Ebend- yy	1,600.0	ksi
Eminbend - yy	850.0	ksi
Density	31.210	pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.5080, L = 0.8550 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = **0.838** : 1
Section used for this span **5.125x12**
= 2,011.26 psi
= 2,400.00 psi
Load Combination +D+L+H
Location of maximum on span = 5.500 ft
Span # where maximum occurs = Span # 1

Maximum Shear Stress Ratio = **0.569** : 1
Section used for this span **5.125x12**
= 150.81 psi
= 265.00 psi
Load Combination +D+L+H
Location of maximum on span = 10.036 ft
Span # where maximum occurs = Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.213 in	Ratio =	618 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.340 in	Ratio =	388 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.347	0.236	0.90	1.000	1.00	1.00	1.00	1.00	1.00	7.68	749.61	2160.00	2.30	56.21	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.838	0.569	1.00	1.000	1.00	1.00	1.00	1.00	1.00	20.62	2,011.26	2400.00	6.18	150.81	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.250	0.170	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.68	749.61	3000.00	2.30	56.21	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.272	0.184	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.68	749.61	2760.00	2.30	56.21	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.565	0.384	1.25	1.000	1.00	1.00	1.00	1.00	1.00	17.38	1,695.84	3000.00	5.21	127.16	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.614	0.417	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.38	1,695.84	2760.00	5.21	127.16	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.195	0.133	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.68	749.61	3840.00	2.30	56.21	424.00

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: 5th Floor Beams B5

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.195	0.133	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.68	749.61	3840.00	2.30	56.21	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.442	0.300	1.60	1.000	1.00	1.00	1.00	1.00	1.00	17.38	1,695.84	3840.00	5.21	127.16	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.442	0.300	1.60	1.000	1.00	1.00	1.00	1.00	1.00	17.38	1,695.84	3840.00	5.21	127.16	424.00
+D+0.750Lr+0.750L+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.442	0.300	1.60	1.000	1.00	1.00	1.00	1.00	1.00	17.38	1,695.84	3840.00	5.21	127.16	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.442	0.300	1.60	1.000	1.00	1.00	1.00	1.00	1.00	17.38	1,695.84	3840.00	5.21	127.16	424.00
+0.60D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.117	0.080	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.61	449.77	3840.00	1.38	33.72	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.117	0.080	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.61	449.77	3840.00	1.38	33.72	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3400	5.540		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.497	7.497
Overall MINimum	4.703	4.703
D Only	2.794	2.794
+D+L+H	7.497	7.497
+D+Lr+H	2.794	2.794
+D+S+H	2.794	2.794
+D+0.750Lr+0.750L+H	6.321	6.321
+D+0.750L+0.750S+H	6.321	6.321
+D+W+H	2.794	2.794
+D+0.70E+H	2.794	2.794
+D+0.750Lr+0.750L+0.750W+H	6.321	6.321
+D+0.750L+0.750S+0.750W+H	6.321	6.321
+D+0.750Lr+0.750L+0.5250E+H	6.321	6.321
+D+0.750L+0.750S+0.5250E+H	6.321	6.321
+0.60D+W+H	1.676	1.676
+0.60D+0.70E+H	1.676	1.676
D Only	2.794	2.794
Lr Only		
L Only	4.703	4.703
S Only		
W Only		
E Only		
H Only		

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: 5th Floor Beams B6

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : ASCE 7-05

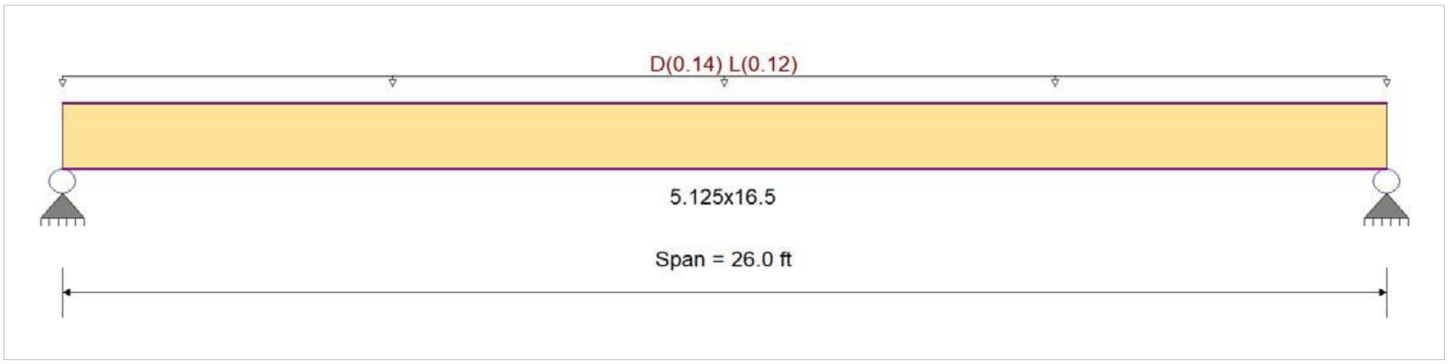
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0	psi
Fb -	1,850.0	psi
Fc - Prll	1,650.0	psi
Fc - Perp	650.0	psi
Fv	265.0	psi
Ft	1,100.0	psi

E : Modulus of Elasticity

Ebend- xx	1,800.0	ksi
Eminbend - xx	950.0	ksi
Ebend- yy	1,600.0	ksi
Eminbend - yy	850.0	ksi
Density	31.210	pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.140, L = 0.120 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.498**: 1	Maximum Shear Stress Ratio	=	**0.203** : 1
Section used for this span		**5.125x16.5**	Section used for this span		**5.125x16.5**
	=	1,133.71 psi		=	53.83 psi
	=	2,275.65 psi		=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	13.000 ft	Location of maximum on span	=	24.672 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.359 in	Ratio =	868 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.779 in	Ratio =	400 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.298	0.122	0.90	0.948	1.00	1.00	1.00	1.00	1.00	11.83	610.46	2048.09	1.63	28.98	238.50
+D+L+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.498	0.203	1.00	0.948	1.00	1.00	1.00	1.00	1.00	21.97	1,133.71	2275.65	3.03	53.83	265.00
+D+Lr+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.215	0.088	1.25	0.948	1.00	1.00	1.00	1.00	1.00	11.83	610.46	2844.56	1.63	28.98	331.25
+D+S+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.233	0.095	1.15	0.948	1.00	1.00	1.00	1.00	1.00	11.83	610.46	2617.00	1.63	28.98	304.75
+D+0.750Lr+0.750L+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.353	0.144	1.25	0.948	1.00	1.00	1.00	1.00	1.00	19.44	1,002.89	2844.56	2.68	47.62	331.25
+D+0.750L+0.750S+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.383	0.156	1.15	0.948	1.00	1.00	1.00	1.00	1.00	19.44	1,002.89	2617.00	2.68	47.62	304.75
+D+W+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.168	0.068	1.60	0.948	1.00	1.00	1.00	1.00	1.00	11.83	610.46	3641.04	1.63	28.98	424.00

Wood Beam

DESCRIPTION: 5th Floor Beams B6

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.168	0.068	1.60	0.948	1.00	1.00	1.00	1.00	1.00	11.83	610.46	3641.04	1.63	28.98	424.00
+D+0.750Lr+0.750L+0.750W+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.275	0.112	1.60	0.948	1.00	1.00	1.00	1.00	1.00	19.44	1,002.89	3641.04	2.68	47.62	424.00
+D+0.750L+0.750S+0.750W+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.275	0.112	1.60	0.948	1.00	1.00	1.00	1.00	1.00	19.44	1,002.89	3641.04	2.68	47.62	424.00
+D+0.750Lr+0.750L+0.5250E+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.275	0.112	1.60	0.948	1.00	1.00	1.00	1.00	1.00	19.44	1,002.89	3641.04	2.68	47.62	424.00
+D+0.750L+0.750S+0.5250E+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.275	0.112	1.60	0.948	1.00	1.00	1.00	1.00	1.00	19.44	1,002.89	3641.04	2.68	47.62	424.00
+0.60D+W+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.101	0.041	1.60	0.948	1.00	1.00	1.00	1.00	1.00	7.10	366.27	3641.04	0.98	17.39	424.00
+0.60D+0.70E+H					0.948	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.101	0.041	1.60	0.948	1.00	1.00	1.00	1.00	1.00	7.10	366.27	3641.04	0.98	17.39	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.7786	13.095		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.380	3.380
Overall MINimum	1.560	1.560
D Only	1.820	1.820
+D+L+H	3.380	3.380
+D+Lr+H	1.820	1.820
+D+S+H	1.820	1.820
+D+0.750Lr+0.750L+H	2.990	2.990
+D+0.750L+0.750S+H	2.990	2.990
+D+W+H	1.820	1.820
+D+0.70E+H	1.820	1.820
+D+0.750Lr+0.750L+0.750W+H	2.990	2.990
+D+0.750L+0.750S+0.750W+H	2.990	2.990
+D+0.750Lr+0.750L+0.5250E+H	2.990	2.990
+D+0.750L+0.750S+0.5250E+H	2.990	2.990
+0.60D+W+H	1.092	1.092
+0.60D+0.70E+H	1.092	1.092
D Only	1.820	1.820
Lr Only		
L Only	1.560	1.560
S Only		
W Only		
E Only		
H Only		

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .
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BARKER DROTTAR ASSOCIATES LLC

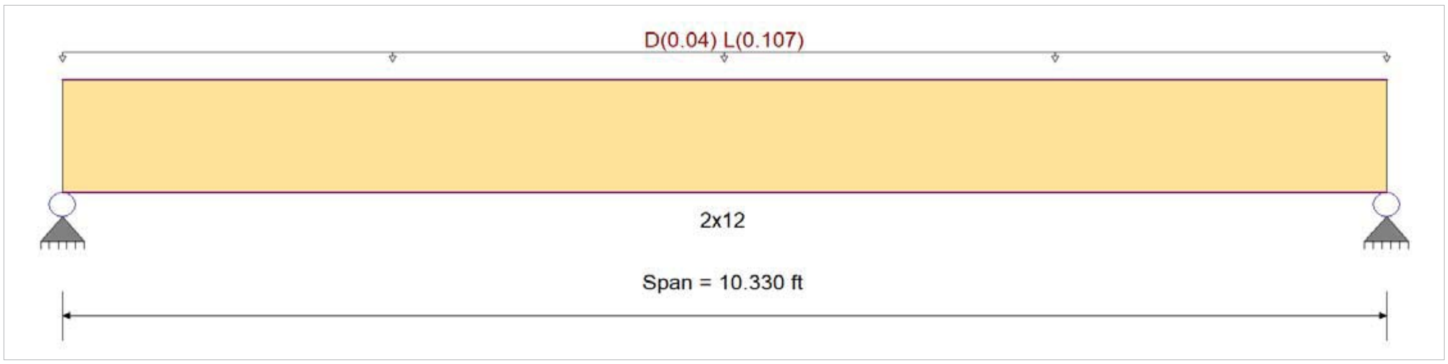
DESCRIPTION: Corridor Joists J1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	750.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-16	Fb -	750.0 psi	Ebend- xx	1,300.0 ksi
		Fc - Prll	700.0 psi	Eminbend - xx	470.0 ksi
Wood Species	: Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade	: No.2	Fv	170.0 psi		
		Ft	475.0 psi	Density	31.210 pcf
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.040, L = 0.1070 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.862** 1	Maximum Shear Stress Ratio	=	**0.327** : 1
Section used for this span		**2x12**	Section used for this span		**2x12**
	=	743.64 psi		=	55.67 psi
	=	862.50 psi		=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.165 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.119 in	Ratio =	1040 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.164 in	Ratio =	757 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.261	0.099	0.90	1.000	1.00	1.15	1.00	1.00	1.00	0.53	202.35	776.25	0.17	15.15	153.00
+D+L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.862	0.327	1.00	1.000	1.00	1.15	1.00	1.00	1.00	1.96	743.64	862.50	0.63	55.67	170.00
+D+Lr+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.188	0.071	1.25	1.000	1.00	1.15	1.00	1.00	1.00	0.53	202.35	1078.13	0.17	15.15	212.50
+D+S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.204	0.077	1.15	1.000	1.00	1.15	1.00	1.00	1.00	0.53	202.35	991.88	0.17	15.15	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.564	0.214	1.25	1.000	1.00	1.15	1.00	1.00	1.00	1.60	608.32	1078.13	0.51	45.54	212.50
+D+0.750L+0.750S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.613	0.233	1.15	1.000	1.00	1.15	1.00	1.00	1.00	1.60	608.32	991.88	0.51	45.54	195.50
+D+0.60W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.147	0.056	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.53	202.35	1380.00	0.17	15.15	272.00

DESCRIPTION: Corridor Joists J1

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.441	0.167	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.60	608.32	1380.00	0.51	45.54	272.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.441	0.167	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.60	608.32	1380.00	0.51	45.54	272.00
+0.60D+0.60W+0.60H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.088	0.033	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.32	121.41	1380.00	0.10	9.09	272.00
+D+0.70E+0.60H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.147	0.056	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.53	202.35	1380.00	0.17	15.15	272.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.441	0.167	1.60	1.000	1.00	1.15	1.00	1.00	1.00	1.60	608.32	1380.00	0.51	45.54	272.00
+0.60D+0.70E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.330 ft	1	0.088	0.033	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.32	121.41	1380.00	0.10	9.09	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1637	5.203		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.759	0.759
Overall MINimum	0.553	0.553
+D+H	0.207	0.207
+D+L+H	0.759	0.759
+D+Lr+H	0.207	0.207
+D+S+H	0.207	0.207
+D+0.750Lr+0.750L+H	0.621	0.621
+D+0.750L+0.750S+H	0.621	0.621
+D+0.60W+H	0.207	0.207
+D+0.750Lr+0.750L+0.450W+H	0.621	0.621
+D+0.750L+0.750S+0.450W+H	0.621	0.621
+0.60D+0.60W+0.60H	0.124	0.124
+D+0.70E+0.60H	0.207	0.207
+D+0.750L+0.750S+0.5250E+H	0.621	0.621
+0.60D+0.70E+H	0.124	0.124
D Only	0.207	0.207
Lr Only		
L Only	0.553	0.553
S Only		
W Only		
E Only		
H Only		

BARKER STRUCTURAL
Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
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Wood Beam

Lic. # : KW-06002046 BARKER DROTTAR ASSOCIATES LLC

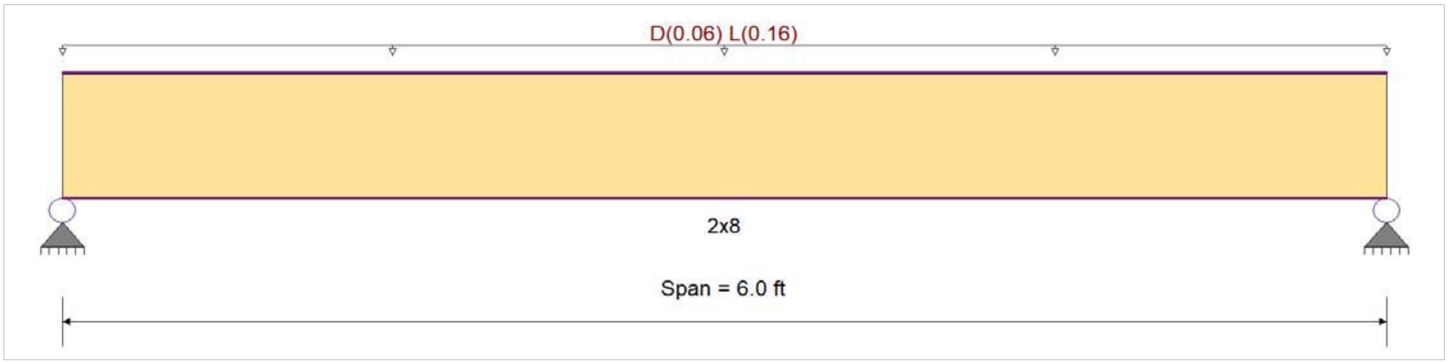
DESCRIPTION: Corridor Joists J2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	750.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-16	Fb -	750.0 psi	Ebend- xx	1,300.0 ksi
		Fc - Prll	700.0 psi	Eminbend - xx	470.0 ksi
Wood Species	: Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade	: No.2	Fv	170.0 psi		
		Ft	475.0 psi	Density	31.210 pcf
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.060, L = 0.160 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.873** : 1	Maximum Shear Stress Ratio	=	**0.430** : 1
Section used for this span		**2x8**	Section used for this span		**2x8**
	=	904.07 psi		=	73.09 psi
	=	1,035.00 psi		=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.076 in	Ratio =	950 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.104 in	Ratio =	690 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.265	0.130	0.90	1.200	1.00	1.15	1.00	1.00	1.00	0.27	246.56	931.50	0.14	19.93	153.00
+D+L+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.873	0.430	1.00	1.200	1.00	1.15	1.00	1.00	1.00	0.99	904.07	1035.00	0.53	73.09	170.00
+D+Lr+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.191	0.094	1.25	1.200	1.00	1.15	1.00	1.00	1.00	0.27	246.56	1293.75	0.14	19.93	212.50
+D+S+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.207	0.102	1.15	1.200	1.00	1.15	1.00	1.00	1.00	0.27	246.56	1190.25	0.14	19.93	195.50
+D+0.750Lr+0.750L+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.572	0.281	1.25	1.200	1.00	1.15	1.00	1.00	1.00	0.81	739.69	1293.75	0.43	59.80	212.50
+D+0.750L+0.750S+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.621	0.306	1.15	1.200	1.00	1.15	1.00	1.00	1.00	0.81	739.69	1190.25	0.43	59.80	195.50
+D+0.60W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.149	0.073	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.27	246.56	1656.00	0.14	19.93	272.00

Wood Beam

DESCRIPTION: Corridor Joists J2

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+0.750L+0.450W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.447	0.220	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.81	739.69	1656.00	0.43	59.80	272.00
+D+0.750L+0.750S+0.450W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.447	0.220	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.81	739.69	1656.00	0.43	59.80	272.00
+0.60D+0.60W+0.60H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.089	0.044	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.16	147.94	1656.00	0.09	11.96	272.00
+D+0.70E+0.60H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.149	0.073	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.27	246.56	1656.00	0.14	19.93	272.00
+D+0.750L+0.750S+0.5250E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.447	0.220	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.81	739.69	1656.00	0.43	59.80	272.00
+0.60D+0.70E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.089	0.044	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.16	147.94	1656.00	0.09	11.96	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1042	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.660	0.660
Overall MINimum	0.480	0.480
+D+H	0.180	0.180
+D+L+H	0.660	0.660
+D+Lr+H	0.180	0.180
+D+S+H	0.180	0.180
+D+0.750Lr+0.750L+H	0.540	0.540
+D+0.750L+0.750S+H	0.540	0.540
+D+0.60W+H	0.180	0.180
+D+0.750Lr+0.750L+0.450W+H	0.540	0.540
+D+0.750L+0.750S+0.450W+H	0.540	0.540
+0.60D+0.60W+0.60H	0.108	0.108
+D+0.70E+0.60H	0.180	0.180
+D+0.750L+0.750S+0.5250E+H	0.540	0.540
+0.60D+0.70E+H	0.108	0.108
D Only	0.180	0.180
Lr Only		
L Only	0.480	0.480
S Only		
W Only		
E Only		
H Only		

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
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Wood Beam

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BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Corridor Joists J3

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-16

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

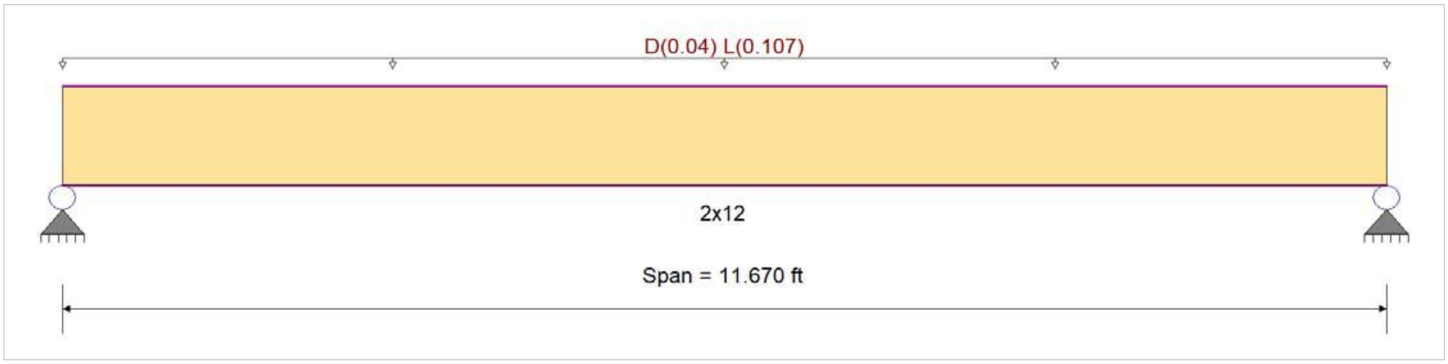
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	875	psi
Fb -	875	psi
Fc - Prll	600	psi
Fc - Perp	625	psi
Fv	170	psi
Ft	425	psi

E : Modulus of Elasticity

Ebend- xx	1300	ksi
Eminbend - xx	470	ksi
Density	31.21	pcf

Repetitive Member Stress Increase



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.040, L = 0.1070 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.943** : 1	Maximum Shear Stress Ratio	=	**0.376** : 1
Section used for this span		**2x12**	Section used for this span		**2x12**
	=	949.09 psi		=	64.00 psi
	=	1,006.25 psi		=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.835 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.194 in	Ratio = 721 >=360
Max Upward Transient Deflection	0.000 in	Ratio = 0 <360
Max Downward Total Deflection	0.267 in	Ratio = 525 >=180
Max Upward Total Deflection	0.000 in	Ratio = 0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.285	0.114	0.90	1.000	1.00	1.15	1.00	1.00	1.00	0.68	258.25	905.63	0.20	17.42	153.00
+D+L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.943	0.376	1.00	1.000	1.00	1.15	1.00	1.00	1.00	2.50	949.09	1006.25	0.72	64.00	170.00
+D+Lr+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.205	0.082	1.25	1.000	1.00	1.15	1.00	1.00	1.00	0.68	258.25	1257.81	0.20	17.42	212.50
+D+S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.223	0.089	1.15	1.000	1.00	1.15	1.00	1.00	1.00	0.68	258.25	1157.19	0.20	17.42	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.617	0.246	1.25	1.000	1.00	1.15	1.00	1.00	1.00	2.05	776.38	1257.81	0.59	52.35	212.50
+D+0.750L+0.750S+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.671	0.268	1.15	1.000	1.00	1.15	1.00	1.00	1.00	2.05	776.38	1157.19	0.59	52.35	195.50
+D+0.60W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.160	0.064	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.68	258.25	1610.00	0.20	17.42	272.00

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: Corridor Joists J3

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.482	0.192	1.60	1.000	1.00	1.15	1.00	1.00	1.00	2.05	776.38	1610.00	0.59	52.35	272.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.482	0.192	1.60	1.000	1.00	1.15	1.00	1.00	1.00	2.05	776.38	1610.00	0.59	52.35	272.00
+0.60D+0.60W+0.60H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.096	0.038	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.41	154.95	1610.00	0.12	10.45	272.00
+D+0.70E+0.60H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.160	0.064	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.68	258.25	1610.00	0.20	17.42	272.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.482	0.192	1.60	1.000	1.00	1.15	1.00	1.00	1.00	2.05	776.38	1610.00	0.59	52.35	272.00
+0.60D+0.70E+H					1.000	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.096	0.038	1.60	1.000	1.00	1.15	1.00	1.00	1.00	0.41	154.95	1610.00	0.12	10.45	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2667	5.878		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.858	0.858
Overall MINimum	0.624	0.624
+D+H	0.233	0.233
+D+L+H	0.858	0.858
+D+Lr+H	0.233	0.233
+D+S+H	0.233	0.233
+D+0.750Lr+0.750L+H	0.702	0.702
+D+0.750L+0.750S+H	0.702	0.702
+D+0.60W+H	0.233	0.233
+D+0.750Lr+0.750L+0.450W+H	0.702	0.702
+D+0.750L+0.750S+0.450W+H	0.702	0.702
+0.60D+0.60W+0.60H	0.140	0.140
+D+0.70E+0.60H	0.233	0.233
+D+0.750L+0.750S+0.5250E+H	0.702	0.702
+0.60D+0.70E+H	0.140	0.140
D Only	0.233	0.233
Lr Only		
L Only	0.624	0.624
S Only		
W Only		
E Only		
H Only		

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

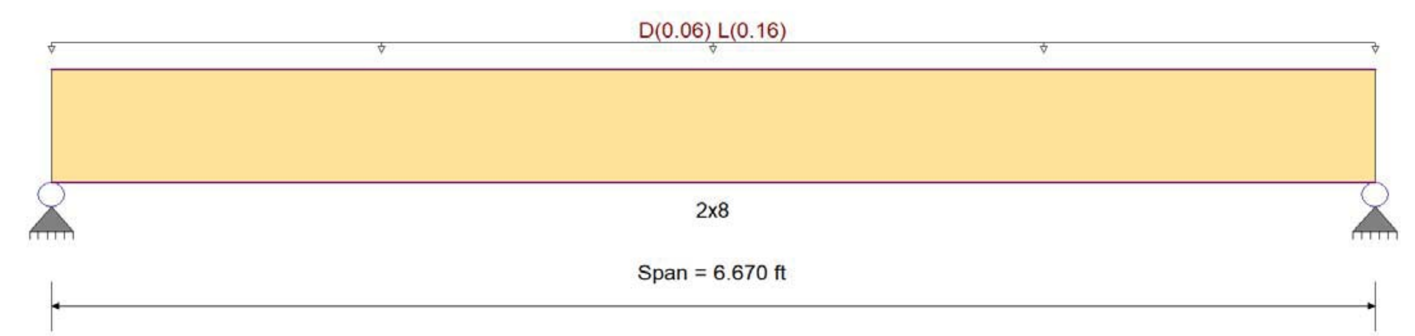
DESCRIPTION: Corridor Joists J4

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	875 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-16	Fb -	875 psi	Ebend- xx	1300 ksi
		Fc - Prll	600 psi	Eminbend - xx	470 ksi
Wood Species	: Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade	: No.2	Fv	170 psi		
		Ft	425 psi	Density	31.21 pcf
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.060, L = 0.160 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.925** : 1	Maximum Shear Stress Ratio	=	**0.491** : 1
Section used for this span		**2x8**	Section used for this span		**2x8**
	=	1,117.25 psi		=	83.47 psi
	=	1,207.50 psi		=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.335 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.116 in	Ratio =	691 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.159 in	Ratio =	502 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.280	0.149	0.90	1.200	1.00	1.15	1.00	1.00	1.00	0.33	304.70	1086.75	0.17	22.76	153.00
+D+L+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.925	0.491	1.00	1.200	1.00	1.15	1.00	1.00	1.00	1.22	1,117.25	1207.50	0.61	83.47	170.00
+D+Lr+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.202	0.107	1.25	1.200	1.00	1.15	1.00	1.00	1.00	0.33	304.70	1509.38	0.17	22.76	212.50
+D+S+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.219	0.116	1.15	1.200	1.00	1.15	1.00	1.00	1.00	0.33	304.70	1388.63	0.17	22.76	195.50
+D+0.750Lr+0.750L+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.606	0.321	1.25	1.200	1.00	1.15	1.00	1.00	1.00	1.00	914.11	1509.38	0.50	68.29	212.50
+D+0.750L+0.750S+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.658	0.349	1.15	1.200	1.00	1.15	1.00	1.00	1.00	1.00	914.11	1388.63	0.50	68.29	195.50
+D+0.60W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.158	0.084	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.33	304.70	1932.00	0.17	22.76	272.00

DESCRIPTION: Corridor Joists J4

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.750Lr+0.750L+0.450W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.473	0.251	1.60	1.200	1.00	1.15	1.00	1.00	1.00	1.00	914.11	1932.00	0.50	68.29	272.00
+D+0.750L+0.750S+0.450W+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.473	0.251	1.60	1.200	1.00	1.15	1.00	1.00	1.00	1.00	914.11	1932.00	0.50	68.29	272.00
+0.60D+0.60W+0.60H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.095	0.050	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.20	182.82	1932.00	0.10	13.66	272.00
+D+0.70E+0.60H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.158	0.084	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.33	304.70	1932.00	0.17	22.76	272.00
+D+0.750L+0.750S+0.5250E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.473	0.251	1.60	1.200	1.00	1.15	1.00	1.00	1.00	1.00	914.11	1932.00	0.50	68.29	272.00
+0.60D+0.70E+H					1.200	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.670 ft	1	0.095	0.050	1.60	1.200	1.00	1.15	1.00	1.00	1.00	0.20	182.82	1932.00	0.10	13.66	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1591	3.359		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.734	0.734
Overall MINimum	0.534	0.534
+D+H	0.200	0.200
+D+L+H	0.734	0.734
+D+Lr+H	0.200	0.200
+D+S+H	0.200	0.200
+D+0.750Lr+0.750L+H	0.600	0.600
+D+0.750L+0.750S+H	0.600	0.600
+D+0.60W+H	0.200	0.200
+D+0.750Lr+0.750L+0.450W+H	0.600	0.600
+D+0.750L+0.750S+0.450W+H	0.600	0.600
+0.60D+0.60W+0.60H	0.120	0.120
+D+0.70E+0.60H	0.200	0.200
+D+0.750L+0.750S+0.5250E+H	0.600	0.600
+0.60D+0.70E+H	0.120	0.120
D Only	0.200	0.200
Lr Only		
L Only	0.534	0.534
S Only		
W Only		
E Only		
H Only		

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
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Wood Beam

DESCRIPTION: 5th Floor Beam B7

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design
Load Combination ASCE 7-16

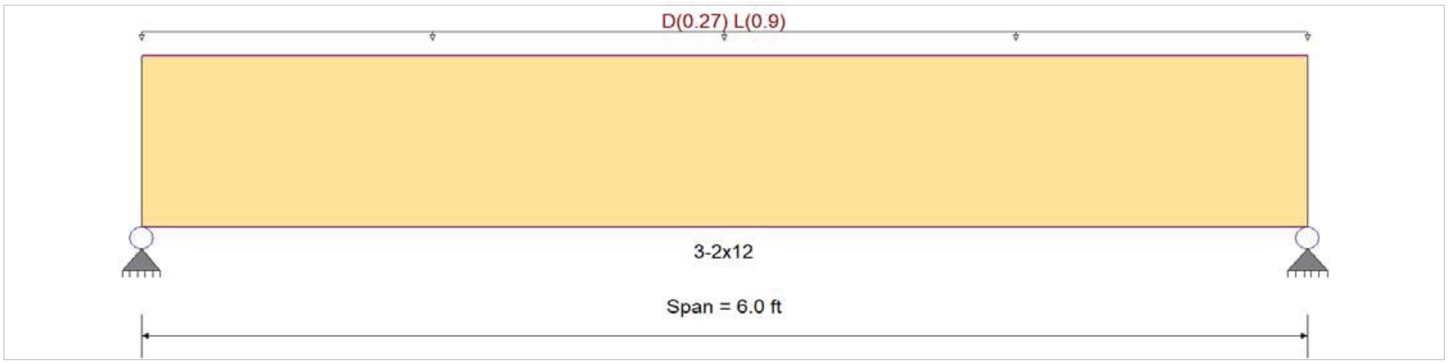
Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	750.0	psi
Fb -	750.0	psi
Fc - Prll	700.0	psi
Fc - Perp	625.0	psi
Fv	170.0	psi
Ft	475.0	psi

E : Modulus of Elasticity

Ebend- xx	1,300.0	ksi
Eminbend - xx	470.0	ksi
Density	31.210	pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.270, L = 0.90 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.887**: 1	Maximum Shear Stress Ratio	=	**0.424** : 1
Section used for this span		**3-2x12**	Section used for this span		**3-2x12**
	=	665.60 psi		=	72.12 psi
	=	750.00 psi		=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.038 in	Ratio =	1893 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.049 in	Ratio =	1456 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+H													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.228	0.109	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.22	153.60	675.00	0.56	16.64	153.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.887	0.424	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.27	665.60	750.00	2.43	72.12	170.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.164	0.078	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.22	153.60	937.50	0.56	16.64	212.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.178	0.085	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.22	153.60	862.50	0.56	16.64	195.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.573	0.274	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.25	537.60	937.50	1.97	58.25	212.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.623	0.298	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.25	537.60	862.50	1.97	58.25	195.50
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.128	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.22	153.60	1200.00	0.56	16.64	272.00

Wood Beam

DESCRIPTION: 5th Floor Beam B7

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.448	0.214	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.25	537.60	1200.00	1.97	58.25	272.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.448	0.214	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.25	537.60	1200.00	1.97	58.25	272.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.077	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.73	92.16	1200.00	0.34	9.99	272.00
+D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.128	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.22	153.60	1200.00	0.56	16.64	272.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.448	0.214	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.25	537.60	1200.00	1.97	58.25	272.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.077	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.73	92.16	1200.00	0.34	9.99	272.00

Overall Maximum Deflections

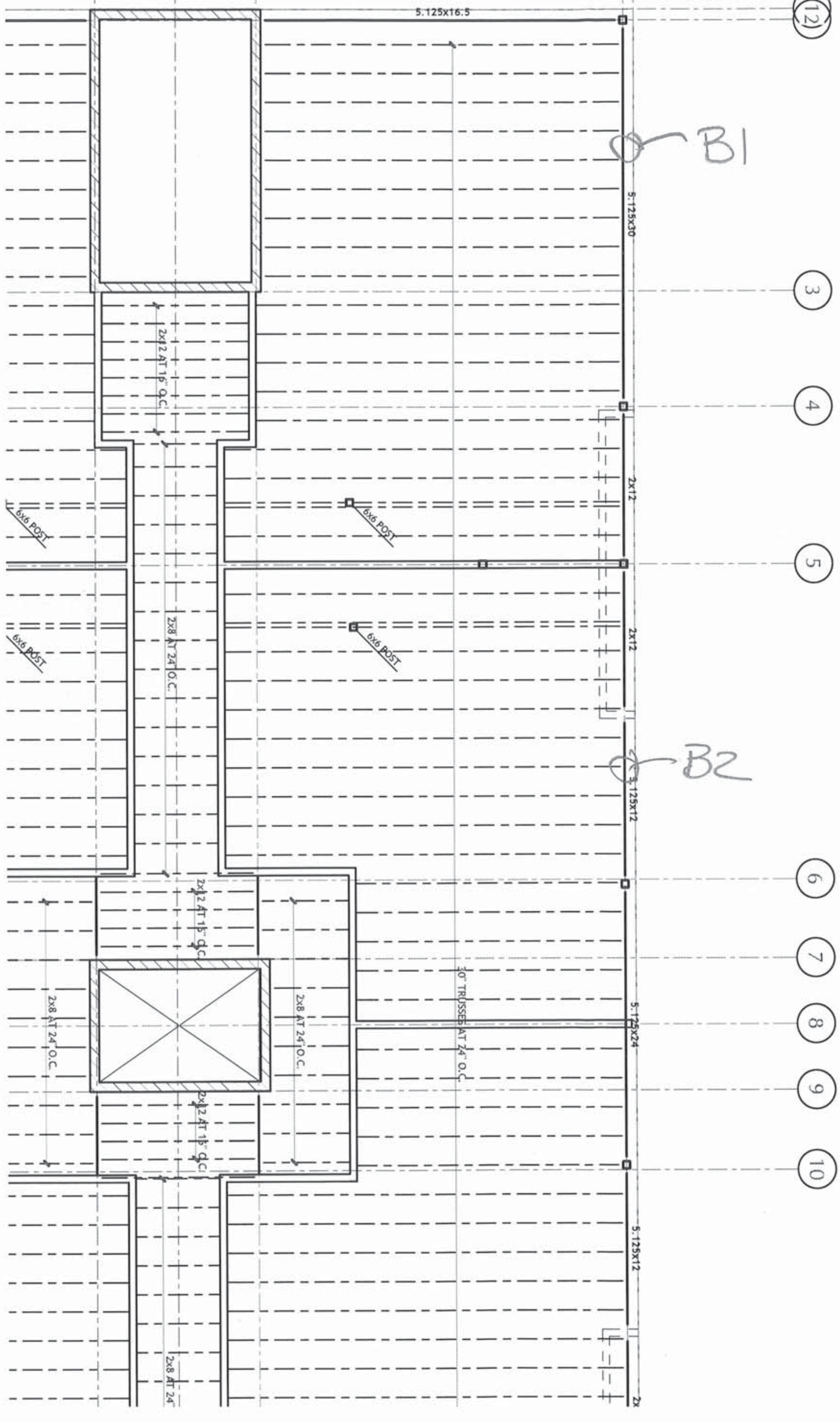
Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0494	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.510	3.510
Overall MINimum	2.700	2.700
+D+H	0.810	0.810
+D+L+H	3.510	3.510
+D+Lr+H	0.810	0.810
+D+S+H	0.810	0.810
+D+0.750Lr+0.750L+H	2.835	2.835
+D+0.750L+0.750S+H	2.835	2.835
+D+0.60W+H	0.810	0.810
+D+0.750Lr+0.750L+0.450W+H	2.835	2.835
+D+0.750L+0.750S+0.450W+H	2.835	2.835
+0.60D+0.60W+0.60H	0.486	0.486
+D+0.70E+0.60H	0.810	0.810
+D+0.750L+0.750S+0.5250E+H	2.835	2.835
+0.60D+0.70E+H	0.486	0.486
D Only	0.810	0.810
Lr Only		
L Only	2.700	2.700
S Only		
W Only		
E Only		
H Only		

4th FL @ 3rd FL
FRAMING PLAN



4TH FLOOR FRAMING & 3rd FLOOR

SEE 5th FLOOR FOR MAJORITY OF FRAMING

B1

SPAN = 26.75'

$w_D = 30psf(26.25/2) + 15(12) = 574plf$

$w_L = 40psf(26.25/2) = 525plf$

$\boxed{\text{USE } 5\tfrac{1}{8} \times 30 \text{ GLB}}$

REF OUTPUT

B2

SPAN = 11.67'

$w_D = 30psf(28.33/2) + 10(12) = 545plf$

$w_L = 40psf(28.33/2) = 567plf$

$\boxed{\text{USE } 5\tfrac{1}{8} \times 12 \text{ GLB}}$ REF OUTPUT

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: 4th Floor Beam B1

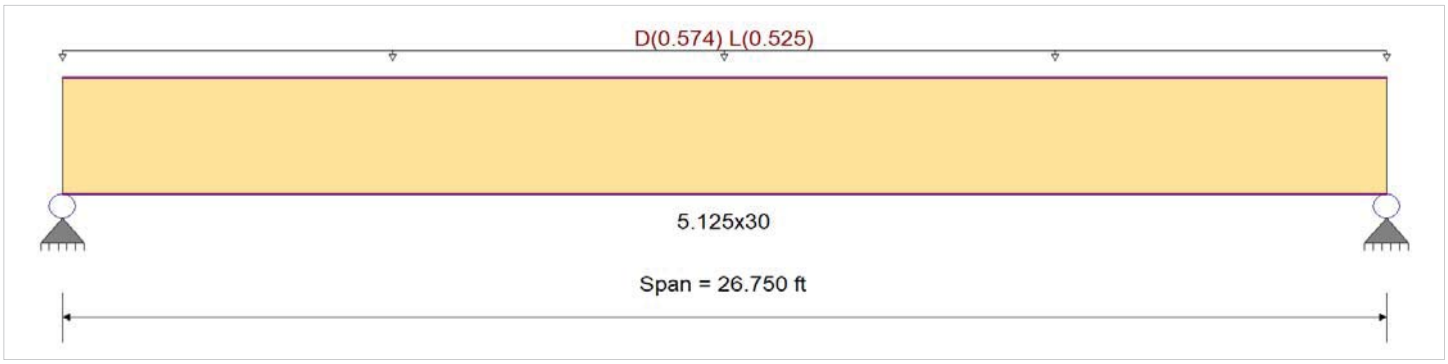
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-05	Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Wood Species	: DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Wood Grade	: 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0 ksi
		Ft	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.5740, L = 0.5250 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.718** : 1	Maximum Shear Stress Ratio	=	**0.442** : 1
Section used for this span		**5.125x30**	Section used for this span		**5.125x30**
	=	1,534.45 psi		=	117.24 psi
	=	2,137.50 psi		=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	13.375 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.293 in	Ratio =	1095 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.614 in	Ratio =	523 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L		M	fb	F'b	V	fv	F'v
D Only														0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.417	0.257	0.90	0.891	1.00	1.00	1.00	1.00	1.00		51.34	801.43	1923.75	6.28	61.23	238.50
+D+L+H					0.891	1.00	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.718	0.442	1.00	0.891	1.00	1.00	1.00	1.00	1.00		98.30	1,534.45	2137.50	12.02	117.24	265.00
+D+Lr+H					0.891	1.00	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.300	0.185	1.25	0.891	1.00	1.00	1.00	1.00	1.00		51.34	801.43	2671.88	6.28	61.23	331.25
+D+S+H					0.891	1.00	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.326	0.201	1.15	0.891	1.00	1.00	1.00	1.00	1.00		51.34	801.43	2458.13	6.28	61.23	304.75
+D+0.750Lr+0.750L+H					0.891	1.00	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.506	0.312	1.25	0.891	1.00	1.00	1.00	1.00	1.00		86.56	1,351.19	2671.88	10.58	103.24	331.25
+D+0.750L+0.750S+H					0.891	1.00	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.550	0.339	1.15	0.891	1.00	1.00	1.00	1.00	1.00		86.56	1,351.19	2458.13	10.58	103.24	304.75
+D+W+H					0.891	1.00	1.00	1.00	1.00	1.00				0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.234	0.144	1.60	0.891	1.00	1.00	1.00	1.00	1.00		51.34	801.43	3420.01	6.28	61.23	424.00

Wood Beam

DESCRIPTION: 4th Floor Beam B1

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					0.891	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.234	0.144	1.60	0.891	1.00	1.00	1.00	1.00	1.00	51.34	801.43	3420.01	6.28	61.23	424.00
+D+0.750Lr+0.750L+0.750W+H					0.891	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.395	0.243	1.60	0.891	1.00	1.00	1.00	1.00	1.00	86.56	1,351.19	3420.01	10.58	103.24	424.00
+D+0.750L+0.750S+0.750W+H					0.891	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.395	0.243	1.60	0.891	1.00	1.00	1.00	1.00	1.00	86.56	1,351.19	3420.01	10.58	103.24	424.00
+D+0.750Lr+0.750L+0.5250E+H					0.891	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.395	0.243	1.60	0.891	1.00	1.00	1.00	1.00	1.00	86.56	1,351.19	3420.01	10.58	103.24	424.00
+D+0.750L+0.750S+0.5250E+H					0.891	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.395	0.243	1.60	0.891	1.00	1.00	1.00	1.00	1.00	86.56	1,351.19	3420.01	10.58	103.24	424.00
+0.60D+W+H					0.891	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.141	0.087	1.60	0.891	1.00	1.00	1.00	1.00	1.00	30.80	480.86	3420.01	3.77	36.74	424.00
+0.60D+0.70E+H					0.891	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.750 ft	1	0.141	0.087	1.60	0.891	1.00	1.00	1.00	1.00	1.00	30.80	480.86	3420.01	3.77	36.74	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.6136	13.473		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	14.699	14.699
Overall MINimum	7.022	7.022
D Only	7.677	7.677
+D+L+H	14.699	14.699
+D+Lr+H	7.677	7.677
+D+S+H	7.677	7.677
+D+0.750Lr+0.750L+H	12.944	12.944
+D+0.750L+0.750S+H	12.944	12.944
+D+W+H	7.677	7.677
+D+0.70E+H	7.677	7.677
+D+0.750Lr+0.750L+0.750W+H	12.944	12.944
+D+0.750L+0.750S+0.750W+H	12.944	12.944
+D+0.750Lr+0.750L+0.5250E+H	12.944	12.944
+D+0.750L+0.750S+0.5250E+H	12.944	12.944
+0.60D+W+H	4.606	4.606
+0.60D+0.70E+H	4.606	4.606
D Only	7.677	7.677
Lr Only		
L Only	7.022	7.022
S Only		
W Only		
E Only		
H Only		

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: 4th Floor Beam B2

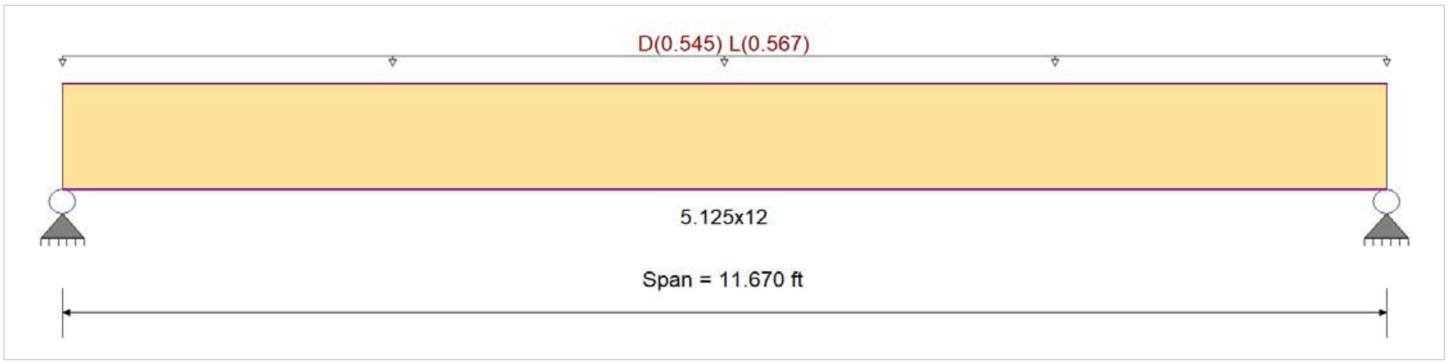
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-05

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,400.0 psi	*E : Modulus of Elasticity*	
Load Combination	ASCE 7-05	Fb -	1,850.0 psi	Ebend- xx	1,800.0 ksi
		Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Wood Species	: DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Wood Grade	: 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0 ksi
		Ft	1,100.0 psi	Density	31.210 pcf

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.5450, L = 0.5670 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.770** : 1	Maximum Shear Stress Ratio	=	**0.497** : 1
Section used for this span		**5.125x12**	Section used for this span		**5.125x12**
	=	1,846.85 psi		=	131.69 psi
	=	2,400.00 psi		=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.835 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.179 in	Ratio =	781 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.351 in	Ratio =	398 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.419	0.271	0.90	1.000	1.00	1.00	1.00	1.00	1.00	9.28	905.16	2160.00	2.65	64.54	238.50
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.770	0.497	1.00	1.000	1.00	1.00	1.00	1.00	1.00	18.93	1,846.85	2400.00	5.40	131.69	265.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.302	0.195	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.28	905.16	3000.00	2.65	64.54	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.328	0.212	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.28	905.16	2760.00	2.65	64.54	304.75
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.537	0.347	1.25	1.000	1.00	1.00	1.00	1.00	1.00	16.52	1,611.43	3000.00	4.71	114.90	331.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.584	0.377	1.15	1.000	1.00	1.00	1.00	1.00	1.00	16.52	1,611.43	2760.00	4.71	114.90	304.75
+D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.236	0.152	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.28	905.16	3840.00	2.65	64.54	424.00

BARKER STRUCTURAL
Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Wood Beam

DESCRIPTION: 4th Floor Beam B2

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.236	0.152	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.28	905.16	3840.00	2.65	64.54	424.00
+D+0.750Lr+0.750L+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.420	0.271	1.60	1.000	1.00	1.00	1.00	1.00	1.00	16.52	1,611.43	3840.00	4.71	114.90	424.00
+D+0.750L+0.750S+0.750W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.420	0.271	1.60	1.000	1.00	1.00	1.00	1.00	1.00	16.52	1,611.43	3840.00	4.71	114.90	424.00
+D+0.750Lr+0.750L+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.420	0.271	1.60	1.000	1.00	1.00	1.00	1.00	1.00	16.52	1,611.43	3840.00	4.71	114.90	424.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.420	0.271	1.60	1.000	1.00	1.00	1.00	1.00	1.00	16.52	1,611.43	3840.00	4.71	114.90	424.00
+0.60D+W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.141	0.091	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.57	543.09	3840.00	1.59	38.72	424.00
+0.60D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.670 ft	1	0.141	0.091	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.57	543.09	3840.00	1.59	38.72	424.00

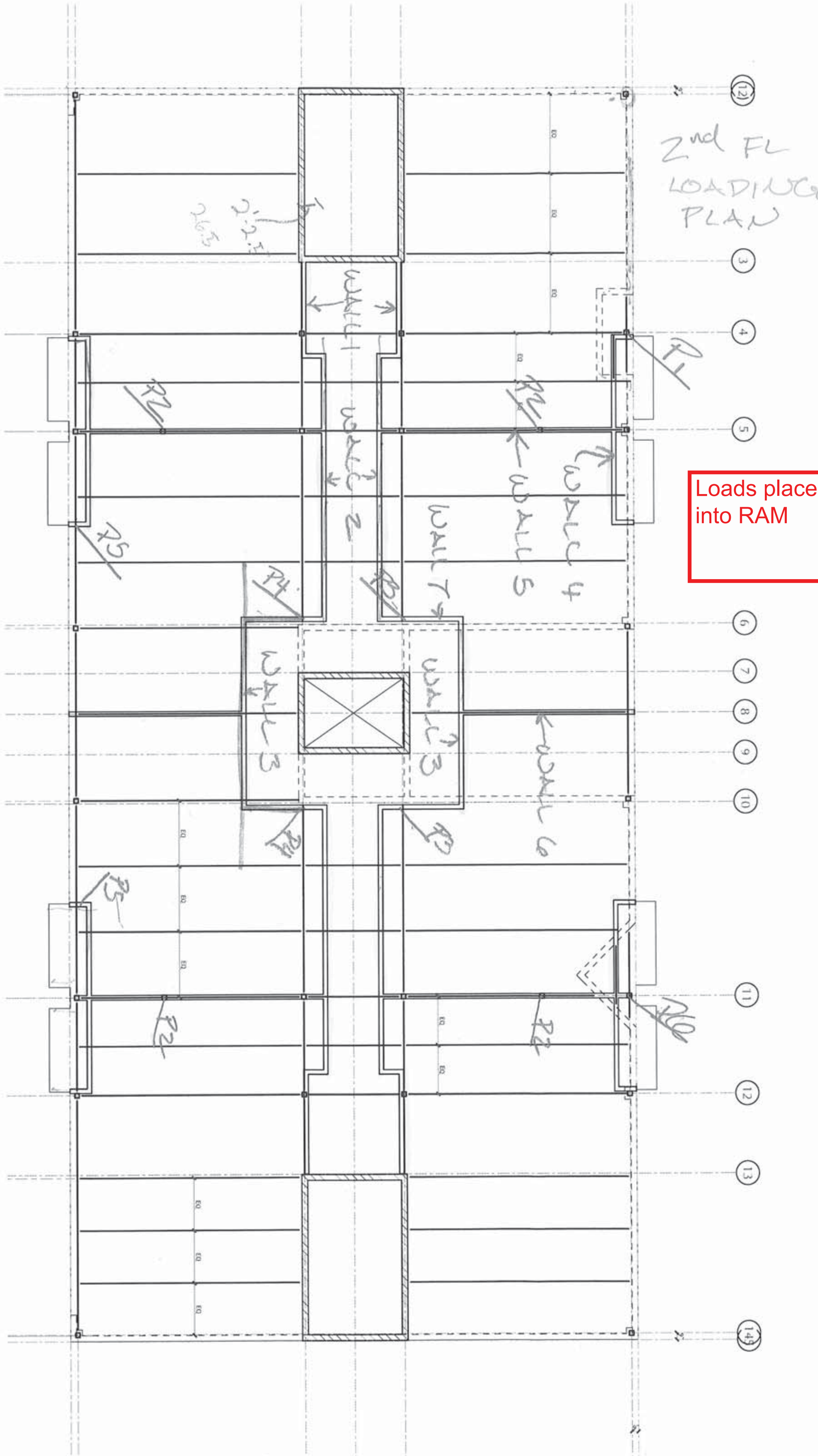
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3514	5.878		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.489	6.489
Overall MINimum	3.308	3.308
D Only	3.180	3.180
+D+L+H	6.489	6.489
+D+Lr+H	3.180	3.180
+D+S+H	3.180	3.180
+D+0.750Lr+0.750L+H	5.661	5.661
+D+0.750L+0.750S+H	5.661	5.661
+D+W+H	3.180	3.180
+D+0.70E+H	3.180	3.180
+D+0.750Lr+0.750L+0.750W+H	5.661	5.661
+D+0.750L+0.750S+0.750W+H	5.661	5.661
+D+0.750Lr+0.750L+0.5250E+H	5.661	5.661
+D+0.750L+0.750S+0.5250E+H	5.661	5.661
+0.60D+W+H	1.908	1.908
+0.60D+0.70E+H	1.908	1.908
D Only	3.180	3.180
Lr Only		
L Only	3.308	3.308
S Only		
W Only		
E Only		
H Only		



Loads placed into RAM

2nd FLOOR LOADING FOR RAM

WALL 1

ROOF: $\omega_D = 20psf(27/2) = 270\ plf = \omega_{Lr}$

5^{th}: $\omega_D = 30psf(37/2) = 555\ plf$ $\omega_L = 60psf(27/2) + 100(11/2) = 1360\ plf$

4^{th} & 3^{rd} $\omega_D = 555\ plf$ $\omega_L = 40(37/2) = 740\ plf$

ω_{TL}: $\omega_D = 270 + 555(3) = 1935\ plf$
$\omega_{Lr} = 270\ plf$
$\omega_L = 1360 + 740(2) = 2840\ plf$

WALL 2

USE SAME AS WALL 1

WALL 3

ROOF: $\omega_D = 20psf(9/2) = 90\ plf = \omega_{Lr}$
5^{th}: $\omega_D = 30psf(26/2) = 390\ plf$ $\omega_L = 100(26/2) = 1300\ plf$
4^{th} & 3^{rd}: $\omega_D = 390\ plf$ $\omega_L = 40psf(26/2) = 520\ plf$

ω_{TL}: $\omega_D = 90 + 390(3) = 1260\ plf$
$\omega_{Lr} = 90\ plf$
$\omega_L = 1300 + 520(2) = 2340\ plf$

WALL 4

NO LOAD ON ROOF & 5TH (CARRIED BY COLUMNS)

4^{th}: $\omega_D = [30psf(29)^2/2 + 15(12)(29)]/26.83 = 665\ plf$
$\omega_L = [40psf(29)^2/2]/26.83 = 627\ plf$

3^{rd}: $\omega_D = 30psf(31.5')^2/2(26.83) = 555\ plf$
$\omega_L = 40psf(26.83)/2 + 60psf(4.5')(26.83(4.5)/2)/26.83 = 694\ plf$

ω_{TL}: $\omega_D = 555 + 665 = 1220\ plf$
$\omega_L = 627 + 694 = 1321\ plf$

WALL 5

ROOF: $\omega_D = 20psf(24/2) = 240plf = \omega_{Lr}$

5th: $\omega_D = 30psf(2') + 10psf(12') = 180plf$
$\omega_L = 60psf(2') = 120plf$

4th & 3rd: $\omega_D = 180plf$ $\omega_L - 40psf(2') = 80plf$

$\omega_{TL} = \omega_D = 240 + 180(3) = 780plf$
$\omega_{Lr} = 240plf$
$\omega_L = 120 + 80(2) = 280plf$

WALL 6 DOESN'T OCCUR @ ROOF OR 5th

4th & 3rd: $\omega_D = 30psf(2) + 10(12) = 180plf$
$\omega_L = 40psf(2) = 80plf$

$\omega_{TL} =$ $\omega_D = 180(2) = 360plf$ $\omega_L = 80(2) = 160plf$

WALL 7

ROOF: $\omega_D = 20psf(23/2) = 230plf = \omega_{Lr}$

5th: $\omega_D = 30psf(2) + 10psf(12) = 180plf$
$\omega_L = 100psf(2) = 200plf$

4th & 3rd: $\omega_D = 180plf$ $\omega_L = 40psf(2) = 80plf$

ω_{TL}: $\omega_D = 230 + 180(3) = 770plf$
$\omega_{Lr} = 230plf$
$\omega_L = 200 + 80(2) = 360plf$

2nd FLOOR LOADING CONTINUED

POINT LOADS ON BEAMS

P1

REACTIONS OF 5th FL BEAMS B2 & B5 AND 4th & 3rd B1

$P_D = 8.632^K + 2.794^K + 7.677(2) = 26.8^K$

$P_L = 10.86^K + 4.703^K + 7.022(2) = 29.6^K$

P2

REACTION OF ROOF BEAM B2

$P_D = 4.055^K$ $P_L = 4.35^K$

P3

REACTION OF ROOF B7 AND 5th B7 (3)

$P_D = .585^K + .81^K(3) = 3.02^K$

$P_L = 2.7(3) = 8.1^K$

$P_{Lr} = .585^K$

P4

REACTION OF ROOF B8 & 5th B7(3)

$P_D = 4.976 + .81(3) = 7.406^K$

$P_L = 2.7(3) = 8.1^K$

$P_{Lr} = 4.976^K$

P5

REACTION OF 4th & 3rd B2

$P_D = 3.18^K(2) = 6.36^K$

$P_L = 3.308(2) = 6.62^K$

PC6

REACTION OF ROOF BEAMS B1 & B5 + 5th FL B5 & B3
(4th & 3rd CARRIED BY WALL)

$P_D = 1.734^K + .88^K + 2.794^K + 5.588^K = 11.0^K$

$P_{Lr} = 1.715^K + .22^K = 1.94^K$

$P_L = 4.703 + 9.405^K = 14.11^K$

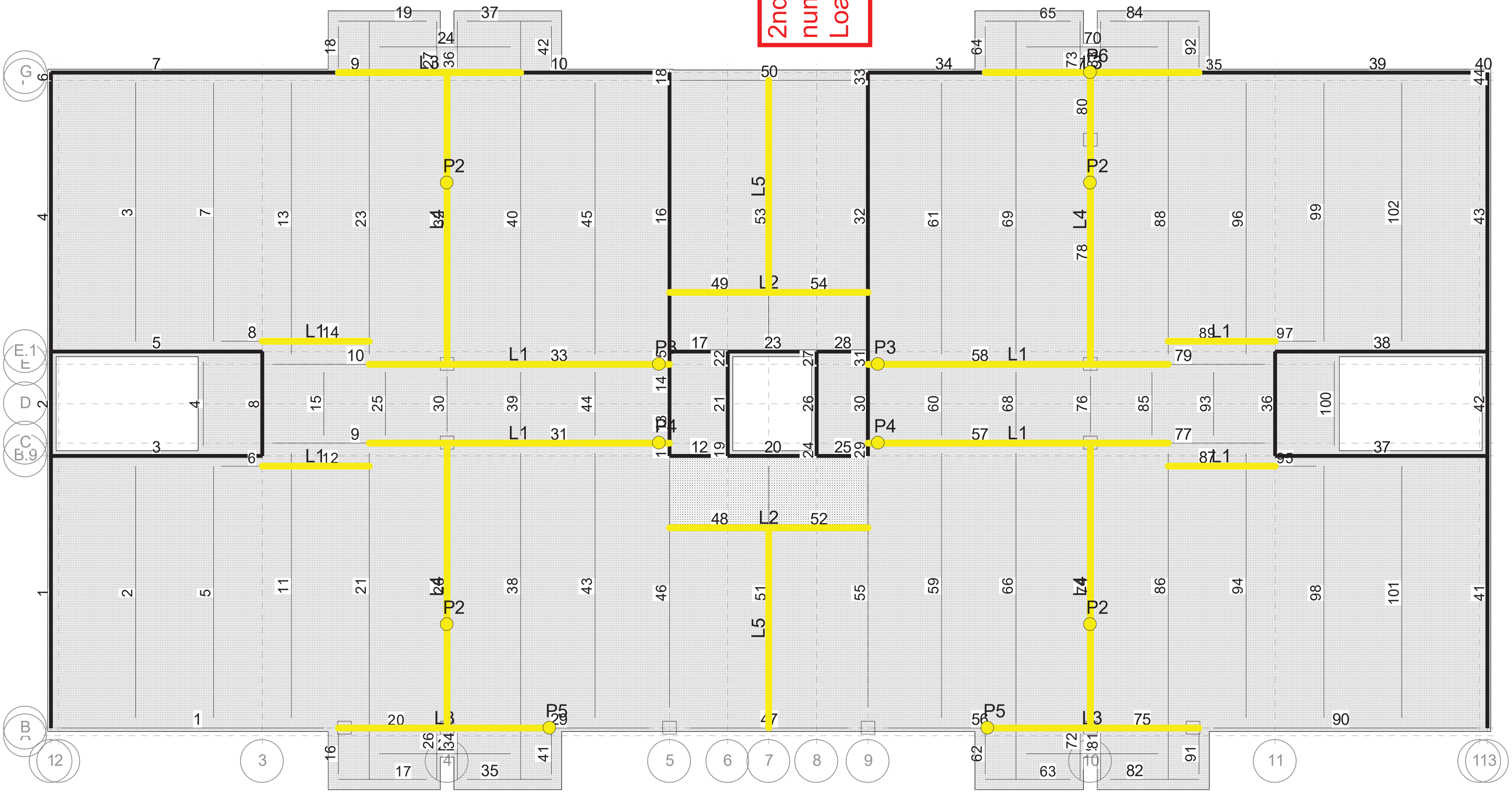
Floor Map

RAM Steel 17.00.01.09
DataBase: 218029
Building Code: IBC

03/27/20 14:07:47
Steel Code: AISC 360-16 LRFD

Floor Type: Floor **Beam Numbers**

2nd Floor Beam numbers and Loading



Floor Map

Surface Loads

	Label	DL psf	CDL psf	LL psf	Reduction Type	PLL psf	CLL psf	Mass DL psf
	Floor Load	10.0	0.0	80.0	Unreducible	0.0	0.0	0.0
	Mech'l	10.0	0.0	125.0	Unreducible	0.0	0.0	0.0

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	Wall 1 and Wall 2	1.935	0.000	3.110	Reducible	0.000	0.000	0.000
L2	Wall 3	1.260	0.000	2.430	Reducible	0.000	0.000	0.000
L3	Wall 4	1.220	0.000	1.321	Reducible	0.000	0.000	0.000
L4	Wall 5	0.780	0.000	0.520	Reducible	0.000	0.000	0.000
L5	Wall 6	0.360	0.000	0.160	Reducible	0.000	0.000	0.000

Point Loads

	Label	DL kips	CDL kips	LL kips	Reduction Type	PLL kips	CLL kips	Mass DL kips
P2	P2	4.055	0.000	4.350	Reducible	0.000	0.000	0.000
P3	P3	3.020	0.000	8.685	Reducible	0.000	0.000	0.000
P4	P4	7.406	0.000	13.076	Reducible	0.000	0.000	0.000
P5	P5	6.360	0.000	6.620	Reducible	0.000	0.000	0.000
P6	P6	11.000	0.000	16.050	Reducible	0.000	0.000	0.000

Beam Summary

RAM Steel 17.00.01.09
DataBase: 218029
Building Code: IBC

03/27/20 14:07:47
Steel Code: AISC 360-16 LRFD

STEEL BEAM DESIGN SUMMARY:

DEMAND/CAPACITY LIMIT FOR STRENGTH : 1.000

Floor Type: Floor

Bm #	Length ft	+Mu kip-ft	-Mu kip-ft	ΦMn kip-ft	Fy ksi	Beam Size	Studs
1	28.67	357.1	0.0	386.6	50.0	W16X31 u	32
2	26.58	166.2	0.0	167.5	50.0	W12X19	10
3	27.17	173.6	0.0	179.3	50.0	W12X19	12
4	10.17	10.4	0.0	88.6	50.0	W10X12 u	6
5	26.58	160.5	0.0	167.5	50.0	W12X19 u	10
6	7.58	19.4	0.0	64.6	50.0	W8X10	6
7	27.17	167.5	0.0	179.3	50.0	W12X19	12
8	7.58	19.4	0.0	64.6	50.0	W8X10	6
9	18.00	452.8	0.0	459.0	50.0	W18X35 u	28
10	18.00	456.1	0.0	459.0	50.0	W18X35 u	29
11	27.83	227.6	0.0	256.7	50.0	W14X22 u	25
12	7.58	52.6	0.0	96.8	50.0	W10X12 u	6
13	28.42	234.9	0.0	265.8	50.0	W14X22 u	26
14	7.58	52.6	0.0	96.8	50.0	W10X12 u	6
15	7.67	10.4	0.0	32.9	50.0	W8X10 u	
16	5.00	0.8	0.0	64.3	50.0	W8X10	4
17	3.00	0.0	-5.6				
	6.58	1.8	-5.6	32.9	50.0	W8X10	
18	5.00	0.8	0.0	64.3	50.0	W8X10	4
19	3.00	0.0	-5.6				
	6.58	1.8	-5.6	32.9	50.0	W8X10	
20	10.00	113.7	0.0	177.4	50.0	W14X30 u	
21	5.00	0.0	-47.0				
	27.83	199.2	-47.0	296.2	50.0	W14X30 u	19
22	14.81	34.1	0.0	51.0	50.0	W8X15 u	
23	28.42	206.5	-47.0	334.9	50.0	W14X30 u	29
	5.00	0.0	-47.0				
24	14.81	34.1	0.0	51.0	50.0	W8X15 u	
25	7.67	10.4	0.0	32.9	50.0	W8X10 u	
26	2.50	0.0	-3.7				
	2.50	0.0	-3.7	32.9	50.0	W8X10	
27	2.50	0.0	-3.7	32.9	50.0	W8X10	
	2.50	0.0	-3.7				
28	27.83	405.0	0.0	425.0	50.0	W16X31 u	45
29	21.67	450.5	0.0	480.7	50.0	W18X35 u	45
30	7.67	11.4	0.0	32.9	50.0	W8X10 u	
31	21.67	663.8	0.0	693.6	50.0	W21X44 u	38
32	28.42	423.1	0.0	442.3	50.0	W16X31 u	52
33	21.67	661.2	0.0	684.8	50.0	W21X44 u	37

Beam Summary

Bm #	Length	+Mu	-Mu	ΦMn	Fy	Beam Size	Studs
34	2.50	0.1	-3.4				
	2.50	0.1	-3.4	32.9	50.0	W8X10	
35	6.22	1.5	-5.6	32.9	50.0	W8X10	
	3.00	0.0	-5.6				
36	2.50	0.1	-3.4	32.9	50.0	W8X10	
	2.50	0.1	-3.4				
37	6.22	1.5	-5.6	32.9	50.0	W8X10	
	3.00	0.0	-5.6				
38	5.00	0.0	-47.0				
	27.83	157.7	-47.0	284.6	50.0	W14X30	15
39	7.67	12.5	0.0	32.9	50.0	W8X10 u	
40	28.42	164.7	-47.0	284.6	50.0	W14X30	14
	5.00	0.0	-47.0				
41	5.00	0.8	0.0	64.3	50.0	W8X10	4
42	5.00	0.8	0.0	32.7	50.0	W8X10	
43	27.83	165.9	0.0	203.5	50.0	W14X22 u	10
44	7.67	12.5	0.0	32.9	50.0	W8X10 u	
45	28.42	173.0	0.0	203.5	50.0	W14X22 u	10
46	26.58	285.8	0.0	311.2	50.0	W16X26 u	28
47	19.33	264.2	0.0	282.2	50.0	W16X26 u	12
48	9.67	63.2	0.0	97.4	50.0	W10X12 u	6
49	9.67	63.2	0.0	97.4	50.0	W10X12 u	6
50	19.33	256.3	0.0	261.0	50.0	W14X22	18
51	26.58	479.5	0.0	509.0	50.0	W18X40 u	49
52	9.67	63.2	0.0	97.4	50.0	W10X12 u	6
53	26.42	426.0	0.0	504.8	50.0	W18X40 u	43
54	9.67	63.2	0.0	97.4	50.0	W10X12 u	6
55	26.58	285.8	0.0	311.2	50.0	W16X26 u	28
56	21.67	450.5	0.0	480.7	50.0	W18X35 u	45
57	21.67	663.8	0.0	693.6	50.0	W21X44 u	38
58	21.67	661.2	0.0	684.8	50.0	W21X44 u	37
59	27.83	165.9	0.0	203.5	50.0	W14X22 u	10
60	7.67	12.5	0.0	32.9	50.0	W8X10 u	
61	28.42	173.0	0.0	203.5	50.0	W14X22 u	10
62	5.00	0.8	0.0	64.3	50.0	W8X10	4
63	3.00	0.0	-5.6				
	6.22	1.5	-5.6	32.9	50.0	W8X10	
64	5.00	0.8	0.0	64.3	50.0	W8X10	4
65	3.00	0.0	-5.6				
	6.22	1.5	-5.6	32.9	50.0	W8X10	
66	5.00	0.0	-47.0				
	27.83	157.7	-47.0	284.6	50.0	W14X30	15
67	14.81	34.1	0.0	51.0	50.0	W8X15 u	
68	7.67	12.5	0.0	32.9	50.0	W8X10 u	
69	28.42	164.7	-47.0	284.6	50.0	W14X30	14

Beam Summary

Bm #	Length	+Mu	-Mu	ΦMn	Fy	Beam Size	Studs
	5.00	0.0	-47.0				
70	14.81	34.1	0.0	51.0	50.0	W8X15 u	
71	13.00	245.1	0.0	316.8	50.0	W16X31 u	16
72	2.50	0.1	-3.4				
	2.50	0.1	-3.4	32.9	50.0	W8X10	
73	2.50	0.1	-3.4	32.9	50.0	W8X10	
	2.50	0.1	-3.4				
74	27.83	405.0	0.0	425.0	50.0	W16X31 u	45
75	10.00	113.6	0.0	124.5	50.0	W14X22 u	
76	7.67	11.4	0.0	32.9	50.0	W8X10 u	
77	18.00	452.8	0.0	459.0	50.0	W18X35 u	28
78	21.83	235.6	0.0	291.8	50.0	W16X26 u	18
79	18.00	456.1	0.0	459.0	50.0	W18X35 u	29
80	6.58	19.0	0.0	69.7	50.0	W8X10	6
81	2.50	0.0	-3.7				
	2.50	0.0	-3.7	32.9	50.0	W8X10	
82	6.58	1.8	-5.6	32.9	50.0	W8X10	
	3.00	0.0	-5.6				
83	2.50	0.0	-3.7	32.9	50.0	W8X10	
	2.50	0.0	-3.7				
84	6.58	1.8	-5.6	32.9	50.0	W8X10	
	3.00	0.0	-5.6				
85	7.67	10.4	0.0	32.9	50.0	W8X10 u	
86	5.00	0.0	-47.0				
	27.83	199.2	-47.0	296.2	50.0	W14X30 u	19
87	7.58	52.6	0.0	96.8	50.0	W10X12 u	6
88	28.42	206.5	-47.0	334.9	50.0	W14X30 u	29
	5.00	0.0	-47.0				
89	7.58	52.6	0.0	96.8	50.0	W10X12 u	6
90	28.67	357.1	0.0	386.6	50.0	W16X31 u	32
91	5.00	0.8	0.0	64.3	50.0	W8X10	4
92	5.00	0.8	0.0	64.3	50.0	W8X10	4
93	7.67	10.4	0.0	32.9	50.0	W8X10 u	
94	27.83	227.6	0.0	256.7	50.0	W14X22 u	25
95	7.58	19.4	0.0	64.6	50.0	W8X10	6
96	28.42	234.9	0.0	265.8	50.0	W14X22 u	26
97	7.58	19.4	0.0	64.6	50.0	W8X10	6
98	26.58	160.5	0.0	167.5	50.0	W12X19 u	10
99	27.17	167.5	0.0	179.3	50.0	W12X19	12
100	10.17	10.4	0.0	88.6	50.0	W10X12 u	6
101	26.58	166.2	0.0	167.5	50.0	W12X19	10
102	27.17	173.6	0.0	179.3	50.0	W12X19	12

* after Size denotes beam failed stress/capacity criteria.
\# after Size denotes beam failed deflection criteria.

Gravity Beam Design

RAM Steel 17.00.01.09
DataBase: 218029
Building Code: IBC

Individual beam designs for comparison to Summary. This includes all beams in the NW quadrant of the building

03/27/20 14:07:47
Steel Code: AISC 360-16 LRFD

Floor Type: Floor **Beam Number = 3**

SPAN INFORMATION (ft): I-End (3.11,30.12) J-End (3.11,57.28)

Beam Size (Optimum) = W12X19 Fy = 50.0 ksi
Total Beam Length (ft) = 27.17

COMPOSITE PROPERTIES (Not Shored):

			Left			**Right**
Deck Label			Floor Deck			Floor Deck
Concrete thickness (in)			4.50			4.50
Unit weight concrete (pcf)			150.00			150.00
f'c (ksi)			3.00			3.00
Decking Orientation			perpendicular			perpendicular
Decking type			ASC 3W			ASC 3W
beff (in)	=	81.50	Y bar(in)	=	16.12	
Mnf (kip-ft)	=	300.08	Mn (kip-ft)	=	199.24	
C (kips)	=	103.38	PNA (in)	=	10.50	
Ieff (in4)	=	559.15	Itr (in4)	=	834.38	
Stud length (in)	=	6.00	Stud diam (in)	=	0.75	

Stud Capacity (kips) Qn = 17.2 Rg = 1.00 Rp = 0.60
\# of studs: Max = 27 Partial = 12 Actual = 12
Number of Stud Rows = 1 Percent of Full Composite Action = 37.12

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.621	0.621	0.000	---	NonR	0.000	0.000
	27.166	0.621	0.621	0.000			0.000	0.000
2	0.000	0.080	0.000	0.637	---	NonR	0.000	0.000
	27.166	0.080	0.000	0.637			0.000	0.000
3	0.000	0.019	0.019	0.000	---	NonR	0.000	0.000
	27.166	0.019	0.019	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 25.56 kips 1.00Vn = 86.01 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	PreCmp+	1.4DL	82.6	13.6	0.0	1.00	0.90	92.63
	Init DL	1.4DL	82.6	13.6	---	---		
	Max +	1.2DL+1.6LL	173.6	13.6	---	---	0.90	179.31
Controlling		1.2DL+1.6LL	173.6	13.6	---	---	0.90	179.31

REACTIONS (kips):

	Left	**Right**
Initial reaction	8.69	8.69
DL reaction	9.77	9.77
Max +LL reaction	8.65	8.65
Max +total reaction (factored)	25.56	25.56

DEFLECTIONS: (Camber = 1-1/2) **Ratio**

Initial load (in) at 13.58 ft = -2.080 L/D = 157

Live load (in)	at 13.58 ft	=	-0.481	L/D	=	677	>	360	0.53
Post Comp load (in)	at 13.58 ft	=	-0.541	L/D	=	602	>	240	0.40
Net Total load (in)	at 13.58 ft	=	-1.121	L/D	=	291	>	180	0.62

Floor Type: Floor **Beam Number = 4**

SPAN INFORMATION (ft): I-End (9.69,19.95) J-End (9.69,30.12)

Beam Size (User Selected) = W10X12 Fy = 50.0 ksi
Total Beam Length (ft) = 10.17

COMPOSITE PROPERTIES (Not Shored):

	Left	**Right**
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	perpendicular	perpendicular
Decking type	ASC 3W	ASC 3W

beff (in)	=	21.25	Y bar(in)	=	12.63
Mnf (kip-ft)	=	159.33	Mn (kip-ft)	=	98.43
C (kips)	=	51.69	PNA (in)	=	7.66
Ieff (in4)	=	213.74	Itr (in4)	=	349.78
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 17.2 Rg = 1.00 Rp = 0.60
\# of studs: Max = 10 Partial = 6 Actual = 6
Number of Stud Rows = 1 Percent of Full Composite Action = 29.20

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.039	0.039	0.000	---	NonR	0.000	0.000
	10.166	0.039	0.039	0.000			0.000	0.000
2	0.000	0.005	0.000	0.040	---	NonR	0.000	0.000
	10.166	0.005	0.000	0.040			0.000	0.000
3	0.000	0.224	0.224	0.000	---	NonR	0.000	0.000
	10.166	0.224	0.224	0.000			0.000	0.000
4	0.000	0.029	0.000	0.230	---	NonR	0.000	0.000
	10.166	0.029	0.000	0.230			0.000	0.000
5	0.000	0.012	0.012	0.000	---	NonR	0.000	0.000
	10.166	0.012	0.012	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 4.08 kips 1.00Vn = 56.26 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	PreCmp+	1.4DL	5.0	5.1	0.0	1.00	0.90	46.90
	Init DL	1.4DL	5.0	5.1	---	---		
	Max +	1.2DL+1.6LL	10.4	5.1	---	---	0.90	88.59
Controlling		1.2DL+1.6LL	10.4	5.1	---	---	0.90	88.59

REACTIONS (kips):

	Left	**Right**
Initial reaction	1.40	1.40
DL reaction	1.57	1.57

	Left	Right
Max +LL reaction	1.37	1.37
Max +total reaction (factored)	4.08	4.08

DEFLECTIONS:

										Ratio
Initial load (in)	at	5.08 ft	=	-0.042	L/D	=	2877			
Live load (in)	at	5.08 ft	=	-0.010	L/D	=	1165 2	>	360	0.03
Post Comp load (in)	at	5.08 ft	=	-0.012	L/D	=	1035 8	>	240	0.02
Net Total load (in)	at	5.08 ft	=	-0.054	L/D	=	2251	>	180	0.08

Gravity Beam Design

Floor Type: Floor **Beam Number = 7**

SPAN INFORMATION (ft): I-End (10.69,30.12) J-End (10.69,57.28)

Beam Size (Optimum) = W12X19 Fy = 50.0 ksi

Total Beam Length (ft) = 27.17

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	perpendicular	perpendicular
Decking type	ASC 3W	ASC 3W

beff (in)	=	81.50	Y bar(in)	=	16.12
Mnf (kip-ft)	=	300.08	Mn (kip-ft)	=	199.24
C (kips)	=	103.38	PNA (in)	=	10.50
Ieff (in4)	=	559.15	Itr (in4)	=	834.38
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 17.2 Rg = 1.00 Rp = 0.60

\# of studs: Max = 27 Partial = 12 Actual = 12

Number of Stud Rows = 1 Percent of Full Composite Action = 36.68

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRL L	StorLL	Red%	RoofLL	Red%	PartL
1.000	1.06	0.04	1.65	0.0	0.00	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.591	0.591	0.000	---	NonR	0.000	0.000
	27.166	0.591	0.591	0.000			0.000	0.000
2	0.000	0.076	0.000	0.607	---	NonR	0.000	0.000
	27.166	0.076	0.000	0.607			0.000	0.000
3	0.000	0.019	0.019	0.000	---	NonR	0.000	0.000
	27.166	0.019	0.019	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 28.13 kips 1.00Vn = 86.01 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	78.9	13.6	0.0	1.00	0.90	92.63
	Init DL	1.4DL	78.9	13.6	---	---		
	Max +	1.2DL+1.6LL	167.5	13.5	---	---	0.90	179.31
Controlling		1.2DL+1.6LL	167.5	13.5	---	---	0.90	179.31

REACTIONS (kips):

	Left	Right
Initial reaction	8.33	8.29
DL reaction	10.34	9.36
Max +LL reaction	9.83	8.30
Max +total reaction (factored)	28.13	24.51

DEFLECTIONS: (Camber = 1-1/2)

									Ratio
Initial load (in)	at 13.58 ft	=	-1.985	L/D	=	164			
Live load (in)	at 13.58 ft	=	-0.467	L/D	=	699	>	360	0.52
Post Comp load (in)	at 13.58 ft	=	-0.529	L/D	=	616	>	240	0.39
Net Total load (in)	at 13.58 ft	=	-1.014	L/D	=	321	>	180	0.56

Gravity Beam Design

RAM Structural System
Bentley

RAM Steel 17.00.01.09	
DataBase: 218029	03/27/20 14:07:47
Building Code: IBC	Steel Code: AISC 360-16 LRFD

Floor Type: Floor **Beam Number = 8**

SPAN INFORMATION (ft): I-End (10.69,31.12) J-End (18.27,31.12)

Beam Size (Optimum) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 7.58

COMPOSITE PROPERTIES (Not Shored):

	Left	**Right**
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	parallel	parallel
Decking type	ASC 3W	ASC 3W

beff (in)	=	17.37	Y bar(in)	=	10.86
Mnf (kip-ft)	=	120.56	Mn (kip-ft)	=	71.73
C (kips)	=	43.07	PNA (in)	=	6.48
Ieff (in4)	=	140.41	Itr (in4)	=	233.98
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 21.5 Rg = 1.00 Rp = 0.75
\# of studs: Max = 20 Partial = 6 Actual = 6
Number of Stud Rows = 1 Percent of Full Composite Action = 25.45

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	4.750	1.935	0.000	3.110	0.0%	Red	0.000	0.000
	7.583	1.935	0.000	3.110			0.000	0.000
2	0.000	0.010	0.010	0.000	---	NonR	0.000	0.000
	7.583	0.010	0.010	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 16.86 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	0.1	4.8	7.6	1.14	0.90	25.81
	Init DL	1.4DL	0.1	4.8	---	---		
	Max +	1.2DL+1.6LL	19.4	5.3	---	---	0.90	64.56
Controlling		1.2DL+1.6LL	19.4	5.3	---	---	0.90	64.56

REACTIONS (kips):

	Left	**Right**
Initial reaction	0.04	0.04
DL reaction	1.06	4.50
Max +LL reaction	1.65	7.16
Max +total reaction (factored)	3.91	16.86

DEFLECTIONS:

										Ratio
Initial load (in)	at	4.21 ft	=	-0.001			0.00			
Live load (in)	at	4.21 ft	=	-0.018	L/D	=	5192	>	360	0.07
Post Comp load (in)	at	4.21 ft	=	-0.028	L/D	=	3200	>	240	0.07

Net Total load (in)	at	4.21 ft	=	-0.029	L/D	=	3110	> 180	0.06

Floor Type: Floor **Beam Number = 9**

SPAN INFORMATION (ft): I-End (15.44,21.20) J-End (33.44,21.20)

Beam Size (User Selected) = W18X35 Fy = 50.0 ksi
Total Beam Length (ft) = 18.00

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	parallel	parallel
Decking type	ASC 3W	ASC 3W

beff (in) =	40.50	Y bar(in) =	18.29
Mnf (kip-ft) =	582.96	Mn (kip-ft) =	509.95
C (kips) =	258.45	PNA (in) =	17.27
Ieff (in4) =	1558.68	Itr (in4) =	1916.25
Stud length (in) =	6.00	Stud diam (in) =	0.75

Stud Capacity (kips) Qn = 21.5 Rg = 1.00 Rp = 0.75
\# of studs: Full = 52 Partial = 28 Actual = 28
Number of Stud Rows = 1 Percent of Full Composite Action = 53.98

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
2.833	20.26	8.39	17.42	0.0	8.21	0.00	0.0	0.00	0.0	0.00
6.000	2.06	1.83	0.00	0.0	1.84	0.00	0.0	0.00	0.0	0.00
10.417	15.86	8.13	10.84	0.0	8.49	0.00	0.0	0.00	0.0	0.00
			0.00	0.0	-0.58	0.00	0.0	0.00	0.0	0.00
12.000	2.06	1.83	0.00	0.0	1.84	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	10.417	1.935	0.000	3.110	0.0%	Red	0.000	0.000
	18.000	1.935	0.000	3.110			0.000	0.000
2	0.000	0.035	0.035	0.000	---	NonR	0.000	0.000
	18.000	0.035	0.035	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 93.54 kips 1.00Vn = 159.30 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	81.3	10.4	4.4	1.07	0.90	249.38
	Init DL	1.4DL	81.3	10.4	---	---		
	Max +	1.2DL+1.6LL	452.8	10.4	---	---	0.90	458.95
Controlling		1.2DL+1.6LL	452.8	10.4	---	---	0.90	458.95

REACTIONS (kips):

	Left	Right
Initial reaction	12.64	8.17
DL reaction	29.22	26.32
Max +LL reaction	36.55	35.68
Max -LL reaction	-0.24	-0.34
Max +total reaction (factored)	93.54	88.67

DEFLECTIONS:

										Ratio
Initial load (in)	at	9.00 ft	=	-0.216	L/D	=	1002			
Live load (in)	at	9.09 ft	=	-0.217	L/D	=	997	>	360	0.36
Post Comp load (in)	at	9.09 ft	=	-0.316	L/D	=	683	>	240	0.35
Net Total load (in)	at	9.09 ft	=	-0.532	L/D	=	406	>	180	0.44

Gravity Beam Design

Floor Type: Floor **Beam Number = 10**

SPAN INFORMATION (ft): I-End (15.44,28.87) J-End (33.44,28.87)

Beam Size (User Selected) = W18X35 Fy = 50.0 ksi
Total Beam Length (ft) = 18.00

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	parallel	parallel
Decking type	ASC 3W	ASC 3W

beff (in)	=	40.50	Y bar(in)	=	18.29
Mnf (kip-ft)	=	582.96	Mn (kip-ft)	=	509.95
C (kips)	=	258.45	PNA (in)	=	17.27
Ieff (in4)	=	1558.68	Itr (in4)	=	1916.25
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 21.5 Rg = 1.00 Rp = 0.75
\# of studs: Full = 52 Partial = 29 Actual = 29
Number of Stud Rows = 1 Percent of Full Composite Action = 55.61

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRL L	StorLL	Red%	RoofLL	Red%	PartL
2.833	20.48	8.57	17.45	0.0	8.39	0.00	0.0	0.00	0.0	0.00
6.000	2.06	1.83	0.00	0.0	1.84	0.00	0.0	0.00	0.0	0.00
10.417	16.09	8.32	10.86	0.0	8.67	0.00	0.0	0.00	0.0	0.00
			0.00	0.0	-0.57	0.00	0.0	0.00	0.0	0.00
12.000	2.06	1.83	0.00	0.0	1.84	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	10.417	1.935	0.000	3.110	0.0%	Red	0.000	0.000
	18.000	1.935	0.000	3.110			0.000	0.000
2	0.000	0.035	0.035	0.000	---	NonR	0.000	0.000
	18.000	0.035	0.035	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 94.29 kips 1.00Vn = 159.30 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	82.8	10.4	4.4	1.07	0.90	249.38
	Init DL	1.4DL	82.8	10.4	---	---		
	Max +	1.2DL+1.6LL	456.1	10.4	---	---	0.90	458.95
Controlling		1.2DL+1.6LL	456.1	10.4	---	---	0.90	458.95

REACTIONS (kips):

	Left	Right
Initial reaction	12.87	8.31
DL reaction	29.50	26.49
Max +LL reaction	36.81	35.82
Max -LL reaction	-0.24	-0.33
Max +total reaction (factored)	94.29	89.10

DEFLECTIONS:

										Ratio
Initial load (in)	at	9.00 ft	=	-0.219	L/D	=	985			
Live load (in)	at	9.09 ft	=	-0.218	L/D	=	991	>	360	0.36
Post Comp load (in)	at	9.09 ft	=	-0.318	L/D	=	680	>	240	0.35
Net Total load (in)	at	9.09 ft	=	-0.537	L/D	=	402	>	180	0.45

Gravity Beam Design

RAM Steel 17.00.01.09
DataBase: 218029
Building Code: IBC

03/27/20 14:07:47
Steel Code: AISC 360-16 LRFD

Floor Type: Floor **Beam Number = 13**

SPAN INFORMATION (ft): I-End (18.27,28.87) J-End (18.27,57.28)

Beam Size (User Selected) = W14X22 Fy = 50.0 ksi
Total Beam Length (ft) = 28.42

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	perpendicular	perpendicular
Decking type	ASC 3W	ASC 3W

beff (in)	=	85.25	Y bar(in)	=	17.39
Mnf (kip-ft)	=	367.86	Mn (kip-ft)	=	295.35
C (kips)	=	189.53	PNA (in)	=	13.43
Ieff (in4)	=	888.35	Itr (in4)	=	1101.01
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 17.2 Rg = 1.00 Rp = 0.60
\# of studs: Max = 28 Partial = 26 Actual = 26
Number of Stud Rows = 1 Percent of Full Composite Action = 38.45

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
2.250	7.38	0.05	11.79	0.0	0.00	0.00	0.0	0.00	0.0	0.00
2.250	4.50	0.04	7.16	0.0	0.00	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.111	0.111	0.000	---	NonR	0.000	0.000
	1.250	0.111	0.111	0.000			0.000	0.000
2	0.000	0.014	0.000	0.113	---	NonR	0.000	0.000
	1.250	0.014	0.000	0.113			0.000	0.000
3	1.250	0.296	0.296	0.000	---	NonR	0.000	0.000
	28.416	0.296	0.296	0.000			0.000	0.000
4	1.250	0.038	0.000	0.303	---	NonR	0.000	0.000
	28.416	0.038	0.000	0.303			0.000	0.000
5	0.000	0.296	0.296	0.000	---	NonR	0.000	0.000
	28.416	0.296	0.296	0.000			0.000	0.000
6	0.000	0.038	0.000	0.303	---	NonR	0.000	0.000
	28.416	0.038	0.000	0.303			0.000	0.000
7	0.000	0.022	0.022	0.000	---	NonR	0.000	0.000
	28.416	0.022	0.022	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 65.92 kips 1.00Vn = 94.53 kips

Gravity Beam Design

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	PreCmp+	1.4DL	86.7	14.2	0.0	1.00	0.90	124.50
	Init DL	1.4DL	86.7	14.2	---	---		
	Max +	1.2DL+1.6LL	234.9	12.3	---	---	0.90	265.81
Controlling		1.2DL+1.6LL	144.9	2.3	---	---	0.90	159.09

REACTIONS (kips):

	Left	**Right**
Initial reaction	8.57	8.72
DL reaction	20.48	10.73
Max +LL reaction	25.84	10.11
Max +total reaction (factored)	65.92	29.06

DEFLECTIONS: (Camber = 1)

									Ratio
Initial load (in)	at 14.07 ft	=	-1.560	L/D	=	219			
Live load (in)	at 14.07 ft	=	-0.489	L/D	=	698	>	360	0.52
Post Comp load (in)	at 14.07 ft	=	-0.621	L/D	=	549	>	240	0.44
Net Total load (in)	at 14.07 ft	=	-1.181	L/D	=	289	>	180	0.62

Gravity Beam Design

Floor Type: Floor **Beam Number = 14**

SPAN INFORMATION (ft): I-End (18.27,31.12) J-End (25.86,31.12)

Beam Size (User Selected) = W10X12 Fy = 50.0 ksi
Total Beam Length (ft) = 7.58

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	parallel	parallel
Decking type	ASC 3W	ASC 3W

beff (in)	=	22.75	Y bar(in)	=	12.76
Mnf (kip-ft)	=	160.91	Mn (kip-ft)	=	107.58
C (kips)	=	64.61	PNA (in)	=	8.34
Ieff (in4)	=	236.16	Itr (in4)	=	355.62
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 21.5 Rg = 1.00 Rp = 0.75
\# of studs: Full = 18 Partial = 6 Actual = 6
Number of Stud Rows = 1 Percent of Full Composite Action = 36.50

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	1.935	0.000	3.110	0.0%	Red	0.000	0.000
	7.583	1.935	0.000	3.110			0.000	0.000
2	0.000	0.012	0.012	0.000	---	NonR	0.000	0.000
	7.583	0.012	0.012	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 27.72 kips 1.00Vn = 56.26 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	0.1	3.8	7.6	1.14	0.90	34.39
	Init DL	1.4DL	0.1	3.8	---	---		
	Max +	1.2DL+1.6LL	52.6	3.8	---	---	0.90	96.82
Controlling		1.2DL+1.6LL	52.6	3.8	---	---	0.90	96.82

REACTIONS (kips):

	Left	Right
Initial reaction	0.05	0.05
DL reaction	7.38	7.38
Max +LL reaction	11.79	11.79
Max +total reaction (factored)	27.72	27.72

DEFLECTIONS:

											Ratio
Initial load (in)	at	3.79 ft	=	-0.001			0.00				
Live load (in)	at	3.79 ft	=	-0.034	L/D	=	2693	>	360		0.13
Post Comp load (in)	at	3.79 ft	=	-0.055	L/D	=	1660	>	240		0.14

Net Total load (in)	at	3.79 ft	=	-0.055	L/D	=	1643	> 180	0.11

Gravity Beam Design

Floor Type: Floor **Beam Number = 15**

SPAN INFORMATION (ft): I-End (21.44,21.20) J-End (21.44,28.87)

Beam Size (User Selected) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 7.67
Mp (kip-ft) = 36.96

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.468	0.000	---	NonR	0.000
	7.666	0.468	0.000			0.000
2	0.000	0.060	0.480	---	NonR	0.000
	7.666	0.060	0.480			0.000
3	0.000	0.010	0.000	---	NonR	0.000
	7.666	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 5.42 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	Max +	1.2DL+1.6LL	10.4	3.8	0.0	1.00	0.90	32.87
Controlling		1.2DL+1.6LL	10.4	3.8	0.0	1.00	0.90	32.87

REACTIONS (kips):

	Left	**Right**
DL reaction	2.06	2.06
Max +LL reaction	1.84	1.84
Max +total reaction (factored)	5.42	5.42

DEFLECTIONS:

						Ratio
Dead load (in)	at	3.83 ft	=	-0.047	L/D = 1965	
Live load (in)	at	3.83 ft	=	-0.042	L/D = 2202 > 360	0.16
Net Total load (in)	at	3.83 ft	=	-0.089	L/D = 1038	

Gravity Beam Design

Floor Type: Floor **Beam Number = 18**

SPAN INFORMATION (ft): I-End (22.86,57.28) J-End (22.86,62.28)

Beam Size (Optimum) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 5.00

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	parallel	parallel
Decking type	ASC 3W	ASC 3W

beff (in)	=	15.00	Y bar(in)	=	10.59
Mnf (kip-ft)	=	117.29	Mn (kip-ft)	=	71.45
C (kips)	=	43.07	PNA (in)	=	6.48
Ieff (in4)	=	135.46	Itr (in4)	=	224.80
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 21.5 Rg = 1.00 Rp = 0.75
\# of studs: Max = 13 Partial = 4 Actual = 4
Number of Stud Rows = 1 Percent of Full Composite Action = 28.25

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.000	0.000	0.000	---	NonR	0.000	0.000
	1.008	0.079	0.079	0.000			0.000	0.000
2	0.000	0.000	0.000	0.000	---	NonR	0.000	0.000
	1.008	0.010	0.000	0.081			0.000	0.000
3	1.009	0.079	0.079	0.000	---	NonR	0.000	0.000
	5.000	0.079	0.079	0.000			0.000	0.000
4	1.009	0.010	0.000	0.081	---	NonR	0.000	0.000
	5.000	0.010	0.000	0.081			0.000	0.000
5	0.000	0.010	0.010	0.000	---	NonR	0.000	0.000
	5.000	0.010	0.010	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 0.61 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	PreCmp+	1.4DL	0.4	2.5	5.0	1.14	0.90	32.64
	Init DL	1.4DL	0.4	2.5	---	---		
	Max +	1.2DL+1.6LL	0.8	2.5	---	---	0.90	64.31
Controlling		1.2DL+1.6LL	0.8	2.5	---	---	0.90	64.31

REACTIONS (kips):

	Left	**Right**
Initial reaction	0.18	0.22
DL reaction	0.21	0.24

Gravity Beam Design

	Left	Right
Max +LL reaction	0.16	0.20
Max +total reaction (factored)	0.51	0.61

DEFLECTIONS:

										Ratio
Initial load (in)	at	2.50 ft	=	-0.001	L/D	=	44216			
Live load (in)	at	2.50 ft	=	-0.000			0.00			
Post Comp load (in)	at	2.50 ft	=	-0.000			0.00			
Net Total load (in)	at	2.50 ft	=	-0.002	L/D	=	35898	>	180	0.01

Gravity Beam Design

RAM Structural System
Bentley

RAM Steel 17.00.01.09	Page 91 20/50
DataBase: 218029	03/27/20 14:07:47
Building Code: IBC	Steel Code: AISC 360-16 LRFD

Floor Type: Floor **Beam Number = 19**

SPAN INFORMATION (ft): I-End (22.86,62.28) J-End (32.44,62.28)

Beam Size (Optimum)	= W8X10		Fy = 50.0 ksi
Total Beam Length (ft)	= 9.58		
Cantilever on left (ft)	= 3.00		
Mp (kip-ft) = 36.96			

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
0.000	0.24	0.00	0.0	0.20	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.079	0.000	---	NonR	0.000
	3.000	0.079	0.000			0.000
2	0.000	0.010	0.081	---	NonR	0.000
	3.000	0.010	0.081			0.000
3	3.000	0.079	0.000	---	NonR	0.000
	9.583	0.079	0.000			0.000
4	3.000	0.010	0.081	---	NonR	0.000
	9.583	0.010	0.081			0.000
5	0.000	0.195	0.000	---	NonR	0.000
	3.000	0.195	0.000			0.000
6	0.000	0.025	0.200	---	NonR	0.000
	3.000	0.025	0.200			0.000
7	3.000	0.097	0.000	---	NonR	0.000
	9.583	0.097	0.000			0.000
8	3.000	0.012	0.100	---	NonR	0.000
	9.583	0.012	0.100			0.000
9	0.000	0.010	0.000	---	NonR	0.000
	3.000	0.010	0.000			0.000
10	3.000	0.010	0.000	---	NonR	0.000
	9.583	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 3.11 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Left	Max -	1.2DL+1.6LL	-5.6	3.0	3.0	1.00	0.90	32.87
Center	Max +	1.2DL+1.6LL	1.8	7.0	0.0	1.00	0.90	32.87
	Max -	1.2DL+1.6LL	-5.6	3.0	6.6	2.30	0.90	32.87
Controlling		1.2DL+1.6LL	-5.6	3.0	6.6	2.30	0.90	32.87

REACTIONS (kips):

	Left	**Right**
DL reaction	2.22	0.36
Max +LL reaction	1.92	0.59
Max -LL reaction	0.00	-0.28

	Left	Right
Max +total reaction (factored)	5.73	1.38

DEFLECTIONS:

								Ratio
Left cantilever:								
Dead load (in)	=	-0.024	L/D	=	3042			0.00
Pos Live load (in)	=	-0.033	L/D	=	2206	>	360	0.16
Neg Live load (in)	=	0.012	L/D	=	5776	>	360	0.06
Pos Total load (in)	=	-0.056	L/D	=	1279	>	240	0.19

Center span:									
Dead load (in)	at	5.37 ft	=	0.002	L/D	=	3192 0			
Live load (in)	at	5.37 ft	=	0.010	L/D	=	8047	> 360	0.04
Net Total load (in)	at	5.37 ft	=	0.012	L/D	=	6427	> 240	0.04

Floor Type: Floor **Beam Number = 23**

SPAN INFORMATION (ft): I-End (25.86,28.87) J-End (25.86,62.28)

Beam Size (User Selected) = W14X30 Fy = 50.0 ksi
Total Beam Length (ft) = 33.42
Cantilever on right (ft) = 5.00

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	perpendicular	perpendicular
Decking type	ASC 3W	ASC 3W

beff (in)	=	85.25	Y bar(in)	=	17.01
Mnf (kip-ft)	=	493.47	Mn (kip-ft)	=	372.12
C (kips)	=	206.76	PNA (in)	=	13.45
Ieff (in4)	=	1084.95	Itr (in4)	=	1452.50
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Rg Stud Red. Factor Rg[1] = 1.00 Rg[2] = 0.85
Rp Stud Red. Factor Rp[1] = 0.60 Rp[2] = 0.60
Stud Capacity (kips) Qn[1] = 17.2 Qn[2] = 14.6
# of studs: Max = 56 Partial = 16 Actual = 29
Number of Stud Rows = 2 Percent of Full Composite Action = 46.72

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
2.250	7.38	0.05	11.79	0.0	0.00	0.00	0.0	0.00	0.0	0.00
30.917	2.46	2.20	0.00	0.0	2.63	0.00	0.0	0.00	0.0	0.00
			0.00	0.0	-0.56	0.00	0.0	0.00	0.0	0.00
33.417	2.22	1.98	0.00	0.0	1.92	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.591	0.591	0.000	---	NonR	0.000	0.000
	28.416	0.591	0.591	0.000			0.000	0.000
2	0.000	0.076	0.000	0.607	---	NonR	0.000	0.000
	28.416	0.076	0.000	0.607			0.000	0.000
3	0.000	0.030	0.030	0.000	---	NonR	0.000	0.000
	28.416	0.030	0.030	0.000			0.000	0.000
4	28.417	0.030	0.030	0.000	---	NonR	0.000	0.000
	33.416	0.030	0.030	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 50.55 kips 1.00Vn = 111.78 kips

MOMENTS (Ultimate):

Gravity Beam Design

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	77.2	13.3	0.0	1.00	0.90	177.38
	PreCmp-	1.4DL	-22.1	28.4	26.2	1.15	0.90	54.00
	Init DL	1.4DL	77.2	13.3	---	---		
	Max +	1.2DL+1.6LL	206.5	12.6	---	---	0.90	334.91
	Max -	1.2DL+1.6LL	-47.0	28.4	26.2	1.23	0.90	57.41
Right	PreCmp-	1.4DL	-22.1	28.4	2.5	1.00	0.90	177.38
	Max -	1.2DL+1.6LL	-47.0	28.4	2.5	1.00	0.90	177.38
Controlling		1.2DL+1.6LL	-47.0	28.4	26.2	1.23	0.90	57.41

REACTIONS (kips):

	Left	**Right**
Initial reaction	8.32	13.72
DL reaction	16.09	15.94
Max +LL reaction	19.53	14.67
Max -LL reaction	-0.57	-0.61
Max +total reaction (factored)	50.55	42.61

DEFLECTIONS:

						Ratio
Center span:						
Initial load (in)	at 13.78 ft	= -0.919	L/D =	371		
Live load (in)	at 13.78 ft	= -0.360	L/D =	947	> 360	0.38
Post Comp load (in)	at 13.78 ft	= -0.436	L/D =	782	> 240	0.31
Net Total load (in)	at 13.78 ft	= -1.355	L/D =	252	> 180	0.72
Right cantilever:						
Init load (in)		= 0.433	L/D =	277		
Pos Live load (in)		= -0.065	L/D =	1834	> 360	0.20
Neg Live load (in)		= 0.199	L/D =	604	> 360	0.60
Pos Post Comp load (in)		= -0.032	L/D =	3783	> 240	0.06
Neg Post Comp load (in)		= 0.232	L/D =	516	> 240	0.46
Neg Total load (in)		= 0.665	L/D =	180	< 240	1.33

Gravity Beam Design

Floor Type: Floor **Beam Number = 24**

SPAN INFORMATION (ft): I-End (25.86,59.78) J-End (40.66,59.78)

Beam Size (User Selected) = W8X15 Fy = 50.0 ksi
Total Beam Length (ft) = 14.81
Mp (kip-ft) = 56.67

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
6.583	0.87	0.00	0.0	1.29	0.00	0.0	0.00	0.0	0.00
		0.00	0.0	-0.56	0.00	0.0	0.00	0.0	0.00
8.583	0.76	0.00	0.0	1.22	0.00	0.0	0.00	0.0	0.00
		0.00	0.0	-0.60	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	6.584	0.000	0.000	---	NonR	0.000
	6.925	0.027	0.000			0.000
2	6.584	0.000	0.000	---	NonR	0.000
	6.925	0.003	0.027			0.000
3	6.925	0.027	0.000	---	NonR	0.000
	8.241	0.027	0.000			0.000
4	6.925	0.003	0.027	---	NonR	0.000
	8.241	0.003	0.027			0.000
5	8.242	0.027	0.000	---	NonR	0.000
	8.583	0.000	0.000			0.000
6	8.242	0.003	0.027	---	NonR	0.000
	8.583	0.000	0.000			0.000
7	0.000	0.195	0.000	---	NonR	0.000
	6.583	0.195	0.000			0.000
8	0.000	0.025	0.200	---	NonR	0.000
	6.583	0.025	0.200			0.000
9	6.584	0.097	0.000	---	NonR	0.000
	14.805	0.097	0.000			0.000
10	8.584	0.025	0.200	---	NonR	0.000
	14.805	0.025	0.200			0.000
11	6.584	0.012	0.100	---	NonR	0.000
	8.583	0.012	0.100			0.000
12	8.584	0.097	0.000	---	NonR	0.000
	14.805	0.097	0.000			0.000
13	0.000	0.015	0.000	---	NonR	0.000
	14.805	0.015	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 7.27 kips 1.00Vn = 59.61 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	Max +	1.2DL+1.6LL	34.1	6.9	0.0	1.00	0.90	51.00

Gravity Beam Design

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
Controlling		1.2DL+1.6LL	34.1	6.9	0.0	1.00	0.90	51.00

REACTIONS (kips):

	Left	**Right**
DL reaction	2.46	2.48
Max +LL reaction	2.63	2.68
Max -LL reaction	-0.56	-0.60
Max +total reaction (factored)	7.17	7.27

DEFLECTIONS:

										Ratio
Dead load (in)	at	7.40 ft	=	-0.302	L/D	=	588			
Live load (in)	at	7.40 ft	=	-0.347	L/D	=	511	>	360	0.70
Net Total load (in)	at	7.40 ft	=	-0.649	L/D	=	274			

Gravity Beam Design

Floor Type: Floor **Beam Number = 25**

SPAN INFORMATION (ft): I-End (27.44,21.20) J-End (27.44,28.87)

Beam Size (User Selected) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 7.67
Mp (kip-ft) = 36.96

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.468	0.000	---	NonR	0.000
	7.666	0.468	0.000			0.000
2	0.000	0.060	0.480	---	NonR	0.000
	7.666	0.060	0.480			0.000
3	0.000	0.010	0.000	---	NonR	0.000
	7.666	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 5.42 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	Max +	1.2DL+1.6LL	10.4	3.8	0.0	1.00	0.90	32.87
Controlling		1.2DL+1.6LL	10.4	3.8	0.0	1.00	0.90	32.87

REACTIONS (kips):

	Left	**Right**
DL reaction	2.06	2.06
Max +LL reaction	1.84	1.84
Max +total reaction (factored)	5.42	5.42

DEFLECTIONS:

					Ratio
Dead load (in)	at 3.83 ft	= -0.047	L/D = 1965		
Live load (in)	at 3.83 ft	= -0.042	L/D = 2202	> 360	0.16
Net Total load (in)	at 3.83 ft	= -0.089	L/D = 1038		

Gravity Beam Design

Floor Type: Floor **Beam Number = 27**

SPAN INFORMATION (ft): I-End (32.44,57.28) J-End (32.44,62.28)

Beam Size (Optimum) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 5.00
Cantilever on right (ft) = 2.50
Mp (kip-ft) = 36.96

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
5.000	0.36	0.00	0.0	0.59	0.00	0.0	0.00	0.0	0.00
		0.00	0.0	-0.28	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	2.500	0.000	0.000	---	NonR	0.000
	2.841	0.027	0.000			0.000
2	2.500	0.000	0.000	---	NonR	0.000
	2.841	0.003	0.027			0.000
3	2.842	0.027	0.000	---	NonR	0.000
	5.000	0.027	0.000			0.000
4	2.842	0.003	0.027	---	NonR	0.000
	5.000	0.003	0.027			0.000
5	0.000	0.010	0.000	---	NonR	0.000
	2.500	0.010	0.000			0.000
6	2.500	0.010	0.000	---	NonR	0.000
	5.000	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 1.60 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	Max -	1.2DL+1.6LL	-3.7	2.5	2.5	1.67	0.90	32.87
Right	Max -	1.2DL+1.6LL	-3.7	2.5	2.5	1.00	0.90	32.87
Controlling		1.2DL+1.6LL	-3.7	2.5	2.5	1.00	0.90	32.87

REACTIONS (kips):

	Left	**Right**
DL reaction	-0.40	0.87
Max +LL reaction	0.28	1.29
Max -LL reaction	-0.63	-0.56
Max +total reaction (factored)	-0.55	3.11
Max -total reaction	-1.48	1.22

DEFLECTIONS: **Ratio**

Center span:

Dead load (in)	at 1.45 ft	= 0.001		0.00		
Live load (in)	at 1.45 ft	= 0.001	L/D =	2461 4	> 360	0.01

Center span:

Net Total load (in)	at	1.45 ft	=	0.002	L/D	=	1499 5		

Right cantilever:

Dead load (in)	=	-0.008	L/D	=	7436			
Pos Live load (in)	=	-0.013	L/D	=	4768	>	360	0.08
Neg Live load (in)	=	0.006	L/D	=	10542	>	360	0.03
Pos Total load (in)	=	-0.021	L/D	=	2905	>	240	0.08

Gravity Beam Design

Floor Type: Floor **Beam Number = 30**

SPAN INFORMATION (ft): I-End (33.44,21.20) J-End (33.44,28.87)

Beam Size (User Selected) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 7.67
Mp (kip-ft) = 36.96

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.516	0.000	---	NonR	0.000
	7.666	0.516	0.000			0.000
2	0.000	0.066	0.529	---	NonR	0.000
	7.666	0.066	0.529			0.000
3	0.000	0.010	0.000	---	NonR	0.000
	7.666	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 5.97 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	Max +	1.2DL+1.6LL	11.4	3.8	0.0	1.00	0.90	32.87
Controlling		1.2DL+1.6LL	11.4	3.8	0.0	1.00	0.90	32.87

REACTIONS (kips):

	Left	**Right**
DL reaction	2.27	2.27
Max +LL reaction	2.03	2.03
Max +total reaction (factored)	5.97	5.97

DEFLECTIONS:

							Ratio
Dead load (in)	at	3.83 ft	=	-0.052	L/D =	1786	
Live load (in)	at	3.83 ft	=	-0.046	L/D =	1999 > 360	0.18
Net Total load (in)	at	3.83 ft	=	-0.098	L/D =	943	

Floor Type: Floor **Beam Number = 31**

SPAN INFORMATION (ft): I-End (33.44,21.20) J-End (55.11,21.20)

Beam Size (User Selected) = W21X44 Fy = 50.0 ksi
Total Beam Length (ft) = 21.67

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	parallel	parallel
Decking type	ASC 3W	ASC 3W

beff (in)	=	65.00	Y bar(in)	=	21.59
Mnf (kip-ft)	=	860.67	Mn (kip-ft)	=	770.70
C (kips)	=	409.20	PNA (in)	=	20.33
Ieff (in4)	=	2696.14	Itr (in4)	=	3178.57
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 21.5 Rg = 1.00 Rp = 0.75
\# of studs: Full = 70 Partial = 38 Actual = 38
Number of Stud Rows = 1 Percent of Full Composite Action = 54.24

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
7.222	2.47	2.20	0.00	0.0	2.21	0.00	0.0	0.00	0.0	0.00
7.222	8.63	7.69	0.00	0.0	8.09	0.00	0.0	0.00	0.0	0.00
			0.00	0.0	-0.58	0.00	0.0	0.00	0.0	0.00
14.444	2.47	2.20	0.00	0.0	2.21	0.00	0.0	0.00	0.0	0.00
14.444	9.15	8.15	0.00	0.0	8.04	0.00	0.0	0.00	0.0	0.00
20.667	7.41	0.00	13.08	0.0	0.00	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	1.935	0.000	3.110	0.0%	Red	0.000	0.000
	21.666	1.935	0.000	3.110			0.000	0.000
2	0.000	0.044	0.044	0.000	---	NonR	0.000	0.000
	21.666	0.044	0.044	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 138.25 kips 1.00Vn = 217.35 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	106.3	14.2	7.2	1.00	0.90	312.26
	Init DL	1.4DL	106.3	14.2	---	---		
	Max +	1.2DL+1.6LL	663.8	11.0	---	---	0.90	693.63
Controlling		1.2DL+1.6LL	621.3	14.4	---	---	0.90	632.21

REACTIONS (kips):

	Left	Right
Initial reaction	10.52	10.67
DL reaction	33.06	39.96
Max +LL reaction	44.58	56.44
Max -LL reaction	-0.39	-0.19
Max +total reaction (factored)	111.01	138.25

DEFLECTIONS:

									Ratio
Initial load (in)	at 10.83 ft	=	-0.267	L/D	=	973			
Live load (in)	at 10.83 ft	=	-0.288	L/D	=	904	>	360	0.40
Post Comp load (in)	at 10.83 ft	=	-0.425	L/D	=	611	>	240	0.39
Net Total load (in)	at 10.83 ft	=	-0.692	L/D	=	376	>	180	0.48

Gravity Beam Design

RAM Structural System
Bentley

Floor Type: Floor **Beam Number = 32**

SPAN INFORMATION (ft): I-End (33.44,28.87) J-End (33.44,57.28)

Beam Size (User Selected) = W16X31 Fy = 50.0 ksi
Total Beam Length (ft) = 28.42

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	perpendicular	perpendicular
Decking type	ASC 3W	ASC 3W

beff (in)	=	85.25	Y bar(in)	=	18.88
Mnf (kip-ft)	=	547.80	Mn (kip-ft)	=	491.48
C (kips)	=	339.42	PNA (in)	=	15.69
Ieff (in4)	=	1574.60	Itr (in4)	=	1766.18
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Rg Stud Red. Factor Rg[1] = 1.00 Rg[2] = 0.85
Rp Stud Red. Factor Rp[1] = 0.60 Rp[2] = 0.60
Stud Capacity (kips) Qn[1] = 17.2 Qn[2] = 14.6
# of studs: Max = 56 Partial = 52 Actual = 52
Number of Stud Rows = 2 Percent of Full Composite Action = 65.06

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
17.670	4.05	0.00	4.35	0.0	0.00	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.780	0.000	0.520	0.0%	Red	0.000	0.000
	28.416	0.780	0.000	0.520			0.000	0.000
2	0.000	0.577	0.577	0.000	---	NonR	0.000	0.000
	28.416	0.577	0.577	0.000			0.000	0.000
3	0.000	0.074	0.000	0.592	---	NonR	0.000	0.000
	28.416	0.074	0.000	0.592			0.000	0.000
4	0.000	0.031	0.031	0.000	---	NonR	0.000	0.000
	28.416	0.031	0.031	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 57.57 kips 1.00Vn = 131.18 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	86.0	14.2	0.0	1.00	0.90	202.50
	Init DL	1.4DL	86.0	14.2	---	---		
	Max +	1.2DL+1.6LL	423.1	15.5	---	---	0.90	442.34
Controlling		1.2DL+1.6LL	414.6	17.7	---	---	0.90	414.52

REACTIONS (kips):

	Left	Right
Initial reaction	8.65	8.65
DL reaction	22.31	23.30
Max +LL reaction	17.45	18.51
Max +total reaction (factored)	54.69	57.57

DEFLECTIONS:

							Ratio
Initial load (in)	at 14.21 ft	=	-0.821	L/D =	415		
Live load (in)	at 14.35 ft	=	-0.430	L/D =	794	> 360	0.45
Post Comp load (in)	at 14.35 ft	=	-0.772	L/D =	442	> 240	0.54
Net Total load (in)	at 14.35 ft	=	-1.592	L/D =	214	> 180	0.84

Gravity Beam Design

Floor Type: Floor **Beam Number = 33**

SPAN INFORMATION (ft): I-End (33.44,28.87) J-End (55.11,28.87)

Beam Size (User Selected) = W21X44 Fy = 50.0 ksi
Total Beam Length (ft) = 21.67

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	parallel	parallel
Decking type	ASC 3W	ASC 3W

beff (in)	=	65.00	Y bar(in)	=	21.59
Mnf (kip-ft)	=	860.67	Mn (kip-ft)	=	760.89
C (kips)	=	387.67	PNA (in)	=	20.30
Ieff (in4)	=	2646.71	Itr (in4)	=	3178.57
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 21.5 Rg = 1.00 Rp = 0.75
\# of studs: Full = 69 Partial = 37 Actual = 37
Number of Stud Rows = 1 Percent of Full Composite Action = 53.80

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
7.222	8.84	7.88	0.00	0.0	8.26	0.00	0.0	0.00	0.0	0.00
			0.00	0.0	-0.57	0.00	0.0	0.00	0.0	0.00
7.222	2.47	2.20	0.00	0.0	2.21	0.00	0.0	0.00	0.0	0.00
14.444	9.34	8.32	0.00	0.0	8.21	0.00	0.0	0.00	0.0	0.00
14.444	2.47	2.20	0.00	0.0	2.21	0.00	0.0	0.00	0.0	0.00
20.667	3.02	0.00	8.69	0.0	0.00	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	1.935	0.000	3.110	0.0%	Red	0.000	0.000
	21.666	1.935	0.000	3.110			0.000	0.000
2	0.000	0.044	0.044	0.000	---	NonR	0.000	0.000
	21.666	0.044	0.044	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 127.03 kips 1.00Vn = 217.35 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	108.1	14.2	7.2	1.00	0.90	312.20
	Init DL	1.4DL	108.1	14.2	---	---		
	Max +	1.2DL+1.6LL	661.2	11.0	---	---	0.90	684.80
Controlling		1.2DL+1.6LL	616.7	14.4	---	---	0.90	618.43

REACTIONS (kips):

	Left	Right
Initial reaction	10.70	10.85
DL reaction	33.06	35.97
Max +LL reaction	44.55	52.42
Max -LL reaction	-0.38	-0.19
Max +total reaction (factored)	110.95	127.03

DEFLECTIONS:

										Ratio
Initial load (in)	at	10.83 ft	=	-0.272	L/D	=	957			
Live load (in)	at	10.83 ft	=	-0.292	L/D	=	892	>	360	0.40
Post Comp load (in)	at	10.83 ft	=	-0.429	L/D	=	606	>	240	0.40
Net Total load (in)	at	10.83 ft	=	-0.701	L/D	=	371	>	180	0.49

Gravity Beam Design

RAM Steel 17.00.01.09
DataBase: 218029 03/27/20 14:07:47
Building Code: IBC Steel Code: AISC 360-16 LRFD

Floor Type: Floor **Beam Number = 36**

SPAN INFORMATION (ft): I-End (34.44,57.28) J-End (34.44,62.28)

Beam Size (Optimum)	=	W8X10	Fy	=	50.0 ksi
Total Beam Length (ft)	=	5.00			
Cantilever on right (ft)	=	2.50			
Mp (kip-ft)	=	36.96			

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
5.000	0.30	0.00	0.0	0.56	0.00	0.0	0.00	0.0	0.00
		0.00	0.0	-0.30	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	2.500	0.000	0.000	---	NonR	0.000
	2.841	0.027	0.000			0.000
2	2.500	0.000	0.000	---	NonR	0.000
	2.841	0.003	0.027			0.000
3	2.842	0.027	0.000	---	NonR	0.000
	5.000	0.027	0.000			0.000
4	2.842	0.003	0.027	---	NonR	0.000
	5.000	0.003	0.027			0.000
5	0.000	0.010	0.000	---	NonR	0.000
	2.500	0.010	0.000			0.000
6	2.500	0.010	0.000	---	NonR	0.000
	5.000	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 1.48 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	Max +	1.2DL+1.6LL	0.1	2.5	2.5	1.55	0.90	32.87
	Max -	1.2DL+1.6LL	-3.4	2.5	2.5	1.67	0.90	32.87
Right	Max +	1.2DL+1.6LL	0.1	2.5	2.5	1.00	0.90	32.87
	Max -	1.2DL+1.6LL	-3.4	2.5	2.5	1.00	0.90	32.87
Controlling		1.2DL+1.6LL	-3.4	2.5	2.5	1.00	0.90	32.87

REACTIONS (kips):

	Left	**Right**
DL reaction	-0.34	0.76
Max +LL reaction	0.30	1.22
Max -LL reaction	-0.60	-0.60
Max +total reaction (factored)	-0.47	2.87
Max -total reaction	-1.36	1.06

DEFLECTIONS: **Ratio**

Center span:

Dead load (in) at 1.45 ft = 0.001 0.00

Center span:

Live load (in)	at	1.45 ft	=	0.001	L/D	=	2596 1	>	360	0.01
Net Total load (in)	at	1.45 ft	=	0.002	L/D	=	1641 8			

Right cantilever:

Dead load (in)	=	-0.007	L/D	=	8665		
Pos Live load (in)	=	-0.012	L/D	=	5031	> 360	0.07
Neg Live load (in)	=	0.006	L/D	=	9964	> 360	0.04
Pos Total load (in)	=	-0.019	L/D	=	3183	> 240	0.08

Gravity Beam Design

Floor Type: Floor **Beam Number = 37**

SPAN INFORMATION (ft): I-End (34.44,62.28) J-End (43.66,62.28)

Beam Size (Optimum) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 9.22
Cantilever on right (ft) = 3.00
Mp (kip-ft) = 36.96

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
9.222	0.24	0.00	0.0	0.20	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.079	0.000	---	NonR	0.000
	6.222	0.079	0.000			0.000
2	0.000	0.010	0.081	---	NonR	0.000
	6.222	0.010	0.081			0.000
3	6.223	0.079	0.000	---	NonR	0.000
	9.222	0.079	0.000			0.000
4	6.223	0.010	0.081	---	NonR	0.000
	9.222	0.010	0.081			0.000
5	0.000	0.097	0.000	---	NonR	0.000
	6.222	0.097	0.000			0.000
6	0.000	0.012	0.100	---	NonR	0.000
	6.222	0.012	0.100			0.000
7	6.223	0.195	0.000	---	NonR	0.000
	9.222	0.195	0.000			0.000
8	6.223	0.025	0.200	---	NonR	0.000
	9.222	0.025	0.200			0.000
9	0.000	0.010	0.000	---	NonR	0.000
	6.222	0.010	0.000			0.000
10	6.223	0.010	0.000	---	NonR	0.000
	9.222	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 3.11 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	Max +	1.2DL+1.6LL	1.5	2.3	0.0	1.00	0.90	32.87
	Max -	1.2DL+1.6LL	-5.6	6.2	6.2	2.21	0.90	32.87
Right	Max -	1.2DL+1.6LL	-5.6	6.2	3.0	1.00	0.90	32.87
Controlling		1.2DL+1.6LL	-5.6	6.2	6.2	2.21	0.90	32.87

REACTIONS (kips):

	Left	Right
DL reaction	0.30	2.20
Max +LL reaction	0.56	1.90
Max -LL reaction	-0.30	0.00

	Left	Right
Max +total reaction (factored)	1.26	5.68

DEFLECTIONS:

										Ratio
Center span:										
Dead load (in)	at	3.92 ft	=	0.003	L/D	=	2470 7			
Live load (in)	at	3.92 ft	=	0.009	L/D	=	8467	>	360	0.04
Net Total load (in)	at	3.92 ft	=	0.012	L/D	=	6306			
Right cantilever:										
Dead load (in)			=	-0.024	L/D	=	2951			
Pos Live load (in)			=	-0.031	L/D	=	2297	>	360	0.16
Neg Live load (in)			=	0.011	L/D	=	6841	>	360	0.05
Pos Total load (in)			=	-0.056	L/D	=	1292	>	240	0.19

Gravity Beam Design

Floor Type: Floor **Beam Number = 39**

SPAN INFORMATION (ft): I-End (40.66,21.20) J-End (40.66,28.87)

Beam Size (User Selected) = W8X10 Fy = 50.0 ksi

Total Beam Length (ft) = 7.67

Mp (kip-ft) = 36.96

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.563	0.000	---	NonR	0.000
	7.666	0.563	0.000			0.000
2	0.000	0.072	0.578	---	NonR	0.000
	7.666	0.072	0.578			0.000
3	0.000	0.010	0.000	---	NonR	0.000
	7.666	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 6.51 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	Max +	1.2DL+1.6LL	12.5	3.8	0.0	1.00	0.90	32.87
Controlling		1.2DL+1.6LL	12.5	3.8	0.0	1.00	0.90	32.87

REACTIONS (kips):

	Left	**Right**
DL reaction	2.47	2.47
Max +LL reaction	2.21	2.21
Max +total reaction (factored)	6.51	6.51

DEFLECTIONS:

									Ratio
Dead load (in)	at	3.83 ft	=	-0.056	L/D	=	1637		
Live load (in)	at	3.83 ft	=	-0.050	L/D	=	1830	> 360	0.20
Net Total load (in)	at	3.83 ft	=	-0.106	L/D	=	864		

Floor Type: Floor **Beam Number = 40**

SPAN INFORMATION (ft): I-End (40.66,28.87) J-End (40.66,62.28)

Beam Size (Optimum) = W14X30 Fy = 50.0 ksi
Total Beam Length (ft) = 33.42
Cantilever on right (ft) = 5.00

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	perpendicular	perpendicular
Decking type	ASC 3W	ASC 3W

beff (in)	=	85.25	Y bar(in)	=	17.01
Mnf (kip-ft)	=	493.47	Mn (kip-ft)	=	316.26
C (kips)	=	120.61	PNA (in)	=	11.37
Ieff (in4)	=	897.39	Itr (in4)	=	1452.50
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 17.2 Rg = 1.00 Rp = 0.60
\# of studs: Max = 56 Partial = 14 Actual = 14
Number of Stud Rows = 1 Percent of Full Composite Action = 27.25

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
30.917	2.48	2.22	0.00	0.0	2.68	0.00	0.0	0.00	0.0	0.00
			0.00	0.0	-0.60	0.00	0.0	0.00	0.0	0.00
33.417	2.20	1.96	0.00	0.0	1.90	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.563	0.563	0.000	---	NonR	0.000	0.000
	28.416	0.563	0.563	0.000			0.000	0.000
2	0.000	0.072	0.000	0.578	---	NonR	0.000	0.000
	28.416	0.072	0.000	0.578			0.000	0.000
3	0.000	0.030	0.030	0.000	---	NonR	0.000	0.000
	28.416	0.030	0.030	0.000			0.000	0.000
4	28.417	0.030	0.030	0.000	---	NonR	0.000	0.000
	33.416	0.030	0.030	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 26.14 kips 1.00Vn = 111.78 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	73.2	13.3	0.0	1.00	0.90	177.38
	PreCmp-	1.4DL	-22.0	28.4	28.4	1.16	0.90	48.68
	Init DL	1.4DL	73.2	13.3	---	---		

Gravity Beam Design

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
	Max +	1.2DL+1.6LL	164.7	13.8	---	---	0.90	284.63
	Max -	1.2DL+1.6LL	-47.0	28.4	28.4	1.23	0.90	51.45
Right	PreCmp-	1.4DL	-22.0	28.4	2.5	1.00	0.90	177.38
	Max -	1.2DL+1.6LL	-47.0	28.4	2.5	1.00	0.90	177.38
Controlling		1.2DL+1.6LL	-47.0	28.4	28.4	1.23	0.90	51.45

REACTIONS (kips):

	Left	**Right**
Initial reaction	7.88	13.32
DL reaction	8.84	14.91
Max +LL reaction	8.26	13.36
Max -LL reaction	-0.57	-0.65
Max +total reaction (factored)	23.83	39.27

DEFLECTIONS:

Center span:

						Ratio
Initial load (in)	at 13.78 ft	= -0.870	L/D =	392		
Live load (in)	at 13.92 ft	= -0.331	L/D =	1032	> 360	0.35
Post Comp load (in)	at 13.92 ft	= -0.365	L/D =	934	> 240	0.26
Net Total load (in)	at 13.92 ft	= -1.235	L/D =	276	> 180	0.65

Right cantilever:

Init load (in)	= 0.405	L/D =	296		
Pos Live load (in)	= -0.074	L/D =	1614	> 360	0.22
Neg Live load (in)	= 0.190	L/D =	633	> 360	0.57
Pos Post Comp load (in)	= -0.060	L/D =	2003	> 240	0.12
Neg Post Comp load (in)	= 0.204	L/D =	588	> 240	0.41
Neg Total load (in)	= 0.609	L/D =	197	< 240	1.22

Gravity Beam Design

Floor Type: Floor **Beam Number = 42**

SPAN INFORMATION (ft): I-End (43.66,57.28) J-End (43.66,62.28)

Beam Size (Optimum) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 5.00
Mp (kip-ft) = 36.96

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.000	0.000	---	NonR	0.000
	1.008	0.079	0.000			0.000
2	0.000	0.000	0.000	---	NonR	0.000
	1.008	0.010	0.081			0.000
3	1.009	0.079	0.000	---	NonR	0.000
	5.000	0.079	0.000			0.000
4	1.009	0.010	0.081	---	NonR	0.000
	5.000	0.010	0.081			0.000
5	0.000	0.010	0.000	---	NonR	0.000
	5.000	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 0.61 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	Max +	1.2DL+1.6LL	0.8	2.5	5.0	1.14	0.90	32.65
Controlling		1.2DL+1.6LL	0.8	2.5	5.0	1.14	0.90	32.65

REACTIONS (kips):

	Left	**Right**
DL reaction	0.21	0.24
Max +LL reaction	0.16	0.20
Max +total reaction (factored)	0.51	0.61

DEFLECTIONS:

									Ratio
Dead load (in)	at	2.50 ft	=	-0.002	L/D	=	39719		
Live load (in)	at	2.50 ft	=	-0.001	L/D	=	48813	> 360	0.01
Net Total load (in)	at	2.50 ft	=	-0.003	L/D	=	21899		

Gravity Beam Design

Floor Type: Floor **Beam Number = 44**

SPAN INFORMATION (ft): I-End (47.88,21.20) J-End (47.88,28.87)

Beam Size (User Selected) = W8X10 Fy = 50.0 ksi
Total Beam Length (ft) = 7.67
Mp (kip-ft) = 36.96

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.563	0.000	---	NonR	0.000
	7.666	0.563	0.000			0.000
2	0.000	0.072	0.578	---	NonR	0.000
	7.666	0.072	0.578			0.000
3	0.000	0.010	0.000	---	NonR	0.000
	7.666	0.010	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 6.51 kips 1.00Vn = 40.24 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
			kip-ft	ft	ft			kip-ft
Center	Max +	1.2DL+1.6LL	12.5	3.8	0.0	1.00	0.90	32.87
Controlling		1.2DL+1.6LL	12.5	3.8	0.0	1.00	0.90	32.87

REACTIONS (kips):

	Left	**Right**
DL reaction	2.47	2.47
Max +LL reaction	2.21	2.21
Max +total reaction (factored)	6.51	6.51

DEFLECTIONS:

										Ratio
Dead load (in)	at	3.83 ft	=	-0.056	L/D	=	1637			
Live load (in)	at	3.83 ft	=	-0.050	L/D	=	1830	>	360	0.20
Net Total load (in)	at	3.83 ft	=	-0.106	L/D	=	864			

Gravity Beam Design

Floor Type: Floor **Beam Number = 45**

SPAN INFORMATION (ft): I-End (47.88,28.87) J-End (47.88,57.28)

Beam Size (User Selected) = W14X22 Fy = 50.0 ksi
Total Beam Length (ft) = 28.42

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	perpendicular	perpendicular
Decking type	ASC 3W	ASC 3W

beff (in)	=	85.25	Y bar(in)	=	17.39
Mnf (kip-ft)	=	367.86	Mn (kip-ft)	=	226.09
C (kips)	=	86.15	PNA (in)	=	10.60
Ieff (in4)	=	663.76	Itr (in4)	=	1101.01
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 17.2 Rg = 1.00 Rp = 0.60
\# of studs: Max = 28 Partial = 10 Actual = 10
Number of Stud Rows = 1 Percent of Full Composite Action = 26.55

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	0.563	0.563	0.000	---	NonR	0.000	0.000
	28.416	0.563	0.563	0.000			0.000	0.000
2	0.000	0.072	0.000	0.578	---	NonR	0.000	0.000
	28.416	0.072	0.000	0.578			0.000	0.000
3	0.000	0.022	0.022	0.000	---	NonR	0.000	0.000
	28.416	0.022	0.022	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 24.35 kips 1.00Vn = 94.53 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	82.7	14.2	0.0	1.00	0.90	124.50
	Init DL	1.4DL	82.7	14.2	---	---		
	Max +	1.2DL+1.6LL	173.0	14.2	---	---	0.90	203.48
Controlling		1.2DL+1.6LL	173.0	14.2	---	---	0.90	203.48

REACTIONS (kips):

	Left	Right
Initial reaction	8.32	8.32
DL reaction	9.34	9.34
Max +LL reaction	8.21	8.21
Max +total reaction (factored)	24.35	24.35

DEFLECTIONS: (Camber = 1) **Ratio**

Initial load (in) at 14.21 ft = -1.488 L/D = 229

Live load (in)	at	14.21 ft	=	-0.440	L/D	=	774	> 360	0.46
Post Comp load (in)	at	14.21 ft	=	-0.495	L/D	=	688	> 240	0.35
Net Total load (in)	at	14.21 ft	=	-0.984	L/D	=	347	> 180	0.52

Gravity Beam Design

Floor Type: Floor **Beam Number = 49**

SPAN INFORMATION (ft): I-End (55.11,35.87) J-End (64.77,35.87)

Beam Size (User Selected) = W10X12 Fy = 50.0 ksi
Total Beam Length (ft) = 9.67

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	parallel	parallel
Decking type	ASC 3W	ASC 3W

beff (in)	=	29.00	Y bar(in)	=	13.17
Mnf (kip-ft)	=	165.76	Mn (kip-ft)	=	108.23
C (kips)	=	64.61	PNA (in)	=	8.34
Ieff (in4)	=	248.41	Itr (in4)	=	375.90
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Stud Capacity (kips) Qn = 21.5 Rg = 1.00 Rp = 0.75
# of studs: Full = 18 Partial = 6 Actual = 6
Number of Stud Rows = 1 Percent of Full Composite Action = 36.50

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	0.000	1.260	0.000	2.430	0.0%	Red	0.000	0.000
	9.666	1.260	0.000	2.430			0.000	0.000
2	0.000	0.012	0.012	0.000	---	NonR	0.000	0.000
	9.666	0.012	0.012	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 26.17 kips 1.00Vn = 56.26 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	0.2	4.8	9.7	1.14	0.90	23.88
	Init DL	1.4DL	0.2	4.8	---	---		
	Max +	1.2DL+1.6LL	63.2	4.8	---	---	0.90	97.41
Controlling		1.2DL+1.6LL	63.2	4.8	---	---	0.90	97.41

REACTIONS (kips):

	Left	Right
Initial reaction	0.06	0.06
DL reaction	6.15	6.15
Max +LL reaction	11.74	11.74
Max +total reaction (factored)	26.17	26.17

DEFLECTIONS:

								Ratio
Initial load (in)	at	4.83 ft	=	-0.002	L/D	=	7647 4	
Live load (in)	at	4.83 ft	=	-0.066	L/D	=	1750 > 360	0.21

Post Comp load (in)	at	4.83 ft	=	-0.101	L/D	=	1153	>	240	0.21
Net Total load (in)	at	4.83 ft	=	-0.102	L/D	=	1136	>	180	0.16

Floor Type: Floor **Beam Number = 53**

SPAN INFORMATION (ft): I-End (64.77,30.12) J-End (64.77,56.53)

Beam Size (User Selected) = W18X40 Fy = 50.0 ksi

Total Beam Length (ft) = 26.42

COMPOSITE PROPERTIES (Not Shored):

	Left	Right
Deck Label	Floor Deck	Floor Deck
Concrete thickness (in)	4.50	4.50
Unit weight concrete (pcf)	150.00	150.00
f'c (ksi)	3.00	3.00
Decking Orientation	perpendicular	perpendicular
Decking type	ASC 3W	ASC 3W

beff (in)	=	79.25	Y bar(in)	=	19.97
Mnf (kip-ft)	=	737.02	Mn (kip-ft)	=	560.85
C (kips)	=	227.43	PNA (in)	=	16.17
Ieff (in4)	=	1800.86	Itr (in4)	=	2526.84
Stud length (in)	=	6.00	Stud diam (in)	=	0.75

Rg Stud Red. Factor Rg[1] = 1.00 Rg[2] = 0.85

Rp Stud Red. Factor Rp[1] = 0.60 Rp[2] = 0.60

Stud Capacity (kips) Qn[1] = 17.2 Qn[2] = 14.6

# of studs: Max = 52 Partial = 39 Actual = 43

Number of Stud Rows = 2 Percent of Full Composite Action = 27.41

POINT LOADS (kips):

Dist	DL	CDL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
5.750	6.15	0.06	11.74	0.0	0.00	0.00	0.0	0.00	0.0	0.00
5.750	6.15	0.06	11.74	0.0	0.00	0.00	0.0	0.00	0.0	0.00

LINE LOADS (k/ft):

Load	Dist	DL	CDL	LL	Red%	Type	PartL	CLL
1	5.750	0.360	0.000	0.160	0.0%	Red	0.000	0.000
	26.416	0.360	0.000	0.160			0.000	0.000
2	0.000	0.754	0.754	0.000	---	NonR	0.000	0.000
	26.416	0.754	0.754	0.000			0.000	0.000
3	0.000	0.097	0.000	0.773	---	NonR	0.000	0.000
	26.416	0.097	0.000	0.773			0.000	0.000
4	0.000	0.040	0.040	0.000	---	NonR	0.000	0.000
	26.416	0.040	0.040	0.000			0.000	0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 76.97 kips 1.00Vn = 169.15 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	PreCmp+	1.4DL	97.5	13.2	0.0	1.00	0.90	294.00
	Init DL	1.4DL	97.5	13.2	---	---		
	Max +	1.2DL+1.6LL	426.0	9.5	---	---	0.90	504.77

Gravity Beam Design

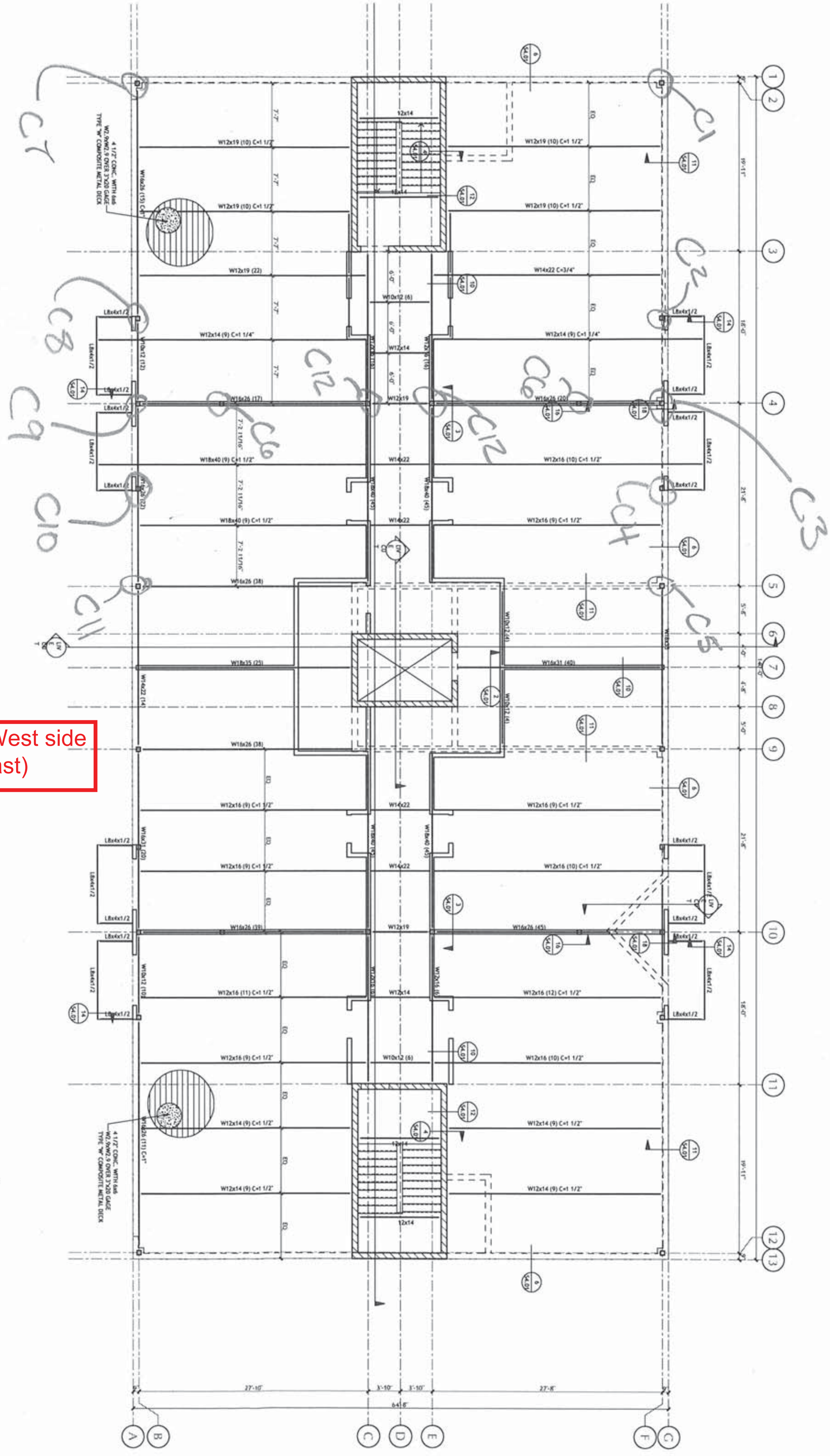
Span	Cond	LoadCombo	Mu	@	Lb	Cb	Phi	Phi*Mn
Controlling		1.2DL+1.6LL	404.4	5.8	---	---	0.90	436.30

REACTIONS (kips):

	Left	**Right**
Initial reaction	10.58	10.51
DL reaction	24.30	18.97
Max +LL reaction	29.88	17.34
Max +total reaction (factored)	76.97	50.51

DEFLECTIONS:

										Ratio
Initial load (in)	at 12.94 ft	=	-0.493	L/D	=	643				
Live load (in)	at 12.81 ft	=	-0.376	L/D	=	843	>	360		0.43
Post Comp load (in)	at 12.81 ft	=	-0.559	L/D	=	567	>	240		0.42
Net Total load (in)	at 12.81 ft	=	-1.051	L/D	=	302	>	180		0.60



Columns (West side same as East)

COLUMNS & FOOTINGS

C1

5th FLOOR

$P_D = R_{B6} + R_{B2} = 15.2^K + 1.8^K = 17^K$

$P_L = R_{B6} + R_{B2} = 1.56^K + 11.8^K = 13.36^K$

$P_{Lr} = R_{B2_{Lr}} = 6.9^K$

4th FL & 3rd FL

$P_D = R_{B1} + R_{B6} = 7.7^K + 1.8^K = 9.5^K$

$P_L = R_{B1} + R_{B6} = 7.02^K + 1.56^K = 8.6^K$

TOTAL

$P_D = 17 + 9.5(2) = 36^K$

$P_L = 13.4 + 8.6(2) = 30.6$

$P_{Lr} = 6.9^K$

H = 12' (MAX UNBRACED LENGTH)

$\boxed{\text{USE HSS } 6\times6\times1/2}$

REF OUTPUT

C2

$P_D = 26.8^K$
$P_L = 29.6^K$ } SEE POINT LOAD P1

H = 12'

$\boxed{\text{USE HSS } 6\times6\times3/8}$

REF OUTPUT

Steel Column

DESCRIPTION: Column C1

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS6x6x1/2**
Analysis Method : Allowable Strength
Steel Stress Grade
Fy : Steel Yield 46.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 12.0 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 12.0 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 12.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 421.313 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 12.0 ft, Xecc = 4.0 in, D = 36.0, LR = 6.90, L = 30.60 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7620** : 1
Load Combination +D+L+H
Location of max.above base 11.919 ft
At maximum location values are . . .
Pa : Axial 67.021 k
Pn / Omega : Allowable 202.667 k
Ma-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 45.449 k-ft
Ma-y : Applied -22.051 k-ft
Mn-y / Omega : Allowable 45.449 k-ft

PASS Maximum Shear Stress Ratio = **0.02614** : 1
Load Combination +D+L+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Va : Applied 1.850 k
Vn / Omega : Allowable 70.779 k

Maximum Load Reactions . .
Top along X-X 1.850 k
Bottom along X-X 1.850 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X -0.2552 in at 7.007 ft above base
for load combination : +D+L+H

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.352	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.014	PASS	0.00 ft
+D+L+H	0.762	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.026	PASS	0.00 ft
+D+Lr+H	0.492	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.017	PASS	0.00 ft
+D+S+H	0.352	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.014	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.734	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.025	PASS	0.00 ft
+D+0.750L+0.750S+H	0.675	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.023	PASS	0.00 ft
+D+0.60W+H	0.352	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.014	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.734	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.025	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.675	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.023	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.211	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.008	PASS	0.00 ft
+D+0.70E+0.60H	0.352	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.014	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.675	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.023	PASS	0.00 ft
+0.60D+0.70E+H	0.211	PASS	11.92 ft	1.00	1.66	64.57	64.57	0.008	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+H	36.421	1.000	1.000						
+D+L+H	67.021	1.850	1.850						

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Las Vegas, NV 89118
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DESCRIPTION: Column C1

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
+D+Lr+H	43.321	1.192	1.192						
+D+S+H	36.421	1.000	1.000						
+D+0.750Lr+0.750L+H	64.546	1.781	1.781						
+D+0.750L+0.750S+H	59.371	1.638	1.638						
+D+0.60W+H	36.421	1.000	1.000						
+D+0.750Lr+0.750L+0.450W+H	64.546	1.781	1.781						
+D+0.750L+0.750S+0.450W+H	59.371	1.638	1.638						
+0.60D+0.60W+0.60H	21.853	0.600	0.600						
+D+0.70E+0.60H	36.421	1.000	1.000						
+D+0.750L+0.750S+0.5250E+H	59.371	1.638	1.638						
+0.60D+0.70E+H	21.853	0.600	0.600						
D Only	36.421	1.000	1.000						
Lr Only	6.900	0.192	0.192						
L Only	30.600	0.850	0.850						
S Only									
W Only									
E Only									
H Only									

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
Axial @ Base	Maximum	67.021	1.850	1.850						
"	Minimum									
Reaction, X-X Axis Base	Maximum	67.021	1.850	1.850						
"	Minimum									
Reaction, Y-Y Axis Base	Maximum	36.421	1.000	1.000						
"	Minimum	36.421	1.000	1.000						
Reaction, X-X Axis Top	Maximum	67.021	1.850	1.850						
"	Minimum									
Reaction, Y-Y Axis Top	Maximum	30.600	0.850	0.850						
"	Minimum	36.421	1.000	1.000						
Moment, X-X Axis Base	Maximum	36.421		1.000						
"	Minimum	36.421		1.000						
Moment, Y-Y Axis Base	Maximum	36.421	1.000	1.000						
"	Minimum	36.421	1.000	1.000						
Moment, X-X Axis Top	Maximum	36.421	1.000	1.000						
"	Minimum	36.421	1.000	1.000						
Moment, Y-Y Axis Top	Maximum	36.421	1.000	1.000						
"	Minimum	36.421	1.000	1.000						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	-0.1379	in	7.007	ft	0.000	in	0.000	ft
+D+L+H	-0.2552	in	7.007	ft	0.000	in	0.000	ft
+D+Lr+H	-0.1644	in	7.007	ft	0.000	in	0.000	ft
+D+S+H	-0.1379	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	-0.2457	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	-0.2259	in	7.007	ft	0.000	in	0.000	ft
+D+0.60W+H	-0.1379	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+0.450W+H	-0.2457	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.450W+H	-0.2259	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	-0.0828	in	7.007	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	-0.1379	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	-0.2259	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	-0.0828	in	7.007	ft	0.000	in	0.000	ft
D Only	-0.1379	in	7.007	ft	0.000	in	0.000	ft
Lr Only	-0.0264	in	7.007	ft	0.000	in	0.000	ft
L Only	-0.1173	in	7.007	ft	0.000	in	0.000	ft

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Steel Column

DESCRIPTION: Column C1

Maximum Deflections for Load Combinations

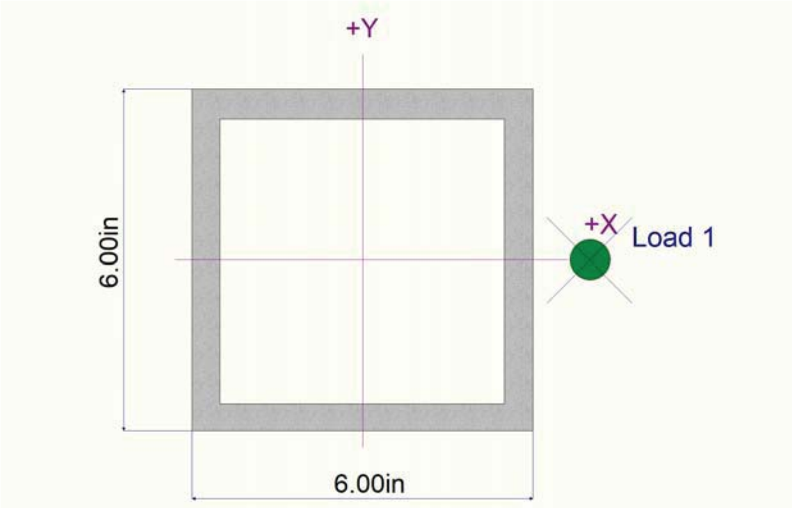
Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

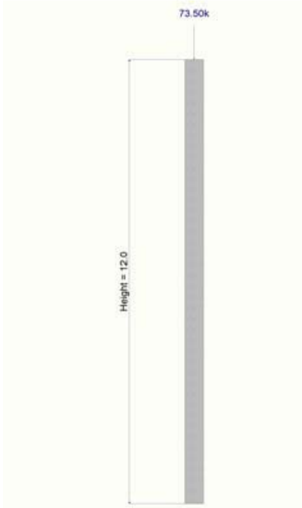
Steel Section Properties : HSS6x6x1/2

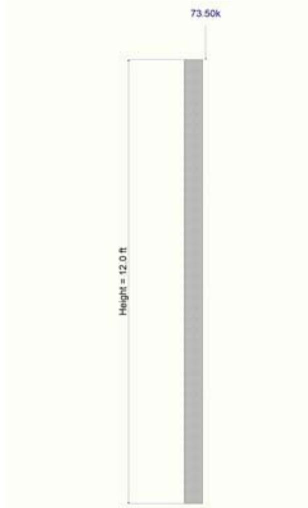
Depth	=	6.000 in	I xx	=	48.30	in^4	J	=	81.100	in^4
Design Thick	=	0.465 in	S xx	=	16.10	in^3				
Width	=	6.000 in	R xx	=	2.230	in				
Wall Thick	=	0.500 in	Zx	=	19.800	in^3				
Area	=	9.740 in^2	I yy	=	48.300	in^4	C	=	28.100	in^3
Weight	=	35.109 plf	S yy	=	16.100	in^3				
			R yy	=	2.230	in				

Ycg = 0.000 in

Sketches







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Steel Column

DESCRIPTION: Column C2

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS6x6x3/8**
Analysis Method : Allowable Strength
Steel Stress Grade
Fy : Steel Yield 46.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 12.0 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 12.0 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 12.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 328.870 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 12.0 ft, Xecc = 4.0 in, D = 26.80, L = 29.60 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	**0.8130**	: 1
Load Combination	+D+L+H	
Location of max.above base	11.919	ft
At maximum location values are . . .		
Pa : Axial	56.729	k
Pn / Omega : Allowable	159.653	k
Ma-x : Applied	0.0	k-ft
Mn-x / Omega : Allowable	36.267	k-ft
Ma-y : Applied	-18.674	k-ft
Mn-y / Omega : Allowable	36.267	k-ft
PASS Maximum Shear Stress Ratio =	**0.02742**	: 1
Load Combination	+D+L+H	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Va : Applied	1.567	k
Vn / Omega : Allowable	57.137	k

Maximum Load Reactions . .

Top along X-X	1.567 k
Bottom along X-X	1.567 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination :

Along X-X -0.2643 in at 7.007 ft above base
for load combination : +D+L+H

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.330	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.013	PASS	0.00 ft
+D+L+H	0.813	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.027	PASS	0.00 ft
+D+Lr+H	0.330	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.013	PASS	0.00 ft
+D+S+H	0.330	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.013	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.707	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.024	PASS	0.00 ft
+D+0.750L+0.750S+H	0.707	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.024	PASS	0.00 ft
+D+0.60W+H	0.330	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.013	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.707	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.024	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.707	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.024	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.198	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.008	PASS	0.00 ft
+D+0.70E+0.60H	0.330	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.013	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.707	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.024	PASS	0.00 ft
+0.60D+0.70E+H	0.198	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.008	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+H	27.129	0.744	0.744						
+D+L+H	56.729	1.567	1.567						

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Column

DESCRIPTION: Column C2

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction k @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments k-ft @ Base	Mx - End Moments @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+Lr+H	27.129	0.744	0.744						
+D+S+H	27.129	0.744	0.744						
+D+0.750Lr+0.750L+H	49.329	1.361	1.361						
+D+0.750L+0.750S+H	49.329	1.361	1.361						
+D+0.60W+H	27.129	0.744	0.744						
+D+0.750Lr+0.750L+0.450W+H	49.329	1.361	1.361						
+D+0.750L+0.750S+0.450W+H	49.329	1.361	1.361						
+0.60D+0.60W+0.60H	16.277	0.447	0.447						
+D+0.70E+0.60H	27.129	0.744	0.744						
+D+0.750L+0.750S+0.5250E+H	49.329	1.361	1.361						
+0.60D+0.70E+H	16.277	0.447	0.447						
D Only	27.129	0.744	0.744						
Lr Only									
L Only	29.600	0.822	0.822						
S Only									
W Only									
E Only									
H Only									

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction k @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments k-ft @ Base	Mx - End Moments @ Top	My - End Moments @ Base	My - End Moments @ Top
Axial @ Base	Maximum	56.729	1.567	1.567						
"	Minimum									
Reaction, X-X Axis Base	Maximum	56.729	1.567	1.567						
"	Minimum									
Reaction, Y-Y Axis Base	Maximum	27.129	0.744	0.744						
"	Minimum	27.129	0.744	0.744						
Reaction, X-X Axis Top	Maximum	56.729	1.567	1.567						
"	Minimum									
Reaction, Y-Y Axis Top	Maximum	29.600	0.822	0.822						
"	Minimum	27.129	0.744	0.744						
Moment, X-X Axis Base	Maximum	27.129		0.744						
"	Minimum	27.129		0.744						
Moment, Y-Y Axis Base	Maximum	27.129	0.744	0.744						
"	Minimum	27.129	0.744	0.744						
Moment, X-X Axis Top	Maximum	27.129	0.744	0.744						
"	Minimum	27.129	0.744	0.744						
Moment, Y-Y Axis Top	Maximum	27.129	0.744	0.744						
"	Minimum	27.129	0.744	0.744						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	-0.1256	in	7.007	ft	0.000	in	0.000	ft
+D+L+H	-0.2643	in	7.007	ft	0.000	in	0.000	ft
+D+Lr+H	-0.1256	in	7.007	ft	0.000	in	0.000	ft
+D+S+H	-0.1256	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	-0.2296	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	-0.2296	in	7.007	ft	0.000	in	0.000	ft
+D+0.60W+H	-0.1256	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+0.450W+H	-0.2296	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.450W+H	-0.2296	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	-0.0753	in	7.007	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	-0.1256	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	-0.2296	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	-0.0753	in	7.007	ft	0.000	in	0.000	ft
D Only	-0.1256	in	7.007	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	-0.1387	in	7.007	ft	0.000	in	0.000	ft

Barker Structural
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P: 702.310.8000
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Steel Column

DESCRIPTION: Column C2

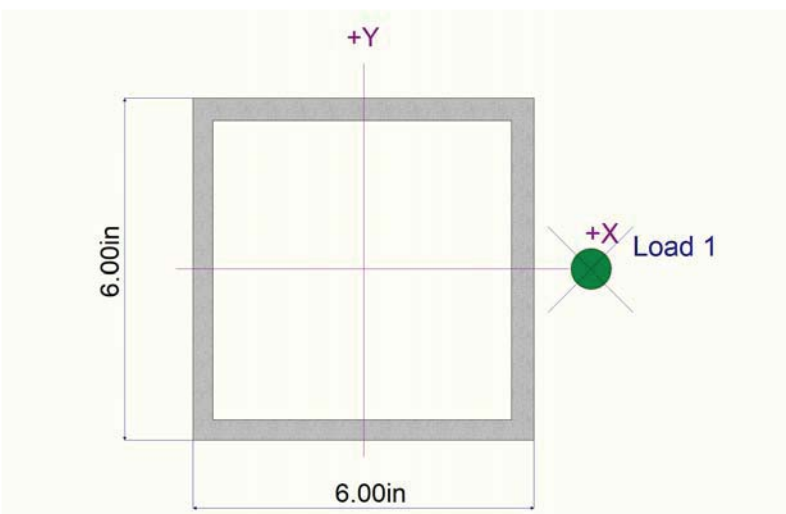
Maximum Deflections for Load Combinations

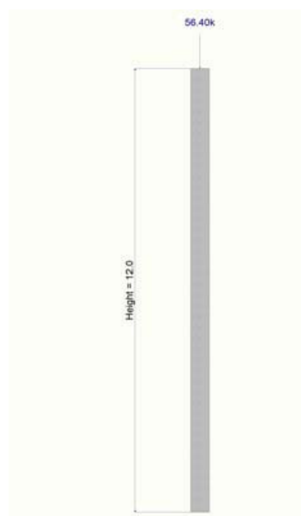
Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

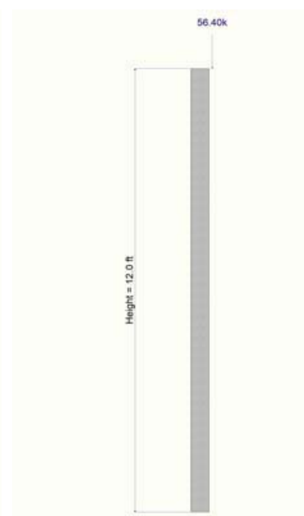
Steel Section Properties : HSS6x6x3/8

Depth	=	6.000	in	I xx	=	39.50	in^4	J	=	64.600	in^4
Design Thick	=	0.349	in	S xx	=	13.20	in^3				
Width	=	6.000	in	R xx	=	2.280	in				
Wall Thick	=	0.375	in	Zx	=	15.800	in^3				
Area	=	7.580	in^2	I yy	=	39.500	in^4	C	=	22.100	in^3
Weight	=	27.406	plf	S yy	=	13.200	in^3				
				R yy	=	2.280	in				
Ycg	=	0.000	in								

Sketches







C3

$P_D = 11.0^K$
$P_L = 14.11^K$ SEE POINT LOAD P6
$P_{Lr} = 1.94^K$

H = 12'

USE HSS 5×5×1/4

REF OUTPUT

C4

$P_D = 6.36^K$
$P_L = 3.3$ SEE POINT LOAD P5

H = 12'

USE 6×6 POST

REF OUTPUT

C5

TAKES REACTION FROM ROOF B5 (2)
6th B3 & B4
4th & 3rd B2 & B4

$P_D = .88^K(2) + 5.6^K + 2.83(3) + 3.18(2) = 22.2^K$

$P_{Lr} = .22(2) = .44^K$
$P_L = 9.41^K + 9.42(3) + 3.31(2) = 44.3^K$

H = 12'

USE HSS 6×6×3/8

REF OUTPUT

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Column

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .
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Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Column C3

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS5x5x1/4**
Analysis Method : Allowable Strength
Steel Stress Grade
Fy : Steel Yield 46.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 12.0 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 12.0 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 12.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 187.003 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 12.0 ft, Xecc = 4.0 in, D = 11.0, LR = 1.940, L = 14.110 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7337** : 1
Load Combination +D+L+H
Location of max.above base 11.919 ft
At maximum location values are . . .
Pa : Axial 25.297 k
Pn / Omega : Allowable 81.448 k
Ma-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 17.468 k-ft
Ma-y : Applied -8.314 k-ft
Mn-y / Omega : Allowable 17.468 k-ft

PASS Maximum Shear Stress Ratio = **0.02106** : 1
Load Combination +D+L+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Va : Applied 0.6975 k
Vn / Omega : Allowable 33.124 k

Maximum Load Reactions . .
Top along X-X 0.6975 k
Bottom along X-X 0.6975 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X -0.2904 in at 7.007 ft above base
for load combination : +D+L+H

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.277	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.009	PASS	0.00 ft
+D+L+H	0.734	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.021	PASS	0.00 ft
+D+Lr+H	0.326	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.011	PASS	0.00 ft
+D+S+H	0.277	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.009	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.673	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.019	PASS	0.00 ft
+D+0.750L+0.750S+H	0.631	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.018	PASS	0.00 ft
+D+0.60W+H	0.277	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.009	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.673	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.019	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.631	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.018	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.166	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.006	PASS	0.00 ft
+D+0.70E+0.60H	0.277	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.009	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.631	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.018	PASS	0.00 ft
+0.60D+0.70E+H	0.166	PASS	11.92 ft	1.00	1.66	74.61	74.61	0.006	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+H	11.187	0.306	0.306						
+D+L+H	25.297	0.698	0.698						

DESCRIPTION: Column C3

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction k @ Base	X-X Axis Reaction k @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments k-ft @ Base	Mx - End Moments k-ft @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+Lr+H	13.127	0.359	0.359						
+D+S+H	11.187	0.306	0.306						
+D+0.750Lr+0.750L+H	23.225	0.640	0.640						
+D+0.750L+0.750S+H	21.770	0.600	0.600						
+D+0.60W+H	11.187	0.306	0.306						
+D+0.750Lr+0.750L+0.450W+H	23.225	0.640	0.640						
+D+0.750L+0.750S+0.450W+H	21.770	0.600	0.600						
+0.60D+0.60W+0.60H	6.712	0.183	0.183						
+D+0.70E+0.60H	11.187	0.306	0.306						
+D+0.750L+0.750S+0.5250E+H	21.770	0.600	0.600						
+0.60D+0.70E+H	6.712	0.183	0.183						
D Only	11.187	0.306	0.306						
Lr Only	1.940	0.054	0.054						
L Only	14.110	0.392	0.392						
S Only									
W Only									
E Only									
H Only									

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction k @ Base	X-X Axis Reaction k @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments k-ft @ Base	Mx - End Moments k-ft @ Top	My - End Moments @ Base	My - End Moments @ Top
Axial @ Base	Maximum	25.297	0.698	0.698						
"	Minimum									
Reaction, X-X Axis Base	Maximum	25.297	0.698	0.698						
"	Minimum									
Reaction, Y-Y Axis Base	Maximum	11.187	0.306	0.306						
"	Minimum	11.187	0.306	0.306						
Reaction, X-X Axis Top	Maximum	25.297	0.698	0.698						
"	Minimum									
Reaction, Y-Y Axis Top	Maximum	14.110	0.392	0.392						
"	Minimum	11.187	0.306	0.306						
Moment, X-X Axis Base	Maximum	11.187		0.306						
"	Minimum	11.187		0.306						
Moment, Y-Y Axis Base	Maximum	11.187	0.306	0.306						
"	Minimum	11.187	0.306	0.306						
Moment, X-X Axis Top	Maximum	11.187	0.306	0.306						
"	Minimum	11.187	0.306	0.306						
Moment, Y-Y Axis Top	Maximum	11.187	0.306	0.306						
"	Minimum	11.187	0.306	0.306						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	-0.1272	in	7.007	ft	0.000	in	0.000	ft
+D+L+H	-0.2904	in	7.007	ft	0.000	in	0.000	ft
+D+Lr+H	-0.1497	in	7.007	ft	0.000	in	0.000	ft
+D+S+H	-0.1272	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	-0.2665	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	-0.2496	in	7.007	ft	0.000	in	0.000	ft
+D+0.60W+H	-0.1272	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+0.450W+H	-0.2665	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.450W+H	-0.2496	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	-0.0763	in	7.007	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	-0.1272	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	-0.2496	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	-0.0763	in	7.007	ft	0.000	in	0.000	ft
D Only	-0.1272	in	7.007	ft	0.000	in	0.000	ft
Lr Only	-0.0224	in	7.007	ft	0.000	in	0.000	ft
L Only	-0.1632	in	7.007	ft	0.000	in	0.000	ft

Steel Column

DESCRIPTION: Column C3

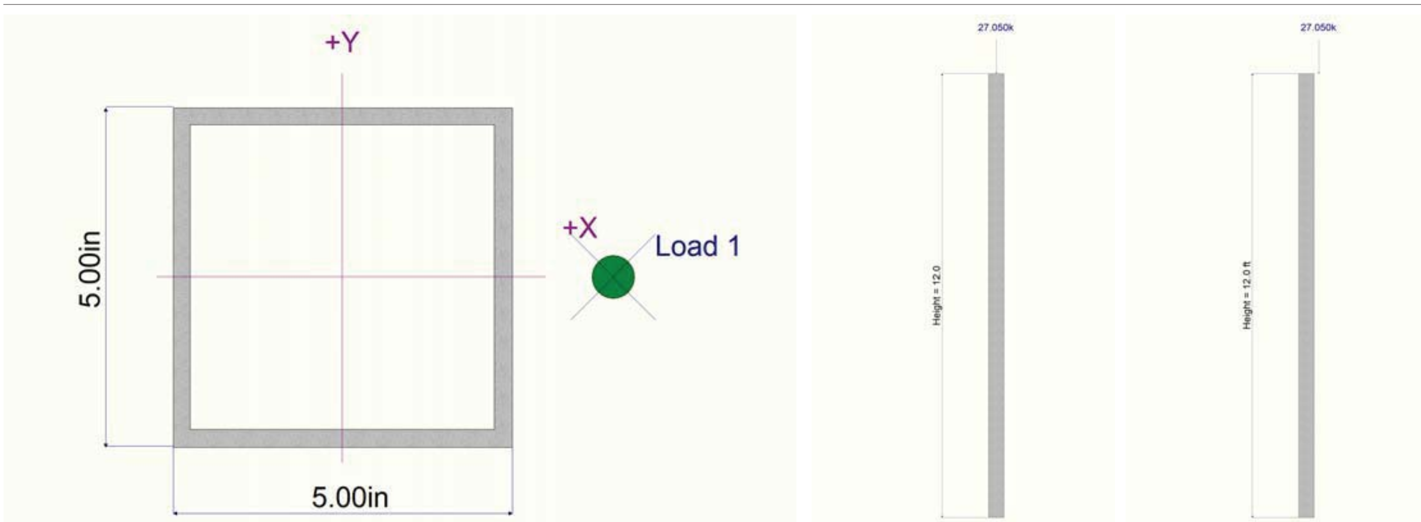
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Steel Section Properties : HSS5x5x1/4

Depth	=	5.000	in	I xx	=	16.00	in^4	J	=	25.800	in^4
Design Thick	=	0.233	in	S xx	=	6.41	in^3				
Width	=	5.000	in	R xx	=	1.930	in				
Wall Thick	=	0.250	in	Zx	=	7.610	in^3				
Area	=	4.300	in^2	I yy	=	16.000	in^4	C	=	10.500	in^3
Weight	=	15.584	plf	S yy	=	6.410	in^3				
				R yy	=	1.930	in				
Ycg	=	0.000	in								

Sketches



DESCRIPTION: C4

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design	Wood Section Name	6x6
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	12 ft	Wood Member Type	Sawn

(Used for non-slender calculations)

Wood Species	Douglas Fir-Larch		
Wood Grade	No.1		
Fb +	1,200.0 psi	Fv	170.0 psi
Fb -	1,200.0 psi	Ft	825.0 psi
Fc - Prll	1,000.0 psi	Density	31.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Exact Width	5.50 in
Exact Depth	5.50 in
Area	30.250 in^2
Ix	76.255 in^4
Iy	76.255 in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 NDS 15.3.2
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 12 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 12 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 78.675 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 12.0 ft, D = 6.360, L = 3.30 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS	Max. Axial+Bending Stress Ratio =	0.5789 : 1
	Load Combination	+D+L+H
	Governing NDS Forumla	Comp Only, fc/Fc'
	Location of max.above base	0.0 ft
	At maximum location values are . . .	
	Applied Axial	9.739 k
	Applied Mx	0.0 k-ft
	Applied My	0.0 k-ft
	Fc : Allowable	556.14 psi
PASS	Maximum Shear Stress Ratio =	0.0 : 1
	Load Combination	+0.60D+0.70E+H
	Location of max.above base	12.0 ft
	Applied Design Shear	0.0 psi
	Allowable Shear	272.0 psi

Maximum SERVICE Lateral Load Reactions . .

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

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	0.596	0.3965	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+L+H	1.000	0.556	0.5789	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+Lr+H	1.250	0.472	0.3608	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+S+H	1.150	0.503	0.3680	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.750Lr+0.750L+H	1.250	0.472	0.4994	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.750L+0.750S+H	1.150	0.503	0.5094	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W+H	1.600	0.386	0.3445	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	0.386	0.4770	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.750L+0.750S+0.450W+H	1.600	0.386	0.4770	PASS	0.0 ft	0.0	PASS	12.0 ft
+0.60D+0.60W+0.60H	1.600	0.386	0.2067	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.70E+0.60H	1.600	0.386	0.3445	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.750L+0.750S+0.5250E+H	1.600	0.386	0.4770	PASS	0.0 ft	0.0	PASS	12.0 ft

Wood Column

DESCRIPTION: C4

Load Combination Results

Load Combination	C D	C P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.70E+H	1.600	0.386	0.2067	PASS	0.0 ft	0.0	PASS	12.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

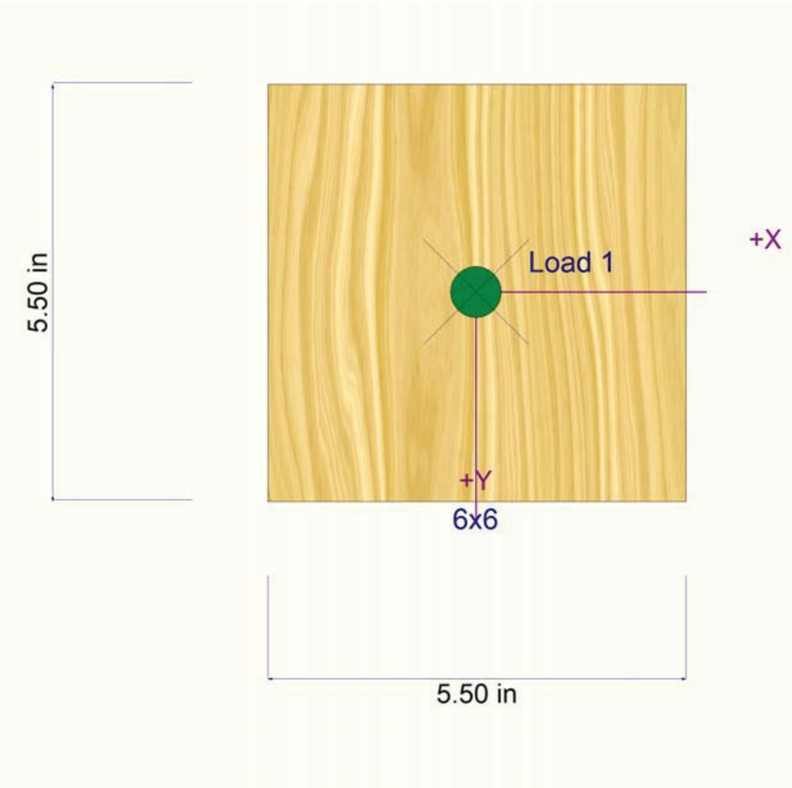
Load Combination	X-X Axis Reaction (k) @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments (k-ft) @ Base	My - End Moments @ Top	Mx - End Moments @ Base	Mx - End Moments @ Top
+D+H					6.439				
+D+L+H					9.739				
+D+Lr+H					6.439				
+D+S+H					6.439				
+D+0.750Lr+0.750L+H					8.914				
+D+0.750L+0.750S+H					8.914				
+D+0.60W+H					6.439				
+D+0.750Lr+0.750L+0.450W+H					8.914				
+D+0.750L+0.750S+0.450W+H					8.914				
+0.60D+0.60W+0.60H					3.863				
+D+0.70E+0.60H					6.439				
+D+0.750L+0.750S+0.5250E+H					8.914				
+0.60D+0.70E+H					3.863				
D Only					6.439				
Lr Only									
L Only					3.300				
S Only									
W Only									
E Only									
H Only									

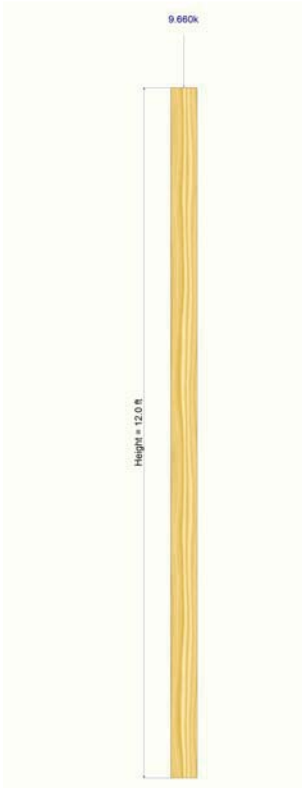
Maximum Deflections for Load Combinations

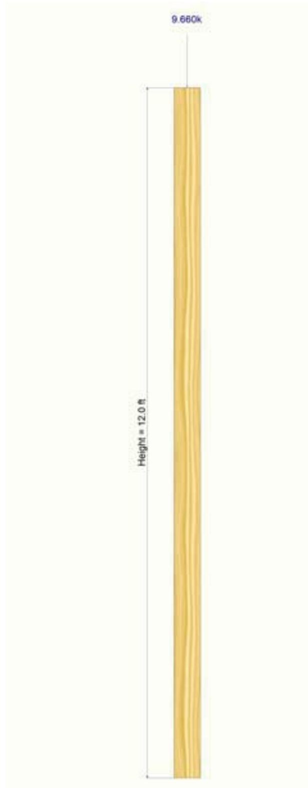
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

DESCRIPTION: C4

Sketches







BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Column

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .
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Lic. # : KW-06002046 BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Column C5

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS6x6x3/8**
Analysis Method : Allowable Strength
Steel Stress Grade
Fy : Steel Yield 46.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 12.0 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 12.0 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 12.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 328.870 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 12.0 ft, Xecc = 3.0 in, D = 22.20, LR = 0.440, L = 44.30 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8233** : 1
Load Combination +D+L+H
Location of max.above base 11.919 ft
At maximum location values are . . .
Pa : Axial 66.829 k
Pn / Omega : Allowable 159.653 k
Ma-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 36.267 k-ft
Ma-y : Applied -16.513 k-ft
Mn-y / Omega : Allowable 36.267 k-ft

PASS Maximum Shear Stress Ratio = **0.02425** : 1
Load Combination +D+L+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Va : Applied 1.385 k
Vn / Omega : Allowable 57.137 k

Maximum Load Reactions . .
Top along X-X 1.385 k
Bottom along X-X 1.385 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X -0.2337 in at 7.007 ft above base
for load combination : +D+L+H

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.223	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.008	PASS	0.00 ft
+D+L+H	0.823	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.024	PASS	0.00 ft
+D+Lr+H	0.227	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.008	PASS	0.00 ft
+D+S+H	0.223	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.008	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.691	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.020	PASS	0.00 ft
+D+0.750L+0.750S+H	0.687	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.020	PASS	0.00 ft
+D+0.60W+H	0.223	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.008	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.691	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.020	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.687	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.020	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.134	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.005	PASS	0.00 ft
+D+0.70E+0.60H	0.223	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.008	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.687	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.020	PASS	0.00 ft
+0.60D+0.70E+H	0.134	PASS	11.92 ft	1.00	1.66	63.16	63.16	0.005	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+H	22.529	0.463	0.463						
+D+L+H	66.829	1.385	1.385						

BARKER STRUCTURAL

Barker Structural
5960 S. Las Vegas Blvd Ste 300
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Steel Column

DESCRIPTION: Column C5

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction k @ Base	X-X Axis Reaction k @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments k-ft @ Base	Mx - End Moments k-ft @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+Lr+H	22.969	0.472	0.472						
+D+S+H	22.529	0.463	0.463						
+D+0.750Lr+0.750L+H	56.084	1.162	1.162						
+D+0.750L+0.750S+H	55.754	1.155	1.155						
+D+0.60W+H	22.529	0.463	0.463						
+D+0.750Lr+0.750L+0.450W+H	56.084	1.162	1.162						
+D+0.750L+0.750S+0.450W+H	55.754	1.155	1.155						
+0.60D+0.60W+0.60H	13.517	0.278	0.278						
+D+0.70E+0.60H	22.529	0.463	0.463						
+D+0.750L+0.750S+0.5250E+H	55.754	1.155	1.155						
+0.60D+0.70E+H	13.517	0.278	0.278						
D Only	22.529	0.463	0.463						
Lr Only	0.440	0.009	0.009						
L Only	44.300	0.923	0.923						
S Only									
W Only									
E Only									
H Only									

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction k @ Base	X-X Axis Reaction k @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments k-ft @ Base	Mx - End Moments k-ft @ Top	My - End Moments @ Base	My - End Moments @ Top
Axial @ Base	Maximum	66.829	1.385	1.385						
"	Minimum									
Reaction, X-X Axis Base	Maximum	66.829	1.385	1.385						
"	Minimum									
Reaction, Y-Y Axis Base	Maximum	22.529	0.463	0.463						
"	Minimum	22.529	0.463	0.463						
Reaction, X-X Axis Top	Maximum	66.829	1.385	1.385						
"	Minimum									
Reaction, Y-Y Axis Top	Maximum	44.300	0.923	0.923						
"	Minimum	22.529	0.463	0.463						
Moment, X-X Axis Base	Maximum	22.529		0.463						
"	Minimum	22.529		0.463						
Moment, Y-Y Axis Base	Maximum	22.529	0.463	0.463						
"	Minimum	22.529	0.463	0.463						
Moment, X-X Axis Top	Maximum	22.529	0.463	0.463						
"	Minimum	22.529	0.463	0.463						
Moment, Y-Y Axis Top	Maximum	22.529	0.463	0.463						
"	Minimum	22.529	0.463	0.463						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	-0.0780	in	7.007	ft	0.000	in	0.000	ft
+D+L+H	-0.2337	in	7.007	ft	0.000	in	0.000	ft
+D+Lr+H	-0.0796	in	7.007	ft	0.000	in	0.000	ft
+D+S+H	-0.0780	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	-0.1959	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	-0.1948	in	7.007	ft	0.000	in	0.000	ft
+D+0.60W+H	-0.0780	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+0.450W+H	-0.1959	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.450W+H	-0.1948	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	-0.0468	in	7.007	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	-0.0780	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	-0.1948	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	-0.0468	in	7.007	ft	0.000	in	0.000	ft
D Only	-0.0780	in	7.007	ft	0.000	in	0.000	ft
Lr Only	-0.0015	in	7.007	ft	0.000	in	0.000	ft
L Only	-0.1557	in	7.007	ft	0.000	in	0.000	ft

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Column

DESCRIPTION: Column C5

Maximum Deflections for Load Combinations

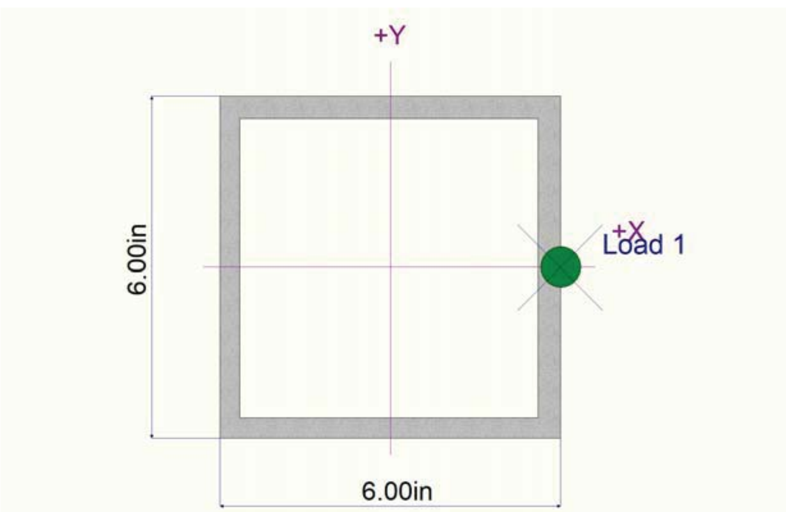
Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

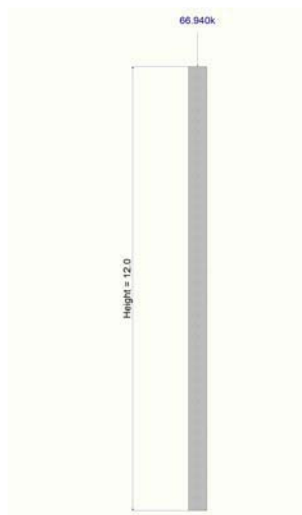
Steel Section Properties : HSS6x6x3/8

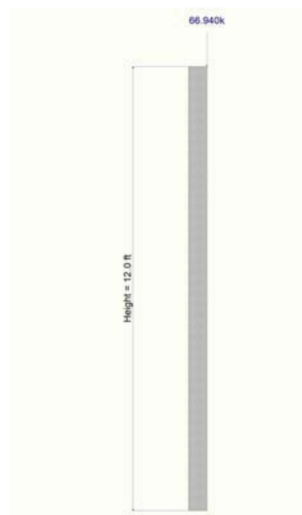
Depth	=	6.000	in	I xx	=	39.50	in^4	J	=	64.600	in^4
Design Thick	=	0.349	in	S xx	=	13.20	in^3				
Width	=	6.000	in	R xx	=	2.280	in				
Wall Thick	=	0.375	in	Zx	=	15.800	in^3				
Area	=	7.580	in^2	I yy	=	39.500	in^4	C	=	22.100	in^3
Weight	=	27.406	plf	S yy	=	13.200	in^3				
				R yy	=	2.280	in				

Ycg	=	0.000	in

Sketches







C6

$P_D = 4.055^K$ SEE POINT LOAD P2
$P_L = 4.35^K$

H=12'

~~USE HSS 4x4x1/4~~
~~OR~~ 6x6 POST

C7 (MASONRY COLUMN)

REACTION SAME AS C1 + REACTION FROM RAM

$P_D = 36^K + 14.5^K = 50.5^K$
$P_{Lr} = 6.9^K$
$P_L = 30.6 + 12.58 = 43.2^K$

H= 18'

USE 16" SQ COL w/ (4) #8 VERTS

REF OUTPUT

C8

REACTION SAME AS C2 + REACTION FROM RAM

$P_D = 26.8 + 33.3 = 60.1^K$

H= 18'

$P_L = 29.6 + 31.2 = 60.8^K$

USE HSS 8x8x1/2

REF OUTPUT

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Column

DESCRIPTION: Column C6

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : HSS4x4x1/4
Analysis Method : Allowable Strength
Steel Stress Grade
Fy : Steel Yield 46.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 12.0 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 12.0 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 12.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 146.170 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 12.0 ft, Xecc = 4.50 in, D = 4.055, LR = 4.350 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3751** : 1
Load Combination +D+Lr+H
Location of max.above base 11.919 ft
At maximum location values are . . .
Pa : Axial 8.551 k
Pn / Omega : Allowable 50.754 k
Ma-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 10.765 k-ft
Ma-y : Applied -3.131 k-ft
Mn-y / Omega : Allowable 10.765 k-ft

PASS Maximum Shear Stress Ratio = **0.01033** : 1
Load Combination +D+Lr+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Va : Applied 0.2627 k
Vn / Omega : Allowable 25.423 k

Maximum Load Reactions . .
Top along X-X 0.2627 k
Bottom along X-X 0.2627 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X -0.2244 in at 7.007 ft above base
for load combination : +D+Lr+H

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.182	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.005	PASS	0.00 ft
+D+L+H	0.182	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.005	PASS	0.00 ft
+D+Lr+H	0.375	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.010	PASS	0.00 ft
+D+S+H	0.182	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.005	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.327	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.009	PASS	0.00 ft
+D+0.750L+0.750S+H	0.182	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.005	PASS	0.00 ft
+D+0.60W+H	0.182	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.005	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.327	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.009	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.182	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.005	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.109	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.003	PASS	0.00 ft
+D+0.70E+0.60H	0.182	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.005	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.182	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.005	PASS	0.00 ft
+0.60D+0.70E+H	0.109	PASS	11.92 ft	1.00	1.66	94.74	94.74	0.003	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+H	4.201	0.127	0.127						
+D+L+H	4.201	0.127	0.127						

Barker Structural
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Las Vegas, NV 89118
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Steel Column

DESCRIPTION: Column C6

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+Lr+H	8.551	0.263	0.263						
+D+S+H	4.201	0.127	0.127						
+D+0.750Lr+0.750L+H	7.464	0.229	0.229						
+D+0.750L+0.750S+H	4.201	0.127	0.127						
+D+0.60W+H	4.201	0.127	0.127						
+D+0.750Lr+0.750L+0.450W+H	7.464	0.229	0.229						
+D+0.750L+0.750S+0.450W+H	4.201	0.127	0.127						
+0.60D+0.60W+0.60H	2.521	0.076	0.076						
+D+0.70E+0.60H	4.201	0.127	0.127						
+D+0.750L+0.750S+0.5250E+H	4.201	0.127	0.127						
+0.60D+0.70E+H	2.521	0.076	0.076						
D Only	4.201	0.127	0.127						
Lr Only	4.350	0.136	0.136						
L Only									
S Only									
W Only									
E Only									
H Only									

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
Axial @ Base	Maximum	8.551	0.263	0.263						
"	Minimum									
Reaction, X-X Axis Base	Maximum	8.551	0.263	0.263						
"	Minimum									
Reaction, Y-Y Axis Base	Maximum	4.201	0.127	0.127						
"	Minimum	4.201	0.127	0.127						
Reaction, X-X Axis Top	Maximum	8.551	0.263	0.263						
"	Minimum									
Reaction, Y-Y Axis Top	Maximum	4.350	0.136	0.136						
"	Minimum	4.201	0.127	0.127						
Moment, X-X Axis Base	Maximum	4.201		0.127						
"	Minimum	4.201		0.127						
Moment, Y-Y Axis Base	Maximum	4.201	0.127	0.127						
"	Minimum	4.201	0.127	0.127						
Moment, X-X Axis Top	Maximum	4.201	0.127	0.127						
"	Minimum	4.201	0.127	0.127						
Moment, Y-Y Axis Top	Maximum	4.201	0.127	0.127						
"	Minimum	4.201	0.127	0.127						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	-0.1082	in	7.007	ft	0.000	in	0.000	ft
+D+L+H	-0.1082	in	7.007	ft	0.000	in	0.000	ft
+D+Lr+H	-0.2244	in	7.007	ft	0.000	in	0.000	ft
+D+S+H	-0.1082	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	-0.1953	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	-0.1082	in	7.007	ft	0.000	in	0.000	ft
+D+0.60W+H	-0.1082	in	7.007	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+0.450W+H	-0.1953	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.450W+H	-0.1082	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	-0.0649	in	7.007	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	-0.1082	in	7.007	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	-0.1082	in	7.007	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	-0.0649	in	7.007	ft	0.000	in	0.000	ft
D Only	-0.1082	in	7.007	ft	0.000	in	0.000	ft
Lr Only	-0.1161	in	7.007	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

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Steel Column

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .

Lic. # : KW-06002046 **BARKER DROTTAR ASSOCIATES LLC**

DESCRIPTION: Column C6

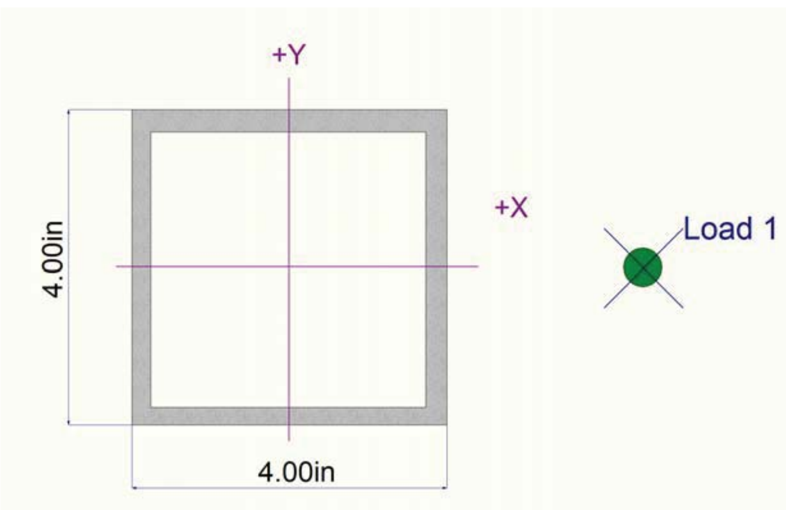
Maximum Deflections for Load Combinations

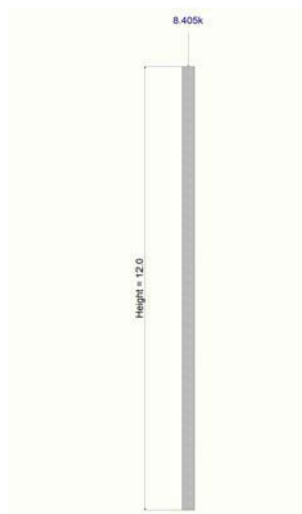
Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

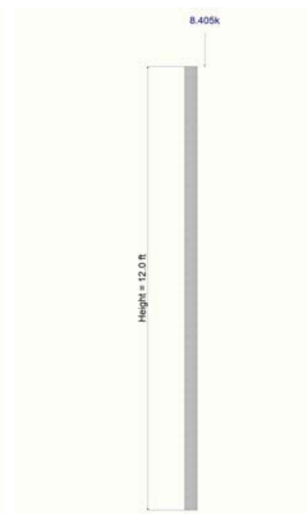
Steel Section Properties : HSS4x4x1/4

Depth	=	4.000	in	I xx	=	7.80	in^4	J	=	12.800	in^4
Design Thick	=	0.233	in	S xx	=	3.90	in^3				
Width	=	4.000	in	R xx	=	1.520	in				
Wall Thick	=	0.250	in	Zx	=	4.690	in^3				
Area	=	3.370	in^2	I yy	=	7.800	in^4	C	=	6.560	in^3
Weight	=	12.181	plf	S yy	=	3.900	in^3				
				R yy	=	1.520	in				
Ycg	=	0.000	in								

Sketches







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Masonry Column

DESCRIPTION: Column C7

Code References

Calculations per TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Material Properties

F'm	=	1,500.0 psi
Fr - Rupture	=	75.0 psi
Em = f'm *	=	900.0
Column Density	=	130.0 pcf
Rebar Grade	=	Grade 60
Fy - Yield	=	60000 psi
Fs - Allowable	=	32,000.0 psi
E - Rebar	=	29,000.0 ksi

Column Data

Column width along X-X	=	15.625 in
Column depth along Y-Y	=	15.625 in
Longitudinal Bar Size	=	# 8.0
Bars per side at +Y & -Y	=	2
Bars per side at +X & -X	=	2
Cover from ties	=	3.50 in
Actual Edge to Bar Center	=	4.375 in

Analysis Settings

Analysis Method	=	Strength Design
φ factor for Strength Design	=	0.90
End Fixity Condition	=	Top Pinned, Bottom Pinned
Overall Column Height	=	18.0 ft
Construction Type		Solid Grouted Hollow Concrete Masonry
Tie Bar Size	=	# 3
Tie Bar Spacing	=	8.0 in

Brace condition for deflection (buckling) along columns :

X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 18.0 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 18.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 3,967.29 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 18.0 ft, Yecc = 3.0 in, D = 50.50, L = 43.20 k
BENDING LOADS . . .

DESIGN SUMMARY

Bending Check Results

PASS Maximum Bending Stress Ratio = **0.668** : 1
Load Combination +1.20D+0.50Lr+1.60L+1.60H
Location of max.above base 17.879 ft
At maximum location values are . . .
Pu 134.481 k
0.9 * Pn 201.390 k
Mu-x -32.212 k-ft
0.9 * Mn-x : 48.166 k-ft

PASS Reinforcing Area Check *(ACI 530-13, Sec 3.3.4.*
As : Actual Reinforcement 3.160
Min: 0.0025 * An 0.610
Max: 0.04 * An 9.766

Dimensional Checks
Min. Side Dim. >= 8" *(ACI 530-13, Sec 5.3.1.*
PASS Governing K * Lu / Dimension <= 30 *(ACI 530-13, Sec 5.3.1.*

Maximum SERVICE Load Reactions . .
Top along X-X 1.301 k
Bottom along X-X 1.301 k

Maximum SERVICE Load Deflections . . .
Along x-x 0.127 in at 10.510 ft above base
for load combination : +D+L+H

Compressive Strength 304.477 k *(ACI 530-13, Sec 3.3.4.*
Pa = 0.80 [0.80 f'm (An - Ast) + FyAst) * [1-(h/(140*r))^2]

PASS Check Column Ties *(ACI 530-13, Sec 2.1.6.*
Min. Tie Dia. = 1/4", # 3 bar provided
Max Tie Spacing = 15.63 in, Provided = 8.00 in

Load Combination Results

Load Combination	Maximum Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Axial Load: Actual	Allow	Maximum Moments: Actual	Allow
+1.40D+1.60H	0.3701	PASS	17.879 ft	76.254 k	206.065 k	17.556 k-ft	47.395 k-ft
+1.20D+0.50Lr+1.60L+1.60H	0.6678	PASS	17.879 ft	134.481 k	201.390 k	32.212 k-ft	48.166 k-ft
+1.20D+1.60L+0.50S+1.60H	0.6678	PASS	17.879 ft	134.481 k	201.390 k	32.212 k-ft	48.166 k-ft
+1.20D+1.60Lr+L+1.60H	0.5363	PASS	17.879 ft	108.561 k	202.432 k	25.776 k-ft	47.993 k-ft
+1.20D+1.60Lr+0.50W+1.60H	0.3172	PASS	17.879 ft	65.361 k	206.065 k	15.048 k-ft	47.395 k-ft
+1.20D+L+1.60S+1.60H	0.5363	PASS	17.879 ft	108.561 k	202.432 k	25.776 k-ft	47.993 k-ft
+1.20D+1.60S+0.50W+1.60H	0.3172	PASS	17.879 ft	65.361 k	206.065 k	15.048 k-ft	47.395 k-ft
+1.20D+0.50Lr+L+W+1.60H	0.5363	PASS	17.879 ft	108.561 k	202.432 k	25.776 k-ft	47.993 k-ft
+1.20D+L+0.50S+W+1.60H	0.5363	PASS	17.879 ft	108.561 k	202.432 k	25.776 k-ft	47.993 k-ft
+0.90D+W+1.60H	0.2379	PASS	17.879 ft	49.021 k	206.065 k	11.286 k-ft	47.395 k-ft

Masonry Column

DESCRIPTION: Column C7

Load Combination Results

Load Combination	Maximum Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Axial Load: Actual	Allow	Maximum Moments: Actual	Allow
+1.20D+L+0.20S+E+1.60H	0.5363	PASS	17.879 ft	108.561 k	202.432 k	25.776 k-ft	47.993 k-ft
+0.90D+E+0.90H	0.2379	PASS	17.879 ft	49.021 k	206.065 k	11.286 k-ft	47.395 k-ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base
+D+H	-0.701 k	0.701 k	54.467 k
+D+L+H	-1.301 k	1.301 k	97.667 k
+D+Lr+H	-0.701 k	0.701 k	54.467 k
+D+S+H	-0.701 k	0.701 k	54.467 k
+D+0.750Lr+0.750L+H	-1.151 k	1.151 k	86.867 k
+D+0.750L+0.750S+H	-1.151 k	1.151 k	86.867 k
+D+0.60W+H	-0.701 k	0.701 k	54.467 k
+D+0.750Lr+0.750L+0.450W+H	-1.151 k	1.151 k	86.867 k
+D+0.750L+0.750S+0.450W+H	-1.151 k	1.151 k	86.867 k
+0.60D+0.60W+0.60H	-0.421 k	0.421 k	32.680 k
+D+0.70E+0.60H	-0.701 k	0.701 k	54.467 k
+D+0.750L+0.750S+0.5250E+H	-1.151 k	1.151 k	86.867 k
+0.60D+0.70E+H	-0.421 k	0.421 k	32.680 k
D Only	-0.701 k	0.701 k	54.467 k
Lr Only	k	k	k
L Only	-0.600 k	0.600 k	43.200 k
S Only	k	k	k
W Only	k	k	k
E Only	k	k	k
H Only	k	k	k

Maximum Deflections for Load Combinations

Load Combination	Max. Y-Y Deflection	Distance
+D+H	0.0682 in	10.510 ft
+D+L+H	0.1266 in	10.510 ft
+D+Lr+H	0.0682 in	10.510 ft
+D+S+H	0.0682 in	10.510 ft
+D+0.750Lr+0.750L+H	0.1120 in	10.510 ft
+D+0.750L+0.750S+H	0.1120 in	10.510 ft
+D+0.60W+H	0.0682 in	10.510 ft
+D+0.750Lr+0.750L+0.450W+H	0.1120 in	10.510 ft
+D+0.750L+0.750S+0.450W+H	0.1120 in	10.510 ft
+0.60D+0.60W+0.60H	0.0409 in	10.510 ft
+D+0.70E+0.60H	0.0682 in	10.510 ft
+D+0.750L+0.750S+0.5250E+H	0.1120 in	10.510 ft
+0.60D+0.70E+H	0.0409 in	10.510 ft
D Only	0.0682 in	10.510 ft
Lr Only	0.0000 in	0.000 ft
L Only	0.0583 in	10.510 ft
S Only	0.0000 in	0.000 ft
W Only	0.0000 in	0.000 ft
E Only	0.0000 in	0.000 ft
H Only	0.0000 in	0.000 ft

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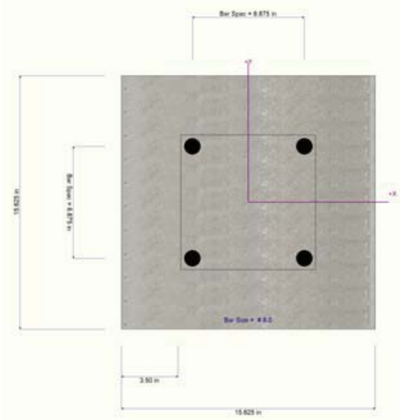
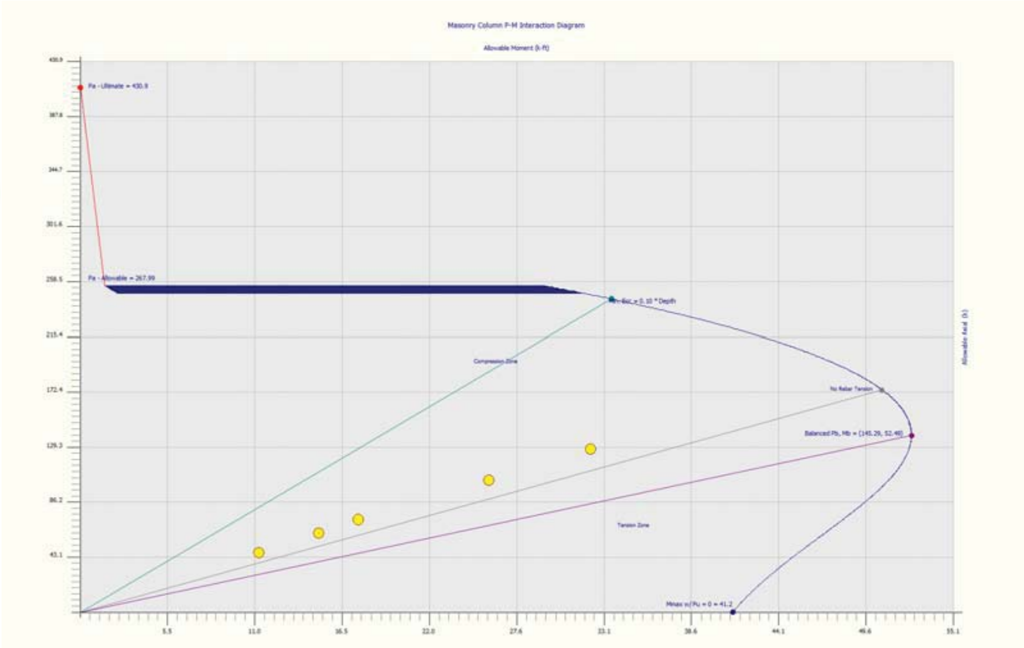
DESCRIPTION: Column C7

Cross Section



Interaction Diagram



BARKER STRUCTURAL

Barker Structural
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Steel Column

DESCRIPTION: Column C8

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS8x8x1/2**
Analysis Method : Allowable Strength
Steel Stress Grade
Fy : Steel Yield 46.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 18.0 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 18.0 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 18.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 876.97 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 18.0 ft, Xecc = 4.0 in, D = 60.10, L = 60.80 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8733** : 1
Load Combination +D+L+H
Location of max.above base 17.879 ft
At maximum location values are . . .
Pa : Axial 121.777 k
Pn / Omega : Allowable 264.782 k
Ma-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 86.078 k-ft
Ma-y : Applied -40.030 k-ft
Mn-y / Omega : Allowable 86.078 k-ft

PASS Maximum Shear Stress Ratio = **0.02205** : 1
Load Combination +D+L+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Va : Applied 2.239 k
Vn / Omega : Allowable 101.519 k

Maximum Load Reactions . .
Top along X-X 2.239 k
Bottom along X-X 2.239 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum Load Deflections . . .
Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X -0.4028 in at 10.510 ft above base
for load combination : +D+L+H

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.436	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.011	PASS	0.00 ft
+D+L+H	0.873	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.022	PASS	0.00 ft
+D+Lr+H	0.436	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.011	PASS	0.00 ft
+D+S+H	0.436	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.011	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.764	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.019	PASS	0.00 ft
+D+0.750L+0.750S+H	0.764	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.019	PASS	0.00 ft
+D+0.60W+H	0.436	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.011	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.764	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.019	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.764	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.019	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.208	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.007	PASS	0.00 ft
+D+0.70E+0.60H	0.436	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.011	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.764	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.019	PASS	0.00 ft
+0.60D+0.70E+H	0.208	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.007	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+H	60.977	1.113	1.113						
+D+L+H	121.777	2.239	2.239						

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Steel Column

DESCRIPTION: Column C8

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	k @ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base	k-ft @ Top	My - End Moments @ Base	@ Top
+D+Lr+H	60.977	1.113	1.113						
+D+S+H	60.977	1.113	1.113						
+D+0.750Lr+0.750L+H	106.577	1.957	1.957						
+D+0.750L+0.750S+H	106.577	1.957	1.957						
+D+0.60W+H	60.977	1.113	1.113						
+D+0.750Lr+0.750L+0.450W+H	106.577	1.957	1.957						
+D+0.750L+0.750S+0.450W+H	106.577	1.957	1.957						
+0.60D+0.60W+0.60H	36.586	0.668	0.668						
+D+0.70E+0.60H	60.977	1.113	1.113						
+D+0.750L+0.750S+0.5250E+H	106.577	1.957	1.957						
+0.60D+0.70E+H	36.586	0.668	0.668						
D Only	60.977	1.113	1.113						
Lr Only									
L Only	60.800	1.126	1.126						
S Only									
W Only									
E Only									
H Only									

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	k @ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base	k-ft @ Top	My - End Moments @ Base	@ Top
Axial @ Base	Maximum	121.777	2.239	2.239						
"	Minimum									
Reaction, X-X Axis Base	Maximum	121.777	2.239	2.239						
"	Minimum									
Reaction, Y-Y Axis Base	Maximum	60.977	1.113	1.113						
"	Minimum	60.977	1.113	1.113						
Reaction, X-X Axis Top	Maximum	121.777	2.239	2.239						
"	Minimum									
Reaction, Y-Y Axis Top	Maximum	60.800	1.126	1.126						
"	Minimum	60.977	1.113	1.113						
Moment, X-X Axis Base	Maximum	60.977		1.113						
"	Minimum	60.977		1.113						
Moment, Y-Y Axis Base	Maximum	60.977	1.113	1.113						
"	Minimum	60.977	1.113	1.113						
Moment, X-X Axis Top	Maximum	60.977	1.113	1.113						
"	Minimum	60.977	1.113	1.113						
Moment, Y-Y Axis Top	Maximum	60.977	1.113	1.113						
"	Minimum	60.977	1.113	1.113						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	-0.2002	in	10.510	ft	0.000	in	0.000	ft
+D+L+H	-0.4028	in	10.510	ft	0.000	in	0.000	ft
+D+Lr+H	-0.2002	in	10.510	ft	0.000	in	0.000	ft
+D+S+H	-0.2002	in	10.510	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	-0.3521	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	-0.3521	in	10.510	ft	0.000	in	0.000	ft
+D+0.60W+H	-0.2002	in	10.510	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+0.450W+H	-0.3521	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.450W+H	-0.3521	in	10.510	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	-0.1201	in	10.510	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	-0.2002	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	-0.3521	in	10.510	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	-0.1201	in	10.510	ft	0.000	in	0.000	ft
D Only	-0.2002	in	10.510	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	-0.2025	in	10.510	ft	0.000	in	0.000	ft

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Steel Column

DESCRIPTION: Column C8

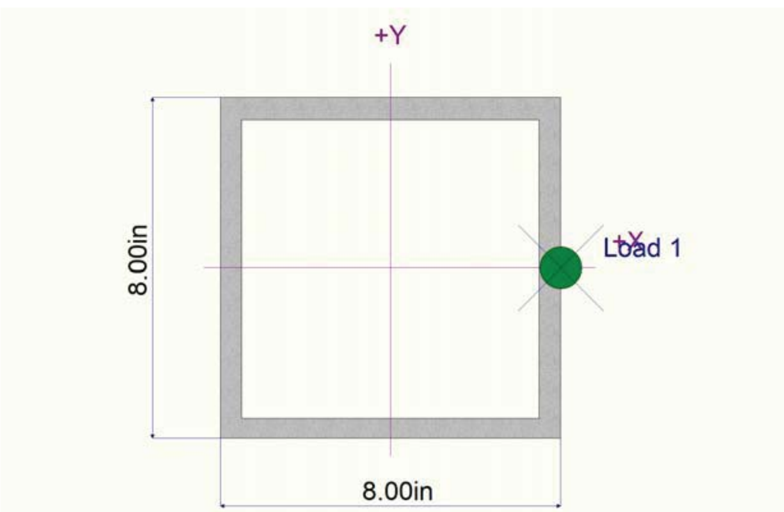
Maximum Deflections for Load Combinations

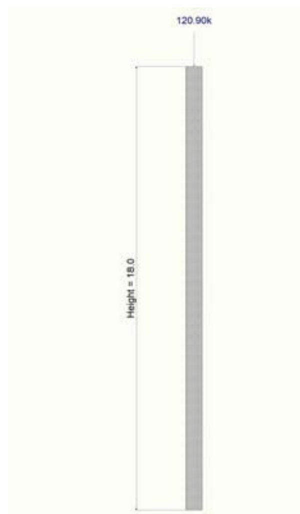
Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

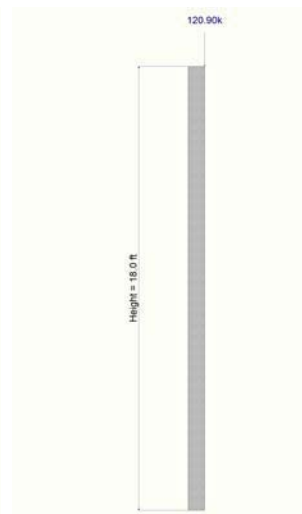
Steel Section Properties : HSS8x8x1/2

Depth	=	8.000	in	I xx	=	125.00	in^4	J	=	204.000	in^4
Design Thick	=	0.465	in	S xx	=	31.20	in^3				
Width	=	8.000	in	R xx	=	3.040	in				
Wall Thick	=	0.500	in	Zx	=	37.500	in^3				
Area	=	13.500	in^2	I yy	=	125.000	in^4	C	=	52.400	in^3
Weight	=	48.721	plf	S yy	=	31.200	in^3				
				R yy	=	3.040	in				
Ycg	=	0.000	in								

Sketches







C9

C3 REACTION PLUS RAM

$P_D = 11 + 55.4 = 66.4^K$
$P_L = 14.11 + 50.3 = 64.41^K$
$P_{Lr} = 1.94^K$

$H = 18'$

USE HSS 8x8x1/2

REF OUTPUT

C10 SAME AS C4

C11

C5 REACTION + CAD

$P_D = 22.2^K + 39^K = 61.2^K$
$P_L = 44.3^K + 37.6^K = 81.9^K$

$H = 18'$

USE HSS 8x8x1/2

REF OUTPUT

C12

REACTION FROM RAM ONLY SEE RAM OUTPUT FOR COLUMN DESIGN

USE HSS 8x8x5/8

WORST CASE MASONRY COLUMN

CARRYING C5 + BEAM REACTION FROM RAM

$P_D = 22.2^K + 10.51 = 32.7^K$
$P_L = 44.3^K + 9.41 = 53.71^K$

USE 16" COLUMN WITH (4) #8 VERTS

REF OUTPUT

TYP. FOR ALL

BARKER STRUCTURAL
Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Steel Column

File = C:\Users\KCG\Desktop\Temp\218029.ec6 .
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Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Column C9

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name :	HSS8x8x1/2	Overall Column Height	18.0 ft
Analysis Method :	Allowable Strength	Top & Bottom Fixity	Top & Bottom Pinned
Steel Stress Grade			
Fy : Steel Yield	46.0 ksi		
E : Elastic Bending Modulus	29,000.0 ksi		

Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 18.0 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 18.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 876.97 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 18.0 ft, Xecc = 3.0 in, D = 66.40, L = 64.410 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	**0.8328**	: 1
Load Combination	+D+L+H	
Location of max.above base	17.879	ft
At maximum location values are . . .		
Pa : Axial	131.687	k
Pn / Omega : Allowable	264.782	k
Ma-x : Applied	0.0	k-ft
Mn-x / Omega : Allowable	86.078	k-ft
Ma-y : Applied	-32.483	k-ft
Mn-y / Omega : Allowable	86.078	k-ft
PASS Maximum Shear Stress Ratio =	**0.01790**	: 1
Load Combination	+D+L+H	
Location of max.above base	0.0	ft
At maximum location values are . . .		
Va : Applied	1.817	k
Vn / Omega : Allowable	101.519	k

Maximum Load Reactions . .

Top along X-X	1.817 k
Bottom along X-X	1.817 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y 0.0 in at 0.0ft above base
for load combination :

Along X-X -0.3268 in at 10.510ft above base
for load combination : +D+L+H

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.424	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.009	PASS	0.00 ft
+D+L+H	0.833	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.018	PASS	0.00 ft
+D+Lr+H	0.424	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.009	PASS	0.00 ft
+D+S+H	0.424	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.009	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.731	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.016	PASS	0.00 ft
+D+0.750L+0.750S+H	0.731	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.016	PASS	0.00 ft
+D+0.60W+H	0.424	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.009	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.731	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.016	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.731	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.016	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.191	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.005	PASS	0.00 ft
+D+0.70E+0.60H	0.424	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.009	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.731	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.016	PASS	0.00 ft
+0.60D+0.70E+H	0.191	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.005	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	X-X Axis Reaction (k) @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments (k-ft) @ Base	Mx - End Moments (k-ft) @ Top	My - End Moments @ Base	My - End Moments @ Top
+D+H	67.277	0.922	0.922						
+D+L+H	131.687	1.817	1.817						

DESCRIPTION: Column C9

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
+D+Lr+H	67.277	0.922	0.922						
+D+S+H	67.277	0.922	0.922						
+D+0.750Lr+0.750L+H	115.584	1.593	1.593						
+D+0.750L+0.750S+H	115.584	1.593	1.593						
+D+0.60W+H	67.277	0.922	0.922						
+D+0.750Lr+0.750L+0.450W+H	115.584	1.593	1.593						
+D+0.750L+0.750S+0.450W+H	115.584	1.593	1.593						
+0.60D+0.60W+0.60H	40.366	0.553	0.553						
+D+0.70E+0.60H	67.277	0.922	0.922						
+D+0.750L+0.750S+0.5250E+H	115.584	1.593	1.593						
+0.60D+0.70E+H	40.366	0.553	0.553						
D Only	67.277	0.922	0.922						
Lr Only									
L Only	64.410	0.895	0.895						
S Only									
W Only									
E Only									
H Only									

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments k-ft @ Base	@ Top	My - End Moments @ Base	@ Top
Axial @ Base	Maximum	131.687	1.817	1.817						
"	Minimum									
Reaction, X-X Axis Base	Maximum	131.687	1.817	1.817						
"	Minimum									
Reaction, Y-Y Axis Base	Maximum	67.277	0.922	0.922						
"	Minimum	67.277	0.922	0.922						
Reaction, X-X Axis Top	Maximum	131.687	1.817	1.817						
"	Minimum									
Reaction, Y-Y Axis Top	Maximum	64.410	0.895	0.895						
"	Minimum	67.277	0.922	0.922						
Moment, X-X Axis Base	Maximum	67.277		0.922						
"	Minimum	67.277		0.922						
Moment, Y-Y Axis Base	Maximum	67.277	0.922	0.922						
"	Minimum	67.277	0.922	0.922						
Moment, X-X Axis Top	Maximum	67.277	0.922	0.922						
"	Minimum	67.277	0.922	0.922						
Moment, Y-Y Axis Top	Maximum	67.277	0.922	0.922						
"	Minimum	67.277	0.922	0.922						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	-0.1659	in	10.510	ft	0.000	in	0.000	ft
+D+L+H	-0.3268	in	10.510	ft	0.000	in	0.000	ft
+D+Lr+H	-0.1659	in	10.510	ft	0.000	in	0.000	ft
+D+S+H	-0.1659	in	10.510	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	-0.2866	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	-0.2866	in	10.510	ft	0.000	in	0.000	ft
+D+0.60W+H	-0.1659	in	10.510	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+0.450W+H	-0.2866	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.450W+H	-0.2866	in	10.510	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	-0.0995	in	10.510	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	-0.1659	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	-0.2866	in	10.510	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	-0.0995	in	10.510	ft	0.000	in	0.000	ft
D Only	-0.1659	in	10.510	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	-0.1609	in	10.510	ft	0.000	in	0.000	ft

Steel Column

DESCRIPTION: Column C9

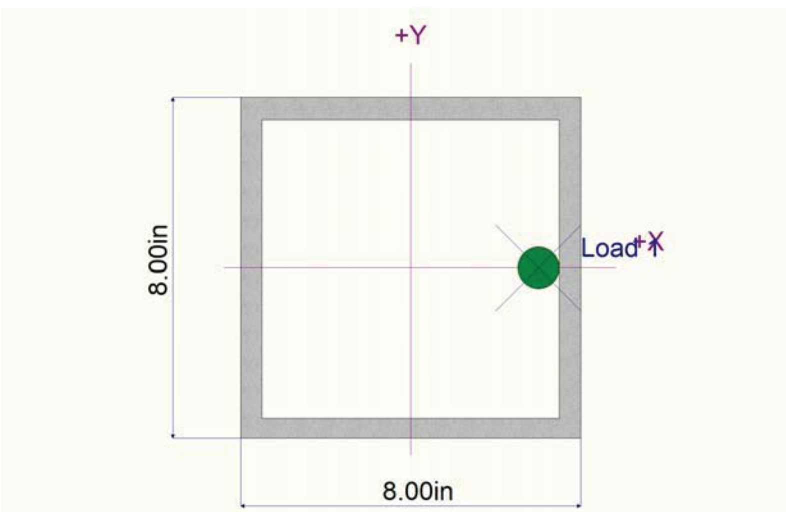
Maximum Deflections for Load Combinations

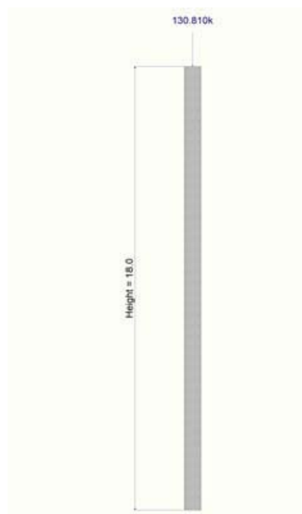
Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

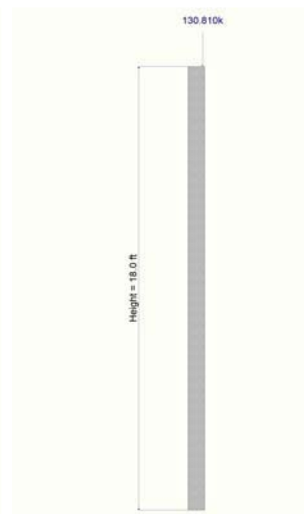
Steel Section Properties : HSS8x8x1/2

Depth	=	8.000 in	I xx	=	125.00	in^4	J	=	204.000	in^4
Design Thick	=	0.465 in	S xx	=	31.20	in^3				
Width	=	8.000 in	R xx	=	3.040	in				
Wall Thick	=	0.500 in	Zx	=	37.500	in^3				
Area	=	13.500 in^2	I yy	=	125.000	in^4	C	=	52.400	in^3
Weight	=	48.721 plf	S yy	=	31.200	in^3				
			R yy	=	3.040	in				
Ycg	=	0.000 in								

Sketches







Steel Column

DESCRIPTION: Column C11

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Steel Section Name : **HSS8x8x1/2**
Analysis Method : Allowable Strength
Steel Stress Grade
Fy : Steel Yield 46.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 18.0 ft
Top & Bottom Fixity Top & Bottom Pinned
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for buckling ABOUT Y-Y Axis = 18.0 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for buckling ABOUT X-X Axis = 18.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 876.97 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 18.0 ft, Xecc = 3.0 in, D = 61.20, L = 81.90 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9107** : 1
Load Combination +D+L+H
Location of max.above base 17.879 ft
At maximum location values are . . .
Pa : Axial 143.977 k
Pn / Omega : Allowable 264.782 k
Ma-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 86.078 k-ft
Ma-y : Applied -35.535 k-ft
Mn-y / Omega : Allowable 86.078 k-ft

PASS Maximum Shear Stress Ratio = **0.01958** : 1
Load Combination +D+L+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Va : Applied 1.988 k
Vn / Omega : Allowable 101.519 k

Maximum Load Reactions . .
Top along X-X 1.988 k
Bottom along X-X 1.988 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum Load Deflections . . .
Along Y-Y 0.0 in at 0.0ft above base
for load combination :
Along X-X -0.3575 in at 10.510ft above base
for load combination : +D+L+H

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.391	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.008	PASS	0.00 ft
+D+L+H	0.911	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.020	PASS	0.00 ft
+D+Lr+H	0.391	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.008	PASS	0.00 ft
+D+S+H	0.391	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.008	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.781	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.017	PASS	0.00 ft
+D+0.750L+0.750S+H	0.781	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.017	PASS	0.00 ft
+D+0.60W+H	0.391	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.008	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.781	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.017	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.781	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.017	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.176	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.005	PASS	0.00 ft
+D+0.70E+0.60H	0.391	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.008	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.781	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.017	PASS	0.00 ft
+0.60D+0.70E+H	0.176	PASS	17.88 ft	1.00	1.66	71.05	71.05	0.005	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction (k) @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments (k-ft) @ Base	@ Top	My - End Moments @ Base	@ Top
+D+H	62.077	0.850	0.850						
+D+L+H	143.977	1.988	1.988						

DESCRIPTION: Column C11

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	k @ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base	k-ft @ Top	My - End Moments @ Base	@ Top
+D+Lr+H	62.077	0.850	0.850						
+D+S+H	62.077	0.850	0.850						
+D+0.750Lr+0.750L+H	123.502	1.703	1.703						
+D+0.750L+0.750S+H	123.502	1.703	1.703						
+D+0.60W+H	62.077	0.850	0.850						
+D+0.750Lr+0.750L+0.450W+H	123.502	1.703	1.703						
+D+0.750L+0.750S+0.450W+H	123.502	1.703	1.703						
+0.60D+0.60W+0.60H	37.246	0.510	0.510						
+D+0.70E+0.60H	62.077	0.850	0.850						
+D+0.750L+0.750S+0.5250E+H	123.502	1.703	1.703						
+0.60D+0.70E+H	37.246	0.510	0.510						
D Only	62.077	0.850	0.850						
Lr Only									
L Only	81.900	1.138	1.138						
S Only									
W Only									
E Only									
H Only									

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	k @ Top	Y-Y Axis Reaction @ Base	@ Top	Mx - End Moments @ Base	k-ft @ Top	My - End Moments @ Base	@ Top
Axial @ Base	Maximum	143.977	1.988	1.988						
"	Minimum									
Reaction, X-X Axis Base	Maximum	143.977	1.988	1.988						
"	Minimum									
Reaction, Y-Y Axis Base	Maximum	62.077	0.850	0.850						
"	Minimum	62.077	0.850	0.850						
Reaction, X-X Axis Top	Maximum	143.977	1.988	1.988						
"	Minimum									
Reaction, Y-Y Axis Top	Maximum	81.900	1.138	1.138						
"	Minimum	62.077	0.850	0.850						
Moment, X-X Axis Base	Maximum	62.077		0.850						
"	Minimum	62.077		0.850						
Moment, Y-Y Axis Base	Maximum	62.077	0.850	0.850						
"	Minimum	62.077	0.850	0.850						
Moment, X-X Axis Top	Maximum	62.077	0.850	0.850						
"	Minimum	62.077	0.850	0.850						
Moment, Y-Y Axis Top	Maximum	62.077	0.850	0.850						
"	Minimum	62.077	0.850	0.850						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	-0.1529	in	10.510	ft	0.000	in	0.000	ft
+D+L+H	-0.3575	in	10.510	ft	0.000	in	0.000	ft
+D+Lr+H	-0.1529	in	10.510	ft	0.000	in	0.000	ft
+D+S+H	-0.1529	in	10.510	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+H	-0.3064	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+H	-0.3064	in	10.510	ft	0.000	in	0.000	ft
+D+0.60W+H	-0.1529	in	10.510	ft	0.000	in	0.000	ft
+D+0.750Lr+0.750L+0.450W+H	-0.3064	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.450W+H	-0.3064	in	10.510	ft	0.000	in	0.000	ft
+0.60D+0.60W+0.60H	-0.0917	in	10.510	ft	0.000	in	0.000	ft
+D+0.70E+0.60H	-0.1529	in	10.510	ft	0.000	in	0.000	ft
+D+0.750L+0.750S+0.5250E+H	-0.3064	in	10.510	ft	0.000	in	0.000	ft
+0.60D+0.70E+H	-0.0917	in	10.510	ft	0.000	in	0.000	ft
D Only	-0.1529	in	10.510	ft	0.000	in	0.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	-0.2046	in	10.510	ft	0.000	in	0.000	ft

Steel Column

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Lic. # : KW-06002046

BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Column C11

Maximum Deflections for Load Combinations

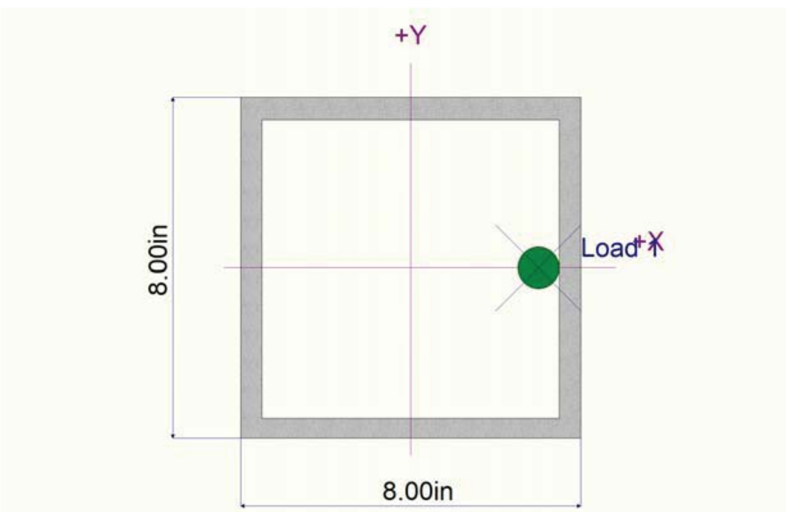
Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

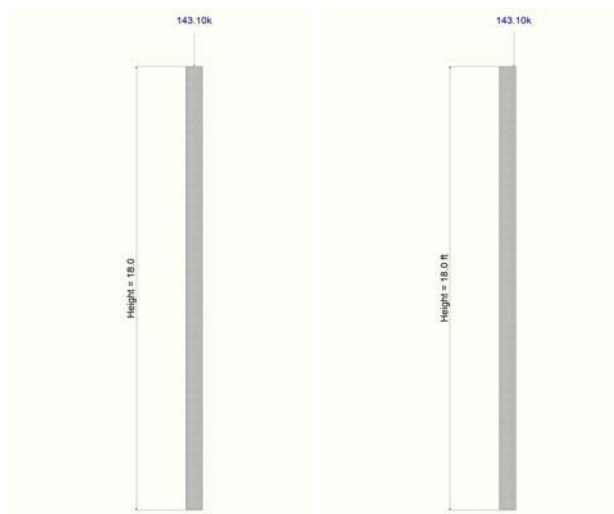
Steel Section Properties : HSS8x8x1/2

Depth	=	8.000	in	I xx	=	125.00	in^4	J	=	204.000	in^4
Design Thick	=	0.465	in	S xx	=	31.20	in^3				
Width	=	8.000	in	R xx	=	3.040	in				
Wall Thick	=	0.500	in	Zx	=	37.500	in^3				
Area	=	13.500	in^2	I yy	=	125.000	in^4	C	=	52.400	in^3
Weight	=	48.721	plf	S yy	=	31.200	in^3				
				R yy	=	3.040	in				

Ycg	=	0.000	in

Sketches





Gravity Column Design

RAM Steel 17.00.01.09
DataBase: 218029
Building Code: IBC

03/27/20 14:13:09
Steel Code: AISC 360-10 LRFD

Story level Floor, Column Line 4-E, Column C12

Fy (ksi)	= 46.00		Column Size	= HSS8X8X5/8
Orientation (deg.)	= 0.0			

INPUT DESIGN PARAMETERS:

		X-Axis	Y-Axis
Lu (ft)		18.00	18.00
K		1	1
Braced Against Joint Translation		Yes	Yes
Column Eccentricity (in)	Top	6.50	6.50
	Bottom	0.00	0.00

CONTROLLING AXIAL COLUMN LOADS - Skip-Load Case 1:

	Dead	Live	Roof
Axial (kip)	85.14	99.85	0.00

DEMAND CAPACITY RATIO: (1.2DL + 1.6LL)

Pu (kip)	=	261.92	0.90Pnx (kip)	=	477.24	Pu/0.90Pnx	=	0.549
			0.90Pny (kip)	=	477.24	Pu/0.90Pny	=	0.549
			0.90Pn (kip)	=	477.24	Pu/0.90Pn	=	0.549

CONTROLLING COMBINED COLUMN LOADS - Skip-Load Case 17:

			Dead	Live	Roof
Axial (kip)			85.14	62.00	0.00
Moments	Top	Mx (kip-ft)	3.56	24.13	0.00
		My (kip-ft)	-10.86	-9.45	0.00
	Bot	Mx (kip-ft)	0.00	0.00	0.00
		My (kip-ft)	0.00	0.00	0.00

Single curvature about X-Axis
Single curvature about Y-Axis

CALCULATED PARAMETERS: (1.2DL + 1.6LL)

Pu (kip)	=	201.36	0.90*Pn (kip)	=	477.24
Mux (kip-ft)	=	42.88	0.90*Mnx (kip-ft)	=	154.22
Muy (kip-ft)	=	-28.15	0.90*Mny (kip-ft)	=	154.22
Rm	=	1.00			
Cbx	=	1.67	Cby	=	1.67
Cmx	=	0.60	Cmy	=	0.60
Pex (kip)	=	895.66	Pey (kip)	=	895.66
B1x	=	1.00	B1y	=	1.00

INTERACTION EQUATION

Pu/0.90*Pn = 0.422

Eq H1-1a: 0.422 + 0.247 + 0.162 = 0.831

FOOTINGS

$q_{all} = 3000\,psf$

FOOTING @ C1

$P_{MAX} = 36 + 30.6 + 6.9 = 73.5^k$

$A_{REQ} = 73.5/3 = 24.5\ ft^2 \Rightarrow$ USE 6' SQ FTG

FOOTING @ C2

$P_{MAX} = 26.8 + 29.6 = 56.4$

$A_{REQ} = 56.4/3 = 18.8\ ft^2 \Rightarrow$ USE 5' SQ FTG

FOOTING @ C3

$P_{MAX} = 11 + 14.11 + 1.94 = 27^k$ + RAM REACTION $= 41.81^k = 69^k$

$A_{REQ} = 9\ ft^2 \Rightarrow$ USE 5' SQ FTG

FOOTING @ C4

$P_{TL} = 9.7^k$ REQUIRES 3.2 sf $\Rightarrow$ OVERHANG COLUMN 8" MIN ALL SIDES

FOOTING @ C5

$P_{TL} = 32.7 + 53.71 = 86.4^k \Rightarrow$ ~~SEE~~ WORST CASE MAS. COLUMN

$A_{REQ} = 28.8\ ft^2 \Rightarrow$ USE 6' SQ FTG

FOOTING @ C7

$P_{TL} = 50.5 + 6.9 + 43.2 = 100.6^K$

$A_{REQ} = 100.6/3 = 33.5\ ft^2 \Rightarrow$ USE 6' SQ FTG

FOOTING @ C8

$P_{TL} = 60.1 + 60.8 = 121^K$

$A_{REQ} = 121/3 = 40.33 ft^2 \Rightarrow$ USE 7' SQ FTG

FOOTING @ C9

$P_{TL} = 66.4 + 64.4 = 131^K$

$A_{REQ} = 131/3 = 43.6\ ft^2 \Rightarrow$ USE 7' SQ FTG

FOOTING @ C11

$P_{TL} = 61.2 + 81.9 = 143.1$

$A_{REQ} = 143.1/3 = 47.7\ ft^2 \Rightarrow$ USE 7'-6" SQ FTG

FOOTING @ C12

$P_{TL} = 85.14 + 61.62 = 147^K$

$A_{REQ} = 147/3 = 49\ ft^2 \Rightarrow$ USE 7'-6" SQ FTG

MASONRY BEARING WALL

$H = 18'$

$w_D = 90psf(27/2) = 1215plf$

$w_L = 60psf(27/2) = 810plf$

$P_w = 25psf$

$S_{DS}(I) = .422(1.25) = .53$

PUT INTO PROGRAM

$\boxed{\text{USE 8" MASONRY WALL w/ \#5 VERTS @ 24" O.C.}}$

Masonry Slender Wall

DESCRIPTION: Typical Bearing Wall

Code References

Calculations per TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Calculations per TMS 402-16, IBC 2018, CBC 2019, ASCE 7-16

Construction Type : Grouted Hollow Concrete Masonry

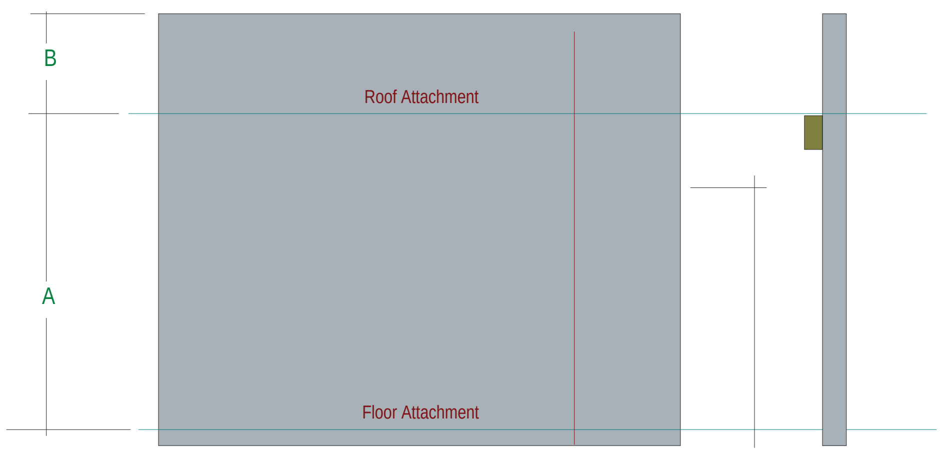
F'm	=	1.50 ksi	Nom. Wall Thickness	8 in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	7.625 in	Min Allow Out-of-plane Defl Ratio	=	0.0
Fr - Rupture	=	61.0 psi	Rebar "d" distance	3.750 in			
Em = f'm *	=	900.0	Lower Level Rebar . . .		Minimum Vertical Steel %	=	0.0020
Max % of ρ bal.	=	0.1208	Bar Size #	5			
Grout Density	=	140 pcf	Bar Spacing	24 in			
Block Weight		Normal Weight					
Wall Weight	=	61.0 psf					

Wall is grouted at rebar cells only

One-Story Wall Dimensions

A Clear Height = 18 ft
B Parapet height = ft

Wall Support Condition Top & Bottom Pinned



Vertical Loads

Vertical Uniform Loads . . . *(Applied per foot of Strip Width)*

	Eccentricity	DL : Dead	Lr : Roof Live	Lf : Floor Live	S : Snow	W : Wind	
Ledger Load	6.750 in	.810		1.215			k/ft
Concentric Load							k/ft

Lateral Loads

Wind Loads :
Full area WIND load 25 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : ASCE seismic factors entered

SDS Value per ASCE 12.11.1 S_{DS} * I = .53

Fp = Wall Wt. * 0.2120 = 12.932 psf

Masonry Slender Wall

DESCRIPTION: Typical Bearing Wall

DESIGN SUMMARY

Results reported for "Strip Width" of 12.0 in

	Governing Load Combination . . .	Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check +1.20D+0.50Lr+L+W+1.60H	Maximum Bending Stress Ratio =	**0.7517**		
		Max Mu	2.186 k-ft	Phi * Mn	2.907 k-ft
PASS	Service Deflection Check +D+0.750Lr+0.750L+0.450W+H	Actual Defl. Ratio L/	202	Allowable Defl. Ratio	150.0
		Max. Deflection	1.070 in		
PASS	Axial Load Check +1.20D+0.50Lr+L+W+1.60H	Max Pu / Ag	44.20 psi	Max. Allow. Defl.	1.440 in
		Location	10.50 ft	0.2 * f'm	300.0 psi
PASS	Reinforcing Limit Check	Actual As/bd	0.003333	Max Allow As/bd	0.1208

Maximum Reactions . . .	*for Load Combination....*	
Top Horizontal	W Only	0.2250 k
Base Horizontal	W Only	0.2250 k
Vertical Reaction	+D+L+H	3.123 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Axial Load 0.2*f'm*b*t k	Mcr k-ft	Mu k-ft	Phi	Phi Mn k-ft	As in^2	As Ratio	0.6 * rho bal
+1.40D+1.60H at 17.40 to 18.00	1.185	18.720	0.47	0.64	0.90	2.55	0.155	0.0033	0.1207
+1.20D+0.50Lr+1.60L+1.60H at 17.40 to 18.	2.961	18.720	0.47	1.64	0.90	2.96	0.155	0.0033	0.1200
+1.20D+1.60L+0.50S+1.60H at 17.40 to 18.0	2.961	18.720	0.47	1.64	0.90	2.96	0.155	0.0033	0.1200
+1.20D+1.60Lr+L+1.60H at 17.40 to 18.00	2.232	18.720	0.47	1.23	0.90	2.80	0.155	0.0033	0.1203
+1.20D+1.60Lr+0.50W+1.60H at 10.80 to 11.	1.499	18.720	0.47	0.89	0.90	2.62	0.155	0.0033	0.1205
+1.20D+L+1.60S+1.60H at 17.40 to 18.00	2.232	18.720	0.47	1.23	0.90	2.80	0.155	0.0033	0.1203
+1.20D+1.60S+0.50W+1.60H at 10.80 to 11.4	1.499	18.720	0.47	0.89	0.90	2.62	0.155	0.0033	0.1205
+1.20D+0.50Lr+L+W+1.60H at 10.20 to 10.80	2.758	18.720	0.47	2.19	0.90	2.92	0.155	0.0033	0.1201
+1.20D+L+0.50S+W+1.60H at 10.20 to 10.80	2.758	18.720	0.47	2.19	0.90	2.92	0.155	0.0033	0.1201
+0.90D+W+1.60H at 9.60 to 10.20	1.190	18.720	0.47	1.35	0.90	2.55	0.155	0.0033	0.1207
+1.20D+L+0.20S+E+1.60H at 12.00 to 12.60	2.626	18.720	0.47	1.57	0.90	2.89	0.155	0.0033	0.1201
+0.90D+E+0.90H at 10.20 to 10.80	1.157	18.720	0.47	0.79	0.90	2.54	0.155	0.0033	0.1207

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values Mcr k-ft	Moment Values Mactual k-ft	Stiffness I gross in^4	Stiffness I cracked in^4	Stiffness I effective in^4	Deflections Deflection in	Deflections Defl. Ratio
+D+H at 10.20 to 10.80	1.286	0.47	0.27	353.60	33.91	353.600	0.035	6,231.3
+D+L+H at 10.80 to 11.40	2.464	0.47	0.80	353.60	36.69	38.902	0.497	434.3
+D+Lr+H at 10.20 to 10.80	1.286	0.47	0.27	353.60	33.91	353.600	0.035	6,231.3
+D+S+H at 10.20 to 10.80	1.286	0.47	0.27	353.60	33.91	353.600	0.035	6,231.3
+D+0.750Lr+0.750L+H at 11.40 to 12.00	2.124	0.47	0.68	353.60	35.90	40.043	0.320	674.1
+D+0.750L+0.750S+H at 11.40 to 12.00	2.124	0.47	0.68	353.60	35.90	40.043	0.320	674.1
+D+0.60W+H at 9.60 to 10.20	1.322	0.47	0.93	353.60	34.00	35.192	0.728	296.7
+D+0.750Lr+0.750L+0.450W+H at 9.60 to 10.	2.234	0.47	1.18	353.60	36.16	36.708	1.070	201.8
+D+0.750L+0.750S+0.450W+H at 9.60 to 10.2	2.234	0.47	1.18	353.60	36.16	36.708	1.070	201.8
+0.60D+0.60W+0.60H at 9.00 to 9.60	0.815	0.47	0.78	353.60	32.77	34.986	0.511	422.7
+D+0.70E+0.60H at 10.20 to 10.80	1.286	0.47	0.65	353.60	33.91	38.752	0.307	704.0
+D+0.750L+0.750S+0.5250E+H at 10.20 to 10	2.197	0.47	0.97	353.60	36.07	37.161	0.755	286.1
+0.60D+0.70E+H at 9.60 to 10.20	0.793	0.47	0.52	353.60	32.71	51.083	0.109	1,972.9
D Only at 10.20 to 10.80	1.286	0.47	0.27	353.60	33.91	353.600	0.035	6,231.3
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Masonry Slender Wall

Lic. # : KW-06002046 BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: Typical Bearing Wall

L Only at 12.00 to 12.60	1.215	0.47	0.48	353.60	33.74	112.129	0.091	2,374.9
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0
W Only at 9.00 to 9.60	0.000	0.47	1.01	353.60	30.73	31.546	0.886	243.9
E Only at 9.00 to 9.60	0.000	0.47	0.52	353.60	30.73	47.428	0.107	2,022.1

Masonry Slender Wall

DESCRIPTION: Typical Bearing Wall

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values Mcr k-ft	Moment Values Mactual k-ft	Stiffness I gross in^4	Stiffness I cracked in^4	Stiffness I effective in^4	Deflections Deflection in	Deflections Defl. Ratio
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
+D+H	0.0 k	0.03 k	1.908 k
+D+L+H	0.1 k	0.06 k	3.123 k
+D+Lr+H	0.0 k	0.03 k	1.908 k
+D+S+H	0.0 k	0.03 k	1.908 k
+D+0.750Lr+0.750L+H	0.1 k	0.05 k	2.819 k
+D+0.750L+0.750S+H	0.1 k	0.05 k	2.819 k
+D+0.60W+H	0.2 k	0.11 k	1.908 k
+D+0.750Lr+0.750L+0.450W+H	0.2 k	0.05 k	2.819 k
+D+0.750L+0.750S+0.450W+H	0.2 k	0.05 k	2.819 k
+0.60D+0.60W+0.60H	0.1 k	0.12 k	1.145 k
+D+0.70E+0.60H	0.1 k	0.06 k	1.908 k
+D+0.750L+0.750S+0.5250E+H	0.1 k	0.01 k	2.819 k
+0.60D+0.70E+H	0.1 k	0.07 k	1.145 k
D Only	0.0 k	0.03 k	1.908 k
Lr Only	0.0 k	0.00 k	0.000 k
L Only	0.0 k	0.04 k	1.215 k
S Only	0.0 k	0.00 k	0.000 k
W Only	0.2 k	0.22 k	0.000 k
E Only	0.1 k	0.12 k	0.000 k
H Only	0.0 k	0.00 k	0.000 k

LATERAL ANALYSIS

SEISMIC

$S_S = .487$ $S_1 = .165$

SITE CLASS C

$S_{DS} = .422$ $S_{D1} = .165$

SEISMIC DESIGN CAT C

SPECIAL REINFORCED MASONRY
SHEAR WALLS

$R = 5.0$

$C_S = S_{DS}/(R/I) = .422/(5/1.25) = 0.106$

ROOF WT = 15psf

$W_{E(LONG)} = 15(154')(0.106) = 245\,plf$ ASD $W_E = 172\,plf$

$W_{E(SHORT)} = 15(65)(0.106) = 103\,plf$ ASD $W_E = 72\,plf$

FLOOR WT = 30psf

$W_{E(LONG)} = 30(140)(0.106) = 445\,plf$ ASD $W_E = 312\,plf$

$W_{E(SHORT)} = 30(65)(.106) = 207\,plf$ ASD $W_E = 145\,plf$

TOTAL

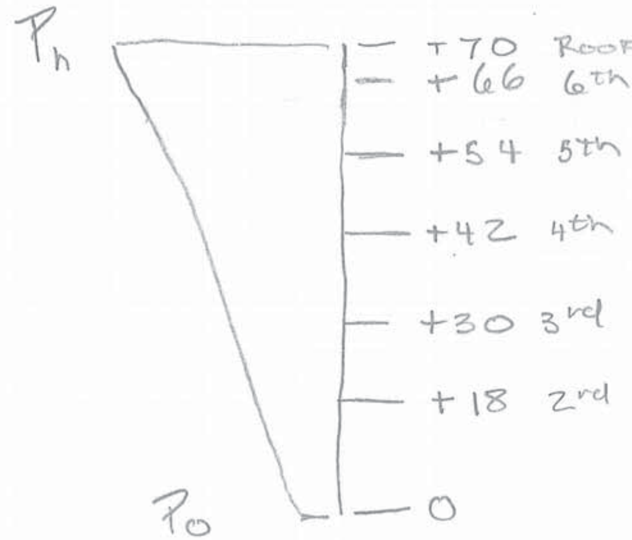
$\left.\begin{aligned} W_{E(LONG)} &= 172 + 312(3) = 1108\,plf \\ W_{E(SHORT)} &= 72 + 145(3) = 507\,plf \end{aligned}\right\}$ ASD

WIND LOADING

$H_T = 70'$

$P_0 = 20.6$
$P_h = 26.3$ } EXP B

PER TABLE 27.5-1



Wind Loading:

		ASD:
Ph=	26.3	15.78
Po=	20.6	12.36

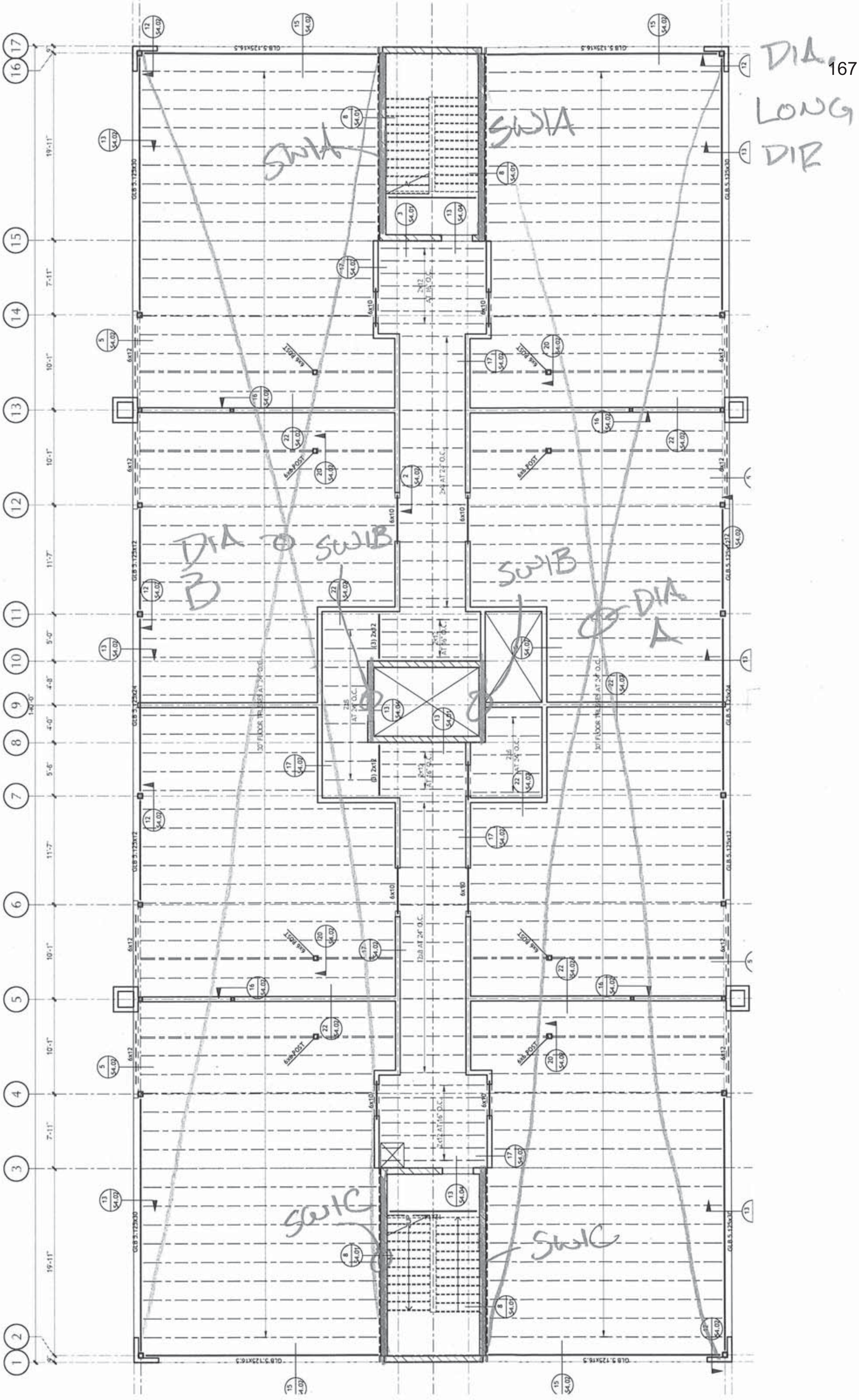
Level	H	w at floor level	Trib Width	Ww
Parapet	70	15.78	N/A	
Roof	66	15.58	6	118
5th	54	15.00	12	180
4th	42	14.41	12	173
3rd	30	13.83	12	166
2nd	18	13.24	15	199
1st	0	12.36	9	111

TOTAL

$w_w = 166 + 173 + 180 + 118 = 637\ \text{plf}$

WIND GOVERNS SHORT DIR
SEISMIC GOVERNS LONG DIR

WOOD BLDG ONLY


DIA LONG DIR
SW1A
SW1A
DIA B
SW1B
SW1B
DIA A
SW1C
SW1C

LONG DIR

VERTICAL DISTRIBUTION

FLOOR	AREA	w	W	H	W×H	C_{vx}	V
ROOF	10,010	15	150.2	48	7210	0.27	19.4^K
5th	9100	30	273	36	9828	.366	28^K
4th	9100	30	273	24	6552	.244	17.5^K
3rd	9100	30	273	12	3276	.122	8.8^K
			969.2^K		26866		

$C_s W = 0.106(.7)(969.2)$
$= 71.9^K$

ROOF DIA A

DIA. CANT OUT 26.67'

$w_R = 19400/65 = 298\,plf$

$V_A = 298(26.67) = 7960^\#$

$v_A = 7960/154 = 52\,plf$

USE ½" SHEATHING W/ 8d @ 6" O.C. EDGES UNBLOCKED

$v_{all} = 360/2.0 = 180\,plf$

DIA B

$V_B = 298(11.67/2) = 1739^\#$

USE TYP SHEATHING BY COMP TO DIA A.

LONG. DIR CONTINUED

5th FL

$W_{5th} = 28000/65 = 431\ plf$

DIA A

$V_A = 431(26.67) = 11495^{\#}$

$v_A = 11495/140 = 82.1\ plf$ ⇒

TYP SHEATHING

$\boxed{\text{USE 3/4" MIN SHEATHING W/ 10d @ 6" OC EDGES UNBLOCKED}}$

$v_{all} = 480/2 = 240\ plf$

DIA B

$V_B = 431(11.67/2) = 2514^{\#}$ ⇒ USE TYP SHEATHING

$\boxed{\text{TYP SHEATHING IS ADEQUATE FOR 4th \& 3rd BY COMPARISON DIAPH, LOADS GENERATED FOR SHEAR WALL CALC}}$

4th

$W_{4th} = 17500/65 = 269\ plf$

$V_{A_4} = 269(26.67) = 7173^{\#}$ $\quad V_{B_4} = 269(11.67/2) = 1570^{\#}$

3rd

$W_3 = 8800/65 = 135\ plf$

$V_{A_3} = 135(26.67) = 3600^{\#}$ $\quad V_{B_3} = 135(11.67/2) = 788^{\#}$

LONG DIR CONTINUED

SHEAR WALLS

PIER	L	H	H/L	R_c	%F
A	20.67	12	0.58	5.168	36.2
B	8.67	12	.723	3.948	27.6
C	20.67	12	0.58	5.168	36.2
				14.284	

PIERS A & C

$F_R = (V_A + V_B)(.362) = (7960 + 1739)(.362) = 3511^{\#}$

$F_{5th} = (11495 + 2514)(.362) = 5071^{\#}$

$F_{4th} = (7173 + 1570)(.362) = 3165^{\#}$

$F_{3rd} = (3600 + 788)(.362) = 1588^{\#}$

$V_{TL} = 3511 + 5071 + 3165 + 1588 = 13335^{\#}$

$v = 13335 / 7.63(20.67)(12) = \underline{7.05\text{ psi}} \Rightarrow \text{OK}$

$M_{OT} = 3511(48) + 5071(36) + 3165(24) + 1588(12) = 446.1^{k'}$

$W_R = 50\text{psf}(48') + 30\text{psf}(26/2)(3) + 15\text{psf}(26/2) = 3765\text{plf}$

$M_R = 3765(20.67)^2/2 = 804^{k'}$

$.6M_R = 483^{k'} > 446^{k'} \Rightarrow$ NO UPLIFT

LONG DIR CONTINUED

SW PIER B

$F_R = (7960 + 1739)(.276) = 2677^{\#}$
$F_5 = (11495 + 2514)(.276) = 3866^{\#}$
$F_4 = (7173 + 1570)(.276) = 2413^{\#}$
$F_3 = (3600 + 788)(.276) = 1211^{\#}$

$V_{TL} = 2677 + 3866 + 2413 + 1211 = 10167^{\#}$

$v = 10167 / 7.63(8.67)(12) = \underline{12.8 \text{ psi}} \Rightarrow OK$

$M_{OT} = 2677(48) + 3866(36) + 2413(24) + 1211(12) = 340^{k'}$

$w_R = 50\text{psf}(48') + 30\text{psf}(6'/2)(3) = 2670 \text{ plf}$

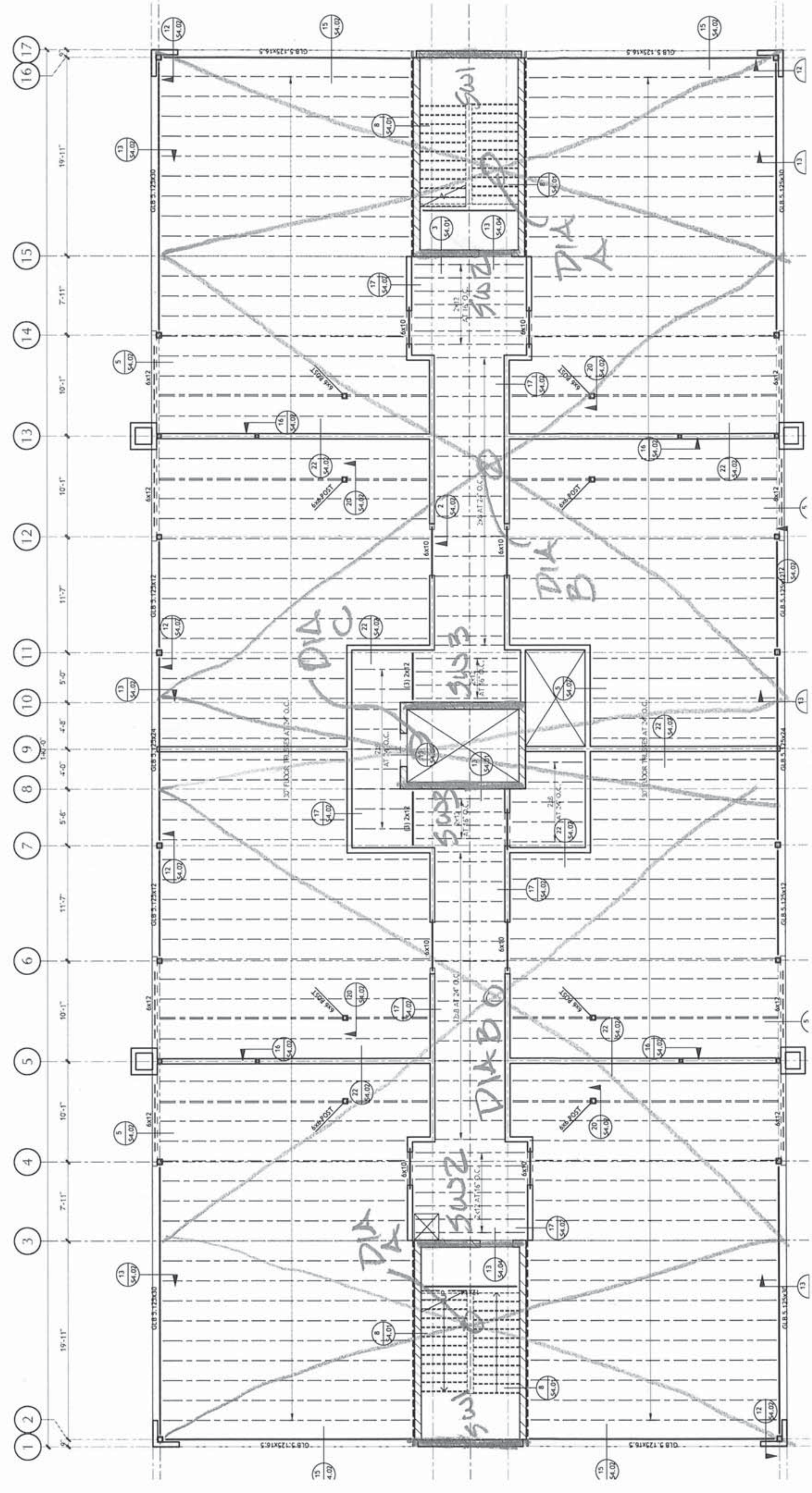
$M_R = 2670(8.67)^2/2 = 100.35^{k'}$

$U = [340 - .6(100.35)] / 8.67(.8) = 46.1^{k}$

$A_{S\,REQ} = 46.1 / 60(.6) = 1.28 \text{ in}^2$

$\boxed{\text{USE (2) \#5 @ (3) CELLS AT CORNER}}$

$A_s = .31(6) = 1.86 \text{ in}^2$



DIA. SHORT DIR

SHORT DIR DIA

ROOF:

DIA A ROOF

$V_{A_R} = 118(20.67)/2 = 1220\#$

$v_A = 1220/65 = 18.76\ plf \Rightarrow$ USE TYP SHEATHING

DIA B

$V_{B_R} = 118(46/2) = 2714\#$

$v_B = 2714/65 = 42plf \Rightarrow$ USE TYP SHEATHING THROUGHOUT BY COMPARISON

DIA C

$V_{C_R} = 118(8')/2 = 472\#$

5th

$V_{A_5} = 180(20.67/2) = 1860\#$ $V_{B_5} = 180(46/2) = 4140\#$

$V_{C_5} = 180(8/2) = 720\#$

4th

$V_{A_4} = 173(20.67/2) = 1788\#$ $V_{B_4} = 173(46/2) = 3979\#$ $V_{C_4} = 173(8/2) = 692\#$

3rd

$V_{A_3} = 166(20.67/2) = 1716\#$ $V_{B_3} = 166(46/2) = 3818$ $V_{C_3} = 166(8/2) = 664\#$

SHORT DIR CONTINUED

SHEAR WALLS

SW1

$F = V_A = 1220 + 1860 + 1788 + 1716 = 6584^{\#}$
ROOF 5th 4th 3rd

$v = 6584 / 11.33'(12)(7.63) = 6.3\,psi \Rightarrow$ OK

$M_{OT} = 1220(48) + 1860(36) + 1788(24) + 1716(12) = 196^{k'}$

$w_R = 50(48) = 2400\,plf$

GRABS 5' OF RETURN WALL EACH SIDE

$P_{RES} = 3765\,plf(5') = 18.8^k$

$M_R = 2400(11.33)^2/2 + 18.8(11.33) = 154.3^{k'}$

$U = [196 - .6(154.3)] / 11.33(.7) = 13^K$

$A_{SR} = 13 / .6(60) = .36 \Rightarrow$ $\boxed{\text{TYP (2) \#5 IS ADEQUATE}}$

SW2

$F = V_A + V_B$

	ROOF	5th	4th	3rd
V_A	1220	1860	1788	1716
V_B	2714	4140	3979	3818
	3934 +	6000 +	5767	+ 5534 = 21235

$v = 21235 / 8'(7.62)(12) = 29.02$

SW2 CONTINUED

RELY ON SHEAR REINFORCING ONLY

$A_{S_V\,REQ} = 21.23^k / .5(60) = .708\ in^2$

USE (2) #5 @ 32" O.C.

$F_{VS} = 0.5\left(\frac{.62(60{,}000)(6.67\times12)}{6.67\times12\times7.63\,(32)}\right) = 76\ psi \Rightarrow OK$

$M_{OT} = 3934(48) + 6000(36) + 5767(24) + 5534(12) = 610^{k'}$

$M_R = 154.3^{k'}$

$V = (610 - .6(154)) / 11.33(18) = 57.1^K$

$A_{SR} = 57.1 / .6(60) = 1.58\ in^2$

$\boxed{\text{USE (2) \#5 IN (3) CORNER CELLS}}$

$A_S = .31(6) = 1.86\ in^2$

SW3

$F = V_B + V_C$

	ROOF	5th	4th	3rd
V_B	2714	4140	3979	3818
V_C	472	720	692	664
	3186 +	4860 +	4671 +	4482 = 17200#

$v = 17200 / 12.67(12)(7.63) = 14.83\ psi \Rightarrow OK$

$M_{OT} = 3186(48) + 4860(36) + 4671(24) + 4482(12) = 494^{k'}$

$W_R = 50psf(48) = 2400$

GRABS 3½' OF RETURN WALL

$P_{RES} = 2400(3.5) = 8160^{\#}$

$M_R = 2400(11.33)^2/2 + 8160(11.33) = 247^{k'}$

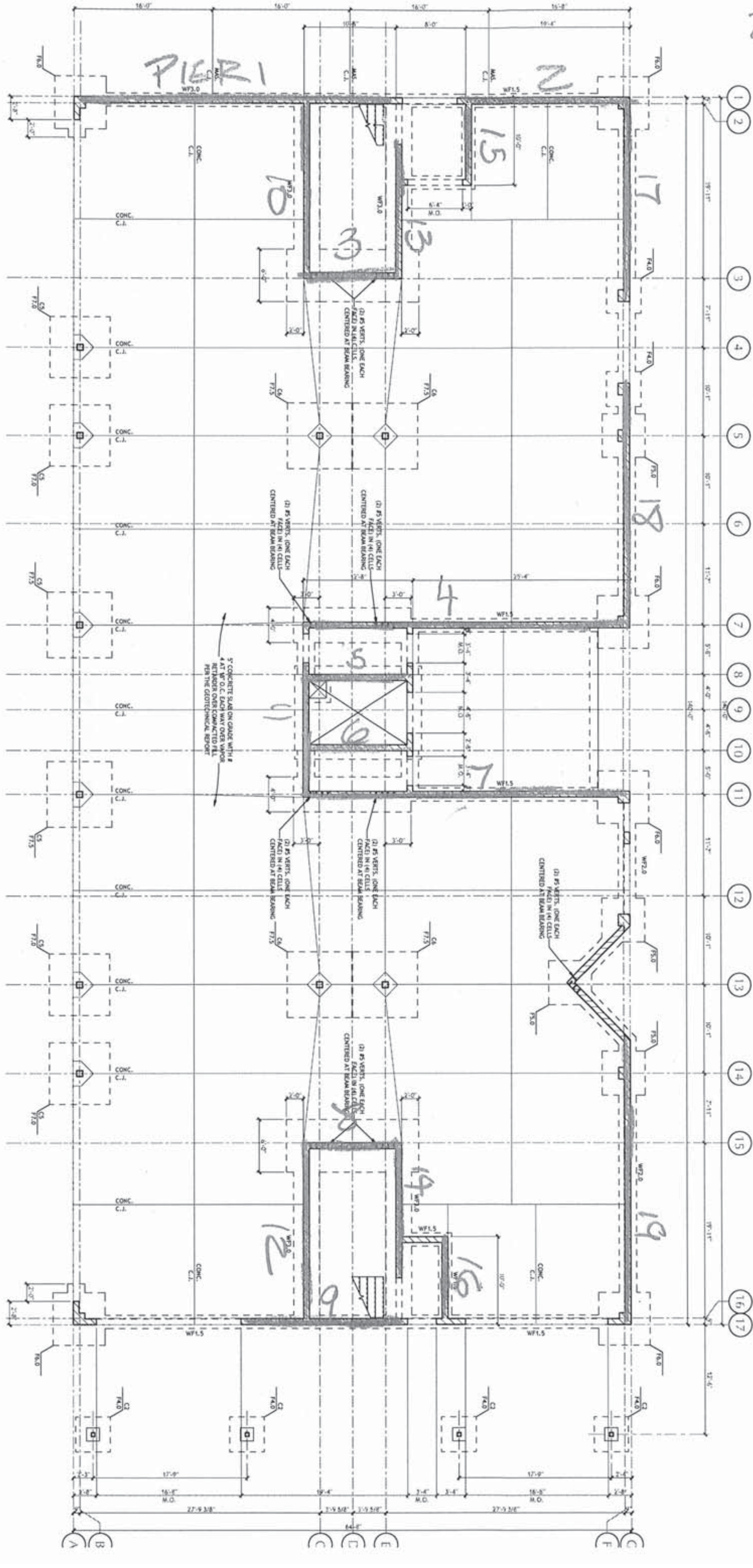
$V = [494 - .6(247)] / 11.33(.8) = 38.14^K$

$A_{SR} = 38 / .6(60) = 1.06\ in^2$

$\boxed{\text{USE (2) \#5 IN (3) CELLS AT CORNER}}$

$A_S = 1.86\ in^2$

2nd FL
SWS


PIER 1
WF3.0
WF1.5
WF2.0
CONC.
C.J.
(2) #5 VERTS. (ONE EACH FACE) IN (4) CELLS CENTERED AT BEAM BEARING
M.O.
A
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17

2nd FLOOR LATERAL

SEISMIC GOVERNS LONG DIR BY COMPARISON TO STRUCT ABOVE

CHECK SHORT DIR

$W_{ESH} = 90psf(65')(0.106) = 620$

$W_{ETL} = 507 + 620 = 1127plf \Rightarrow$ GOVERNS

$W_{WTL} = 637 + 199 = 836plf$ - WIND

SEISMIC GOVERNS BOTH DIR @ 2nd FLOOR

$W = 15psf(154(65)) + 30psf(140)(65)(3) + 90psf((140)(65))$

$= 1788.2^K$

$V_E = 1788.2(.106)(.7) = 132.7^K$

SEE RIGID DIA ANALYSIS

Barker Structural
5960 S. Las Vegas Blvd Ste 300
Las Vegas, NV 89118
P: 702.310.8000
F: 702.310.8001

Torsional Analysis of Rigid Diaphragm

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Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: 2nd Floor Rigid Diaphragm

General Information

IBC 2018, CBC 2019, ASCE 7-16

Applied Lateral Force	132.70 k
.....Additional Orthogonal Force	k
Maximum Load Used for Analysis :	132.70 k

Note: This load is the vector resolved from the above two entries and will be applied to the system of elements at angular increments.

Load Orientation Angular Increment	15.0 deg
Load Location Angular Increment	15.0 deg

Center of Rigidity Location (calculated) . . .

"X" dist. from Datum	52.915 ft
"Y" dist. from Datum	49.511 ft

Center of Shear Application :

Distance from "X" datum point	70.0 ft
Distance from "Y" datum point	32.50 ft

Accidental Torsion values per ASCE 7-05 12.8.4.2

Ecc. as % of Maximum Dimension	5.00 %

Maximum Dimensions :

Along "X" Axis	140.0 ft
Along "Y" Axis	65.0 ft

Accidental Eccentricity +/- from "X" Coord. of Load Application :	7.0 ft
Accidental Eccentricity +/- from "Y" Coord. of Load Application :	3.250 ft

Wall Information

Label	Wall Deflections (Stiffness) for 1.0 kip load: Along Wall "y" Dir	Along Wall "x" Dir	X Wall C.G. Location	Y Wall C.G. Location	Wall Angle CCW	Wall Fixity	Length	Height	Thickness	E - Bending	E - Shear
Pier 1	8.8428E-005 in	4.9827E+003 in	0 ft	14 ft	90 deg	Fix-Fix	38 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 10	2.2357E-004 in	9.1617E+003 in	10.33 ft	27 ft	0 deg	Fix-Fix	20.667 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 11	3.9683E-004 in	1.2351E+004 in	72.33 ft	27 ft	0 deg	Fix-Fix	15.33 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 12	2.2351E-004 in	9.1603E+003 in	129.5 ft	27 ft	0 deg	Fix-Fix	20.67 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 13	3.9683E-004 in	1.2351E+004 in	13 ft	37.67 ft	0 deg	Fix-Fix	15.33 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 14	3.9683E-004 in	1.2351E+004 in	127.67 ft	37.67 ft	0 deg	Fix-Fix	15.33 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 15	1.0474E-003 in	1.8934E+004 in	5 ft	45.67 ft	0 deg	Fix-Fix	10 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 16	1.0474E-003 in	1.8934E+004 in	135 ft	45.67 ft	0 deg	Fix-Fix	10 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi

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Torsional Analysis of Rigid Diaphragm

DESCRIPTION: 2nd Floor Rigid Diaphragm

Wall Information

Label	Wall Deflections (Stiffness) for 1.0 kip load: Along Wall "y" Dir	Along Wall "x" Dir	X Wall C.G. Location	Y Wall C.G. Location	Wall Angle CCW	Wall Fixity	Length	Height	Thickness	E - Bending	E - Shear
Pier 17	1.8154E-004 in	8.1159E+003 in	11.67 ft	64.33 ft	0 deg	Fix-Fix	23.33 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 18	1.3592E-004 in	6.7623E+003 in	46.5 ft	64.33 ft	0 deg	Fix-Fix	28 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 19	1.1018E-004 in	5.8566E+003 in	124 ft	64.33 ft	0 deg	Fix-Fix	32.33 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 2	2.3709E-004 in	9.4672E+003 in	0 ft	54 ft	90 deg	Fix-Fix	20 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 3	7.7540E-004 in	1.6712E+004 in	20 ft	32.33 ft	90 deg	Fix-Fix	11.33 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 4	8.8428E-005 in	4.9827E+003 in	60 ft	45.67 ft	90 deg	Fix-Fix	38 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 5	5.9924E-004 in	1.4944E+004 in	66 ft	33 ft	90 deg	Fix-Fix	12.67 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 6	5.9924E-004 in	1.4944E+004 in	74 ft	33 ft	90 deg	Fix-Fix	12.67 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 7	8.8428E-005 in	4.9827E+003 in	79.33 ft	45.67 ft	90 deg	Fix-Fix	38 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 8	7.7540E-004 in	1.6712E+004 in	119.33 ft	32.33 ft	90 deg	Fix-Fix	11.33 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi
Pier 9	2.5228E-004 in	9.7954E+003 in	139.33 ft	29 ft	90 deg	Fix-Fix	19.33 ft	18 ft	7.63 in	1 Mpsi	1 Mpsi

ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

	Max Shear along Member Local "y-y" Axis				Max Shear along Member Local "x-x" Axis			
Resisting Element	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)
Pier 1	90	-10.08	-17.01	31.248	0	-10.08	-17.01	0.000

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Torsional Analysis of Rigid Diaphragm

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Lic. # : KW-06002046
BARKER DROTTAR ASSOCIATES LLC

DESCRIPTION: 2nd Floor Rigid Diaphragm

ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

	Max Shear along Member Local "y-y" Axis				Max Shear along Member Local "x-x" Axis			
Resisting Element	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)
Pier 10	195	-20.58	-19.83	17.444	90	-10.08	-17.01	0.000
Pier 11	195	-20.58	-19.83	9.828	90	-10.08	-17.01	0.000
Pier 12	195	-20.58	-19.83	17.449	90	-10.08	-17.01	0.000
Pier 13	0	-17.08	-20.26	9.080	90	-10.08	-17.01	0.000
Pier 14	0	-17.08	-20.26	9.080	90	-10.08	-17.01	0.000
Pier 15	0	-17.08	-20.26	3.237	90	-10.08	-17.01	0.000
Pier 16	0	-17.08	-20.26	3.237	90	-10.08	-17.01	0.000
Pier 17	0	-10.08	-17.01	18.113	90	-10.08	-17.01	0.000
Pier 18	0	-10.08	-17.01	24.191	90	-10.08	-17.01	0.000
Pier 19	0	-10.08	-17.01	29.842	90	-10.08	-17.01	0.000
Pier 2	90	-10.08	-17.01	11.655	0	-10.08	-17.01	0.000
Pier 3	90	-10.08	-17.01	3.564	0	-10.08	-17.01	0.000
Pier 4	90	-24.08	-17.01	33.783	0	-10.08	-17.01	0.000
Pier 5	90	-24.08	-17.01	5.302	0	-10.08	-17.01	0.000
Pier 6	75	-24.08	-17.01	5.733	0	-10.08	-17.01	0.000
Pier 7	75	-24.08	-17.01	41.040	0	-10.08	-17.01	0.000
Pier 8	255	-24.08	-17.01	6.555	0	-10.08	-17.01	0.000
Pier 9	255	-24.08	-17.01	23.030	0	-10.08	-17.01	0.000

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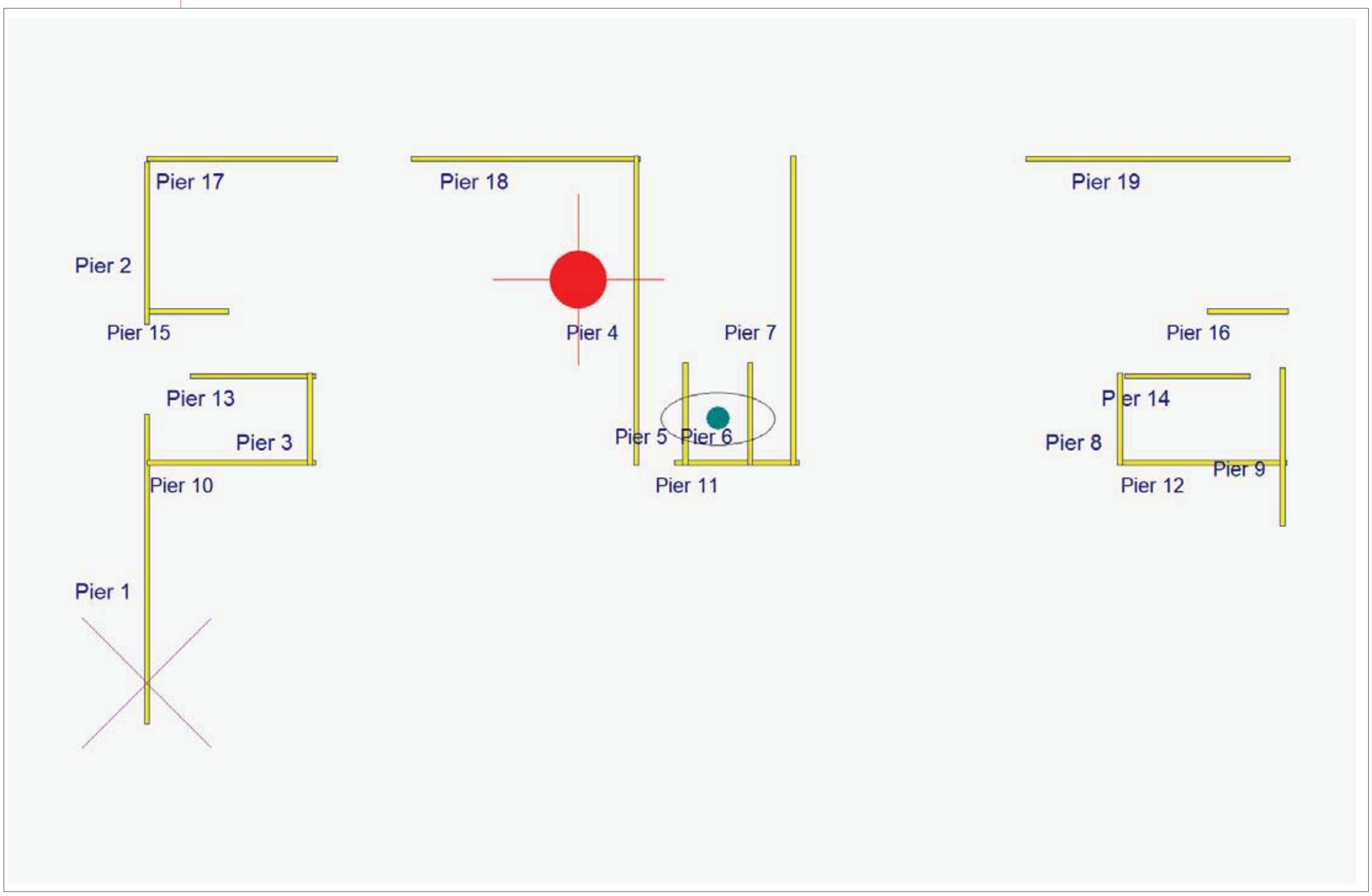
Torsional Analysis of Rigid Diaphragm

DESCRIPTION: 2nd Floor Rigid Diaphragm

Layout of Resisting Elements

Legend : Defined Wall   X Datum
Center of Rigidity   Center of Mass   Accidental eccentricity application boundary



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Torsional Analysis of Rigid Diaphragm

DESCRIPTION: 2nd Floor Rigid Diaphragm

Analysis Notes

This program is designed to distribute an applied shear load to a set of resisting elements.

Each resisting element data entry specifies a deflection along a "major" and "minor" axis due to a 1,000 lb load. Each resisting element may be entered as a wall or a column (whereby the deflection is calculated), or as a generic resisting element with specified deflection. The deflections define the stiffness of each resisting element.

Each resisting element is defined at an (X,Y) location from a datum the user has previously defined. A counter-clockwise rotation of the element can be entered with respect to a traditional "+X" axis line.

A main "shear" load and an optional orthogonal shear load are specified for distribution to the system of resisting elements. In addition the maximum orthogonal dimensions of the structure and minimum accidental eccentricity percentage are specified.

From the entered loads the program calculates resultant force vectors for each angular orientation that is requested. The force is applied to the resisting elements in angular increments to generate a series of resulting direct and torsional shear loads on each element. This application of force is then repeated at angular intervals along an elliptical path defined by the minimum accidental eccentricity.

The end result is a table of direct shear and torsional shear values for each element from the iterated angles of load application and accidental eccentricity. These values are then searched to find the maximum major and minor axis shears applied to each resisting element.

PIERS 10 & 12

$V = 17.45^K$

$v = 17450 / 20.67(12)(7.63) = 9.22 \Rightarrow OK$

$M_{OT} = 17.45(18) = 314.1^{K'}$

$w_R = 50(18) + 90(26/2) = 2070\ plf$

$M_R = 2070(20.67)^2/2 = 442^{K'}$

$U = [314.1 - 442(.6)] / 20.67 = 2.37^K$

TYP REINF. IS ADEQUATE

PIER 11

$V = 9.828$

$v = 9828 / 15.33(12)(7.63) = 7\ psi \Rightarrow OK$

$M_{OT} = 9.83(18) = 177^{K'}$

$w_R = 2070\ plf$

$M_R = 2070(15.33)^2/2 = 243^{K'}$

$U = (177 - 243(.6)) / 15.33 = 2.0^K$

TYP REINF IS ADEQUATE

PIERS 13 & 14

$V = 9.08^K$ $L = 15.33$ ⇒ OK BY COMPARISON TO PIER 11

PIER 9

$V = 23.03^K$

$v = 23030 / 19.33(12)(7.63) = 13.01 \text{ psi}$ ⇒ OK

$M_{OT} = 23.03(18) = 414.5^{K'}$

$W_R = 60(18) = 1080 \text{ plf}$

$M_R = 1080(19.33)^2/2 = 201.7^K$

$U = [414.5 - .6(201.7)] / 19.33 = 15.2^K$

$A_{SR} = 15.2 / .6(60) = .42 \text{ in}^2$ ← TYP (2) #5 ARE ADEQUATE

REMAINING PIERS ADEQUATE BY COMPARISON

PIER 7

$V = 41.04^K$

$v = 41040 / 38(12)(7.63) = 11.8 \text{ psi}$ ⇒ OK

$M_{OT} = 41.04(18) = 739^{K'}$

$W_R = 60 \text{psf}(18) = 1080 \text{ plf}$

$M_R = 1080(38)^2/2 = 780^{K'}$

$U = [739 - .6(780)] / 38 = 7.13^K$ ← TYP (2) #5 ARE ADEQUATE