Structural Calculations

For

Timberlyne

Dan McEntee
Project Number: MGR0524
~~150 Steamboat BLV.~~ Now Assigned 200 Sundance CT for Rushmore
202 Sundance Ct for Steamboat
Steamboat Springs, CO 80487

August 27th, 2024

FRAME ENGINEERING

Frame Engineering, LLC
2500 W. 49th Street, Suite 224
Sioux Falls, SD 57105
(605) 220-2447

SealPact 2024-08-28 10:59:54 EST
Click seal or scan QR Code for
verification; otherwise not valid.

CITY OF STEAMBOAT SPRINGS, COLORADO
ORDINANCE NO. _____

AN ORDINANCE ADOPTING THE INTERNATIONAL BUILDING CODE, 2021 EDITION, INCLUDING APPENDIX CHAPTERS C, E, AND J; INTERNATIONAL RESIDENTIAL CODE, 2021 EDITION INCLUDING APPENDIX CHAPTERS B, C, E, F, & Q; INTERNATIONAL EXISTING BUILDING CODE, 2021 EDITION; NATIONAL ELECTRICAL CODE as Adopted by the State of Colorado Electrical Board; INTERNATIONAL MECHANICAL CODE, 2021 EDITION; INTERNATIONAL ENERGY CONSERVATION CODE, 2021 EDITION; INTERNATIONAL PLUMBING CODE, 2021 EDITION; INTERNATIONAL FUEL GAS CODE, 2021 EDITION: INTERNATIONAL PROPERTY MAINTENANCE CODE 2021 EDITION, INTERNATIONAL WILDLAND URBAN INTERFACE CODE 2021 EDITION, STATE OF COLORADO MODEL ELECTRIC AND SOLAR READY CODE; REGULATING THE ERECTION, CONSTRUCTION, ENLARGEMENT, ALTERATION, REPAIR, MOVING, REMOVAL, DEMOLITION, CONVERSION, OCCUPANCY, EQUIPMENT, USE, HEIGHT, AREA AND MAINTENANCE OF BUILDINGS OR STRUCTURES, AND BUILDING SERVICE EQUIPMENT; REPEALING ALL CONFLICTING ORDINANCES; PROVIDING FOR SEVERABILITY; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the City of Steamboat Springs has previously adopted the International Family of Codes and all related technical codes; and

WHEREAS, the City Council finds that it is necessary to amend certain portions of these previously adopted codes in order to more efficiently and effectively implement these codes in the City; and

WHEREAS, the City Council finds that the fees required in Chapter 5, Article I, Section 5-25 of the City's Revised Municipal Code and set by the Building Official and the City Manager are reasonable and necessary to cover the expected normal costs of plan review and inspection associated with the permits in question; and

WHEREAS, the Routt County Regional Building Department Oversight Committee has reviewed and recommended adoption of the updated codes; and

WHEREAS, the Building Official has reviewed the new codes and recommends their adoption; and

WHEREAS, the City Council wishes to adopt current building codes and amend such codes as deemed necessary in the interest of public health, welfare, and safety.

Table R301.2(1) CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA, is amended as follows:

- Ground Snow Load – Case Study Area view the Routt County Regional Building Department website for Ground Snow values for your specific site. https://routtgis.maps.arcgis.com/apps/webappviewer/index.html?id=df84ded7ab1b4de39a9f68dd7d05a3a0

- Climate Zone 7
- Wind Speed – 115 MPH (ultimate design wind speed)
- Topographic Effects – No
- Seismic Design Category – C for all One Family or Two Family Dwellings, and Townhomes under the IRC.
- Subject to Damage by Weathering – Severe
- Subject to Damage by Frost line Depth – 48 inches (1220mm)
- Subject to Damage by Termite – None to slight
- Subject to Damage by Decay – None to slight
- Winter Design:
    - Outdoor Winter Design Dry-Bulb Temperature – -15ºF (-26ºC)
    - Indoor Winter Design Dry-Bulb Temperature: 70° F (21° C)
    - Coincident Wet Bulb: 56° F (13° C)
    - Heating temperature Difference: 85° F (29° C)
- Summer Design:
    - Outdoor Summer Design Dry-Bulb Temperature: 85° F (29° C)
    - Indoor Summer Design Dry-Bulb Temperature: 75° F (24° C)
    - Design Grains: Varies based on weather data Range: -35 to -55
    - Cooling Temperature Difference: 10° F (-12° C)
- Elevation: Varies Elevation by address can be found at: https://elevation.maplogs.com/poi/routt_county_co_usa.12879.html
- Altitude Correction: Varies
    - 7,000’ 0.77
    - 8,000’ 0.75
    - 9,000’ 0.72
    - 10,000’ 0.69
    - 12,000’ 0.63
- Latitude : 40° North
- Ice Shield Underlayment Required – Yes per IRC Section R905.1.2 Ice Barriers
- Flood Hazards – FIRM, February 4, 2005
- Air Freezing Index – Steamboat 2239
- Mean Annual Temperature – 40-45ºF (4.5-7.2ºC)
- Ground Snow Load Values are governed by Routt County Regional Building Department based on geographic location. Please visit our home page and click on Ground Snow Load Values for site-specific information.

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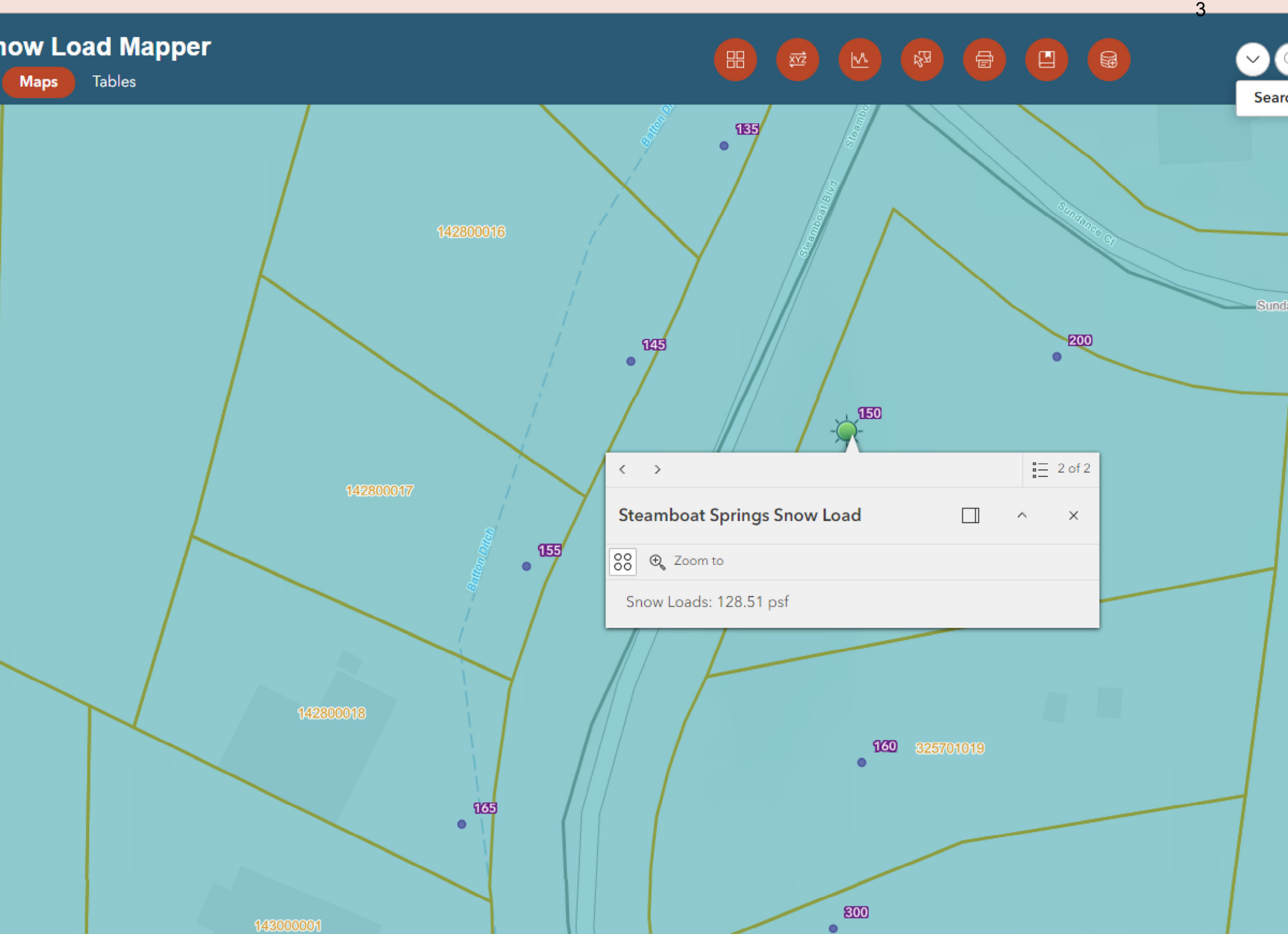
Catalog: Wood Con... Adobe Acrobat



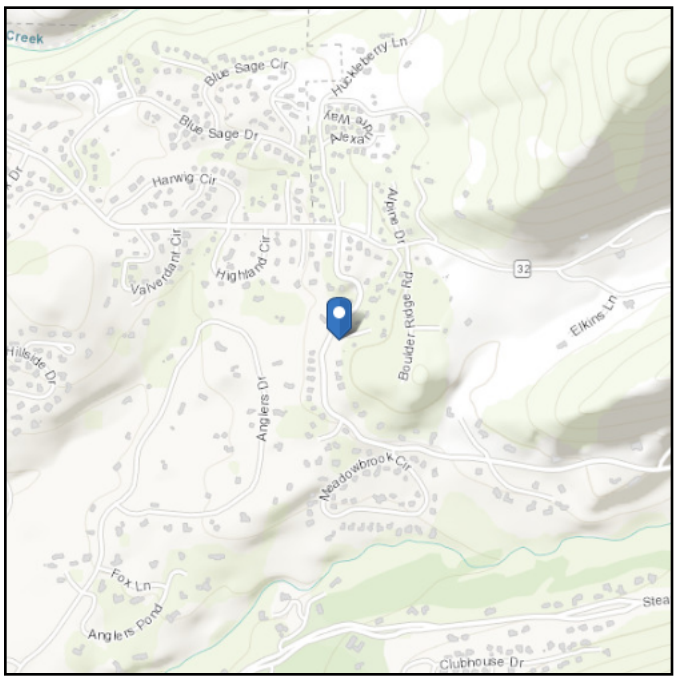
ASCE Hazards Report

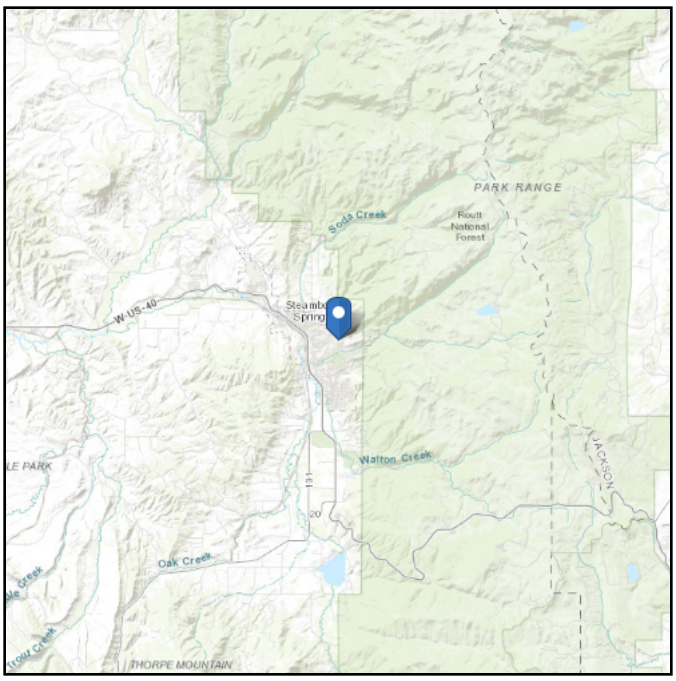
Address:
~~150 Steamboat Blvd~~
Steamboat Springs, Colorado 80487

200 & 202 Sundance CT

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Latitude: 40.478219
Longitude: -106.804772
Elevation: 7168.269349246816 ft (NAVD 88)





Wind

Results:

Wind Speed	106 Vmph
10-year MRI	76 Vmph
25-year MRI	83 Vmph
50-year MRI	88 Vmph
100-year MRI	92 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Tue Aug 20 2024

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

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

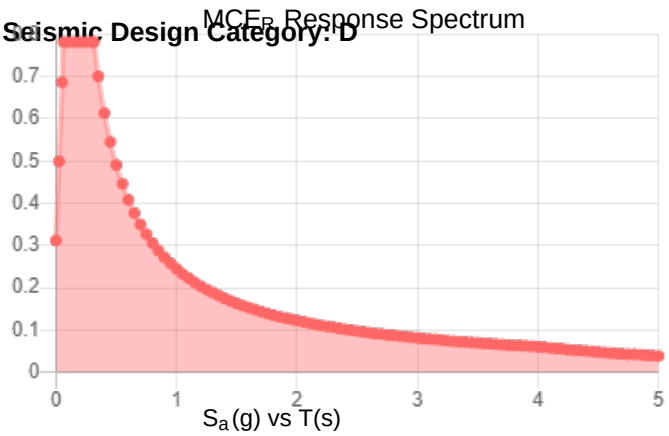
Seismic

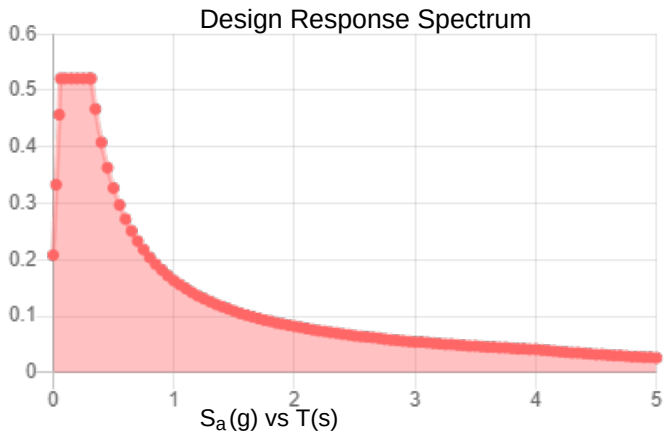
Site Soil Class: D - Default (see Section 11.4.3)

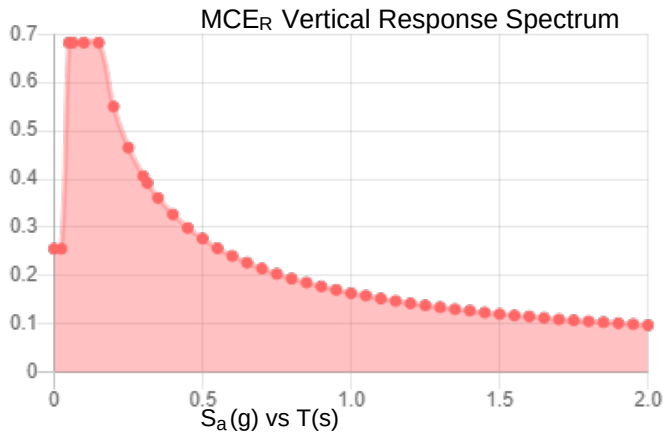
Results:

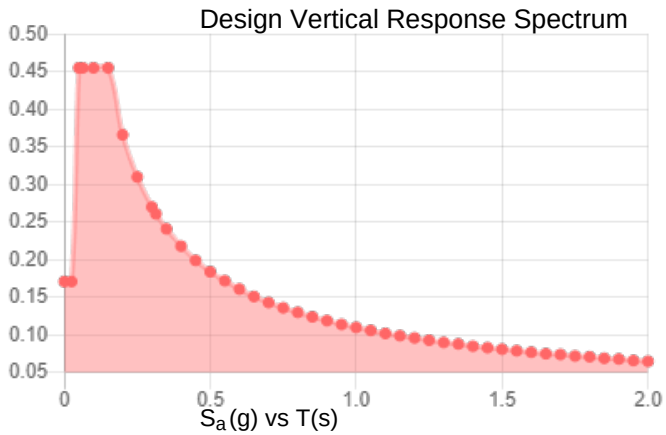
S_S :	0.587	S_{D1} :	0.163
S_1 :	0.102	T_L :	4
F_a :	1.33	PGA :	0.411
F_v :	2.395	PGA_M :	0.493
S_{MS} :	0.781	F_{PGA} :	1.2
S_{M1} :	0.245	I_e :	1
S_{DS} :	0.521	C_v :	1.092

Seismic Design Category: D









Data Accessed: Tue Aug 20 2024

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Snow

Results:

Mapped Elevation:

Data Source:

Date Accessed: Tue Aug 20 2024

In "Case Study" areas, site-specific case studies are required to establish ground snow loads. Extreme local variations in ground snow loads in these areas preclude mapping at this scale.

Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2 percent annual probability of being exceeded (50-year mean recurrence interval).

Statutory requirements of the Authority Having Jurisdiction are not included.

Site is outside ASCE/SEI 7-16, Table 7.2-2 boundaries. For ground snow loads in this area, see SEAC Snow Load Committee. (2016). Colorado Design Snow Loads. Structural Engineers Association of Colorado.

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

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FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Rushmore	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Building Code:	2021	International Residential Code	
Roof Dead Load:	20	PSF	
Ground Snow Load:	130	PSF	
Roof Snow/Live Load:	101	PSF	= 130 psf x 0.7 x 1.1
Floor Dead Load:	10	PSF	
Floor Live Load:	40	PSF	
Deck Live Load:	60	PSF	
Wind Speed (Basic):	115	MPH	
Building Enclosure:	Fully Enclosed		
Exposure:	C		
Seismic Design Category:	C		
Importance Category:	II		

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Rushmore	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Drifting on Lower Roofs:

Drift Weight:

$$\gamma = 0.13p_g + 14\ (Not\ to\ exceed\ 30\ psf)$$
$$\gamma = 0.13 * 130 + 14$$
$$\gamma = 30psf$$

Drift Height (lean-to):

$$h_d = \left(0.43\sqrt[3]{l_u}\sqrt[4]{p_g + 10}\right) - 1.5$$
$$h_d = \left(0.43\sqrt[3]{39}\sqrt[4]{130 + 10}\right) - 1.5$$
$$h_d = 3.5\ ft$$

Drift Load (lean-to):

$$p_d = h_d * \gamma$$
$$p_d = 3.5ft * 30psf$$
$$p_d = 105psf$$

Drift Width (lean-to):

$$w = 4 * h_d$$
$$w = 4 * 3.5ft$$
$$w = 14\ ft$$

Sliding Snow:

$$S = 0.4p_f W/15'$$
$$S = 0.4 * 101psf\ *39'/15'$$
$$S = 105\ \text{psf}$$

MecaWind v2478

Calculations Prepared by:
Date: Aug 20, 2024
File Location: Current Project Not Saved

General:

Wind Load Standard	=	ASCE 7-16	Basic Wind Speed	=	115.0 mph
Exposure Classification	=	C	Risk Category	=	II
Structure Type	=	Building	Design Basis for Wind Pressures	=	ASD
MWFRS Analysis Method	=	Ch 27 Pt 1	C&C Analysis Method	=	Ch 30 Pt 1
Dynamic Type of Structure	=	Rigid	Show Advanced Options	=	True
Reset Advanced Options to Default Values	=	Defaults	Simple Diaphragm Building	=	False
Show Base Reactions in Output	=	None	Altitude above Sea Level	=	0.000 ft
Base Elevation Of Structure	=	0.000 ft	MWFRS Pressure Elevations	=	Mean Ht
Topographic Effects	=	None	Override Directionality Factor K_d	=	False
Override the Gust Factor G	=	False	Override Minimum Pressure	=	False

Building:

Roof	=	Roof Type	= Monoslope	Encl	=	Enclosure Classification	= Enclosed
Help	=	Help on Building Roof Type	= Help	Pitch	=	Pitch of Roof	= 3.0 :12
θ	=	Slope of Roof	= 14.04 Deg	R_{Ht}	=	Ridge Height	= 22.502 ft
E_{Ht}	=	Eave Height	= 14.000 ft	W	=	Building Width	= 34.000 ft
L	=	Building Length	= 56.000 ft	OH	=	Type of Overhang	= All Overhang
Par	=	Parapet	= None	HT_{over}	=	Override Mean Roof Height	= False
Ht_{man}	=	Mean Roof Height	= 18.251 ft	RA_{over}	=	Override Roof Area	= False
GC_{pi_o}	=	Override GC_{pi} value	= False		=		

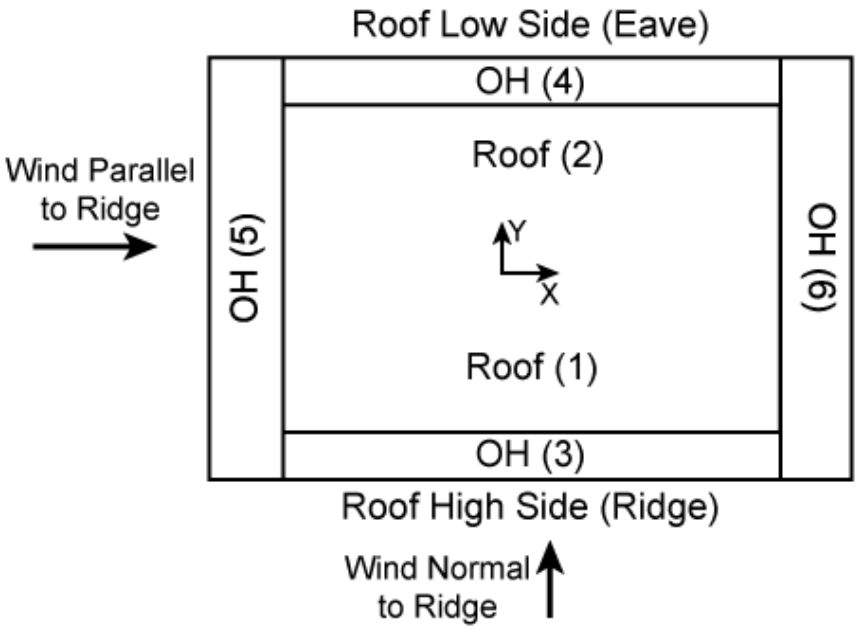
Exposure Constants [Tbl 26.11-1]:

α = 3-s Gust-speed exponent	=	9.500	Z_g = Nominal Ht of Boundary Layer	=	900.000 ft
â = Reciprocal of α	=	0.105	b = 3 sec gust speed factor	=	1.000
α_m = Mean hourly Wind-Speed Exponent	=	0.154	b_m = Mean hourly Windspeed Exponent	=	0.650
c = Turbulence Intensity Factor	=	0.200	ε = Integral Length Scale Exponent	=	0.2000

Overhang Inputs:

Std	=	Overhangs on all sides are the same	=	True
OHType	=	Type of Roof Wall Intersections	=	Overhang
OH	=	Overhang of Roof Beyond Wall	=	2.000 ft

Main Wind Force Resisting System (MWFRS) Wind Calculations per Ch 27 Pt1



h	=	Mean structure height	=	18.251 ft
h_{grade}	=	Elevation from Grade to Top of Structure	=	18.251 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	=	0.885
K_{zt}	=	No Topographic feature specified	=	1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	=	0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	=	+0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	=	-0.18
LF	=	Load Factor based upon ASD Design	=	0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	=	1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	15.28 psf
RA	=	Roof Area	=	2350.20 ft^2
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	15.28 psf
q_{in}	=	Negative Internal Pressure: $q_h \cdot LF$	=	15.28 psf
q_{ip}	=	Positive Internal Pressure: $q_h \cdot LF$	=	15.28 psf

MWFRS Wind Loads [Normal to Ridge]

h	=	Mean Roof Height Of Building	=	18.251 ft
RHt	=	Ridge Height Of Roof	=	22.502 ft
B	=	Horizontal Dimension Of Building Normal To Wind Direction	=	56.000 ft
L	=	Horizontal Dimension Of building Parallel To Wind Direction	=	34.000 ft
L/B	=	Ratio Of L/B used For Cp determination	=	0.607
h/L	=	Ratio Of h/L used For Cp determination	=	0.537
Slope	=	Slope Of Roof	=	14.04 Deg

Gust Factor Calculation for Wind: [Normal to Ridge]

Gust Factor Category I Rigid Structures - Simplified Method

G_1	=	Simplified: For Rigid Structures can use 0.85	=	0.85

Gust Factor Category II Rigid Structures - Complete Analysis

Z_m	=	Equiv Struc Height: Max(0.6•h, Z_{min})	=	15.000 ft
I_{zm}	=	Turbulence Intensity: $c \cdot (33/Z_m)^{1/6}$ [Eq 26.11-1]	=	0.228
L_{zm}	=	Turbulence Integral Length Scale: $\ell \cdot (Z_m/33)^{\varepsilon}$ [Eq 26.11-9]	=	427.057 ft
B	=	Building Width Width Normal to Wind Direction	=	56.000 ft
Q	=	$[1/(1+0.63 \cdot [(B+h)/L_{zm}]^{0.63})]^{0.5}$ [Eq 26.11-8]	=	0.909
G_2	=	Detailed: $0.925 \cdot [(1+1.7 \cdot g_q \cdot I_{zm} \cdot Q)/(1+1.7 \cdot g_v \cdot I_{zm})]$ [Eq 26.11-6]	=	0.877

Gust Factor Used in Analysis

G	=	Gust Factor: Min(G_1, G_2)	=	0.850

Cp_{WW}	=	Windward Wall Coefficient (All L/B Values)	=	0.800
Cp_{LW}	=	Leeward Wall Coefficient using L/B	=	-0.500
Cp_{SW}	=	Side Wall Coefficient (All L/B values)	=	-0.700

Wind Pressures [Normal to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Elev ft	GC_{pi} Windward	GC_{pi} Leeward	q_i psf	K_z	K_{zt}	q_z psf	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
22.502	+0.18	+0.18	15.28	0.925	1.000	15.96	8.11	-9.24	-11.84	17.35	9.60
18.251	+0.18	+0.18	15.28	0.885	1.000	15.28	7.64	-9.24	-11.84	16.88	9.60
14.000	+0.18	+0.18	15.28	0.849	1.000	14.66	7.22	-9.24	-11.84	16.46	9.60
22.502	-0.18	-0.18	15.28	0.925	1.000	15.96	13.60	-3.74	-6.34	17.35	9.60
18.251	-0.18	-0.18	15.28	0.885	1.000	15.28	13.14	-3.74	-6.34	16.88	9.60
14.000	-0.18	-0.18	15.28	0.849	1.000	14.66	12.72	-3.74	-6.34	16.46	9.60

K_z = $2.01 \cdot (z_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]
GC_{pi} = Enclosed Internal Pressure Tbl 26.13-1
q_{ip} = Positive Internal Pressure: $q_h \cdot LF$
Side = $q_h \cdot G \cdot Cp_{SW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Windward = $q_z \cdot G \cdot Cp_{WW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]

K_{zt} = No Topographic feature specified
q_z = $0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]
q_{in} = Negative Internal Pressure: $q_h \cdot LF$
Leeward = $q_h \cdot G \cdot Cp_{LW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Total = Windward - Leeward

- *Minimum Pressure: § 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Roof Wind Pressures [Normal to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Component	Description	Location	Start ft	End ft	GC_{pi}	C_{pMin}	C_{pMax}	$P_{C_{pMin}}$ psf	$P_{C_{pMax}}$ psf	P_{min} psf
OH_Bot	Overhang Bottom	3	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top	3,4,5,6	All	All	+0.18	-0.509	-0.509	-9.36	-9.36	4.80
Roof	Roof Leeward	4	All	All	+0.18	-0.509	-0.509	-9.36	-9.36	4.80
OH_Bot	Overhang Bottom	3	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top	3,4,5,6	All	All	-0.18	-0.509	-0.509	-3.86	-3.86	4.80

Roof	Roof Leeward	4	All	All	-0.18	-0.509	-0.509	-3.86	-3.86	4.80

Roof Pressures based upon Ch 27 Pt1:

Component = The building component for pressures
Start = Start Dist from Windward Edge
C_{pMin} = Smallest Coefficient Magnitude
P_{CpMin} = $q_h \cdot G \cdot C_{pMin} - q_{ip} \cdot GC_{pi}$ [Eq 27.3-1]
Location = Reference Graphic in Output for Values
End = End Dist from Windward Edge
C_{pMax} = Largest Coefficient Magnitude
P_{CpMax} = $q_h \cdot G \cdot C_{pMax} - q_{in} \cdot GC_{pi}$ [Eq 27.3-1]

P_{min} = Min Press projected on vertical plane [§ 27.1.5]
- *0.800 Reduction Factor applied for h/L>=1 & 10<=Slope<=15 Deg*
- *The smaller uplift pressures due to C_{pMin} can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

MWFRS Wind Loads [Normal to Eave]

h	=	Mean Roof Height Of Building	= 18.251 ft
RHt	=	Ridge Height Of Roof	= 22.502 ft
B	=	Horizontal Dimension Of Building Normal To Wind Direction	= 56.000 ft
L	=	Horizontal Dimension Of building Parallel To Wind Direction	= 34.000 ft
L/B	=	Ratio Of L/B used For Cp determination	= 0.607
h/L	=	Ratio Of h/L used For Cp determination	= 0.537
Slope	=	Slope Of Roof	= 14.04 Deg

Gust Factor Calculation for Wind: [Normal to Eave]

Gust Factor Category I Rigid Structures - Simplified Method

G_1	=	Simplified: For Rigid Structures can use 0.85	= 0.85

Gust Factor Category II Rigid Structures - Complete Analysis

Z_m	=	Equiv Struc Height: Max(0.6•h, Z_{min})	= 15.000 ft
I_{zm}	=	Turbulence Intensity: $c \cdot (33/Z_m)^{1/6}$ [Eq 26.11-1]	= 0.228
L_{zm}	=	Turbulence Integral Length Scale: $\ell \cdot (Z_m/33)^{\varepsilon}$ [Eq 26.11-9]	= 427.057 ft
B	=	Building Width Width Normal to Wind Direction	= 56.000 ft
Q	=	$[1/(1+0.63 \cdot [(B+h)/L_{zm}]^{0.63})]^{0.5}$ [Eq 26.11-8]	= 0.909
G_2	=	Detailed: $0.925 \cdot [(1+1.7 \cdot g_q \cdot I_{zm} \cdot Q)/(1+1.7 \cdot g_v \cdot I_{zm})]$ [Eq 26.11-6]	= 0.877

Gust Factor Used in Analysis

G	=	Gust Factor: Min(G_1, G_2)	= 0.850

Cp_{WW}	=	Windward Wall Coefficient (All L/B Values)	= 0.800
Cp_{LW}	=	Leeward Wall Coefficient using L/B	= -0.500
Cp_{SW}	=	Side Wall Coefficient (All L/B values)	= -0.700

Wind Pressures [Normal to Eave]
All wind pressures include a Load Factor (LF) of 0.6

Elev ft	GC_{pi} Windward	GC_{pi} Leeward	q_i psf	K_z	K_{zt}	q_z psf	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
14.000	+0.18	+0.18	15.28	0.849	1.000	14.66	7.22	-9.24	-11.84	16.46	9.60
14.000	-0.18	-0.18	15.28	0.849	1.000	14.66	12.72	-3.74	-6.34	16.46	9.60

K_z = $2.01 \cdot (z_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]
GC_{pi} = Enclosed Internal Pressure Tbl 26.13-1
q_{ip} = Positive Internal Pressure: $q_h \cdot LF$
Side = $q_h \cdot G \cdot Cp_{SW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Windward = $q_z \cdot G \cdot Cp_{WW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
K_{zt} = No Topographic feature specified
q_z = $0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]
q_{in} = Negative Internal Pressure: $q_h \cdot LF$
Leeward = $q_h \cdot G \cdot Cp_{LW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Total = Windward - Leeward

- *Minimum Pressure: § 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Roof Wind Pressures [Normal to Eave]
All wind pressures include a Load Factor (LF) of 0.6

Component	Description	Location	Start ft	End ft	GC_{pi}	C_{pMin}	C_{pMax}	P_{CpMin} psf	P_{CpMax} psf	P_{min} psf
OH_Bot	Overhang Bottom	4	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top	4,5,6	All	All	0	-0.180	-0.762	-2.34	-9.89	4.80
Roof	Roof Windward	3	All	All	+0.18	-0.180	-0.762	-5.09	-12.64	4.80
OH_Bot	Overhang Bottom	4	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top	4,5,6	All	All	0	-0.180	-0.762	-2.34	-9.89	4.80
Roof	Roof Windward	3	All	All	-0.18	-0.180	-0.762	0.41	-7.14	4.80

Roof Pressures based upon Ch 27 Pt1:

Component = The building component for pressures
Start = Start Dist from Windward Edge
Location = Reference Graphic in Output for Values
End = End Dist from Windward Edge

C_{pMin} = Smallest Coefficient Magnitude | C_{pMax} = Largest Coefficient Magnitude

$P_{C_{pMin}}$ = $q_h \cdot G \cdot C_{pMin} - q_{ip} \cdot GC_{pi}$ [Eq 27.3-1] | $P_{C_{pMax}}$ = $q_h \cdot G \cdot C_{pMax} - q_{in} \cdot GC_{pi}$ [Eq 27.3-1]

P_{min} = Min Press projected on vertical plane [§ 27.1.5]

- 0.800 Reduction Factor applied for h/L>=1 & (0 to h/2)
- The smaller uplift pressures due to C_{pMin} can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7
- Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface

MWFRS Wind Loads [Parallel to Ridge]

h	=	Mean Roof Height Of Building	= 18.251 ft
RHt	=	Ridge Height Of Roof	= 22.502 ft
B	=	Horizontal Dimension Of Building Normal To Wind Direction	= 34.000 ft
L	=	Horizontal Dimension Of building Parallel To Wind Direction	= 56.000 ft
L/B	=	Ratio Of L/B used For Cp determination	= 1.647
h/L	=	Ratio Of h/L used For Cp determination	= 0.326
Slope	=	Slope Of Roof	= 14.04 Deg

Gust Factor Calculation for Wind: [Parallel to Ridge]

Gust Factor Category I Rigid Structures - Simplified Method

G_1	=	Simplified: For Rigid Structures can use 0.85	= 0.85

Gust Factor Category II Rigid Structures - Complete Analysis

Z_m	=	Equiv Struc Height: Max(0.6•h, Z_{min})	= 15.000 ft
I_{zm}	=	Turbulence Intensity: $c \cdot (33/Z_m)^{1/6}$ [Eq 26.11-1]	= 0.228
L_{zm}	=	Turbulence Integral Length Scale: $\ell \cdot (Z_m/33)^{\varepsilon}$ [Eq 26.11-9]	= 427.057 ft
B	=	Building Width Width Normal to Wind Direction	= 34.000 ft
Q	=	$[1/(1+0.63 \cdot [(B+h)/L_{zm}]^{0.63})]^{0.5}$ [Eq 26.11-8]	= 0.925
G_2	=	Detailed: $0.925 \cdot [(1+1.7 \cdot g_q \cdot I_{zm} \cdot Q)/(1+1.7 \cdot g_v \cdot I_{zm})]$ [Eq 26.11-6]	= 0.886

Gust Factor Used in Analysis

G	=	Gust Factor: Min(G_1, G_2)	= 0.850

Cp_{WW}	=	Windward Wall Coefficient (All L/B Values)	= 0.800
Cp_{LW}	=	Leeward Wall Coefficient using L/B	= -0.371
Cp_{SW}	=	Side Wall Coefficient (All L/B values)	= -0.700

Wind Pressures [Parallel to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Elev ft	GC_{pi} Windward	GC_{pi} Leeward	q_i psf	K_z	K_{zt}	q_z psf	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
22.502	+0.18	+0.18	15.28	0.925	1.000	15.96	8.11	-7.56	-11.84	15.67	9.60
18.251	+0.18	+0.18	15.28	0.885	1.000	15.28	7.64	-7.56	-11.84	15.20	9.60
14.000	+0.18	+0.18	15.28	0.849	1.000	14.66	7.22	-7.56	-11.84	14.78	9.60
22.502	-0.18	-0.18	15.28	0.925	1.000	15.96	13.60	-2.06	-6.34	15.67	9.60
18.251	-0.18	-0.18	15.28	0.885	1.000	15.28	13.14	-2.06	-6.34	15.20	9.60
14.000	-0.18	-0.18	15.28	0.849	1.000	14.66	12.72	-2.06	-6.34	14.78	9.60

K_z = $2.01 \cdot (z_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1] | K_{zt} = No Topographic feature specified

GC_{pi} = Enclosed Internal Pressure Tbl 26.13-1 | q_z = $0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]

q_{ip} = Positive Internal Pressure: $q_h \cdot LF$ | q_{in} = Negative Internal Pressure: $q_h \cdot LF$

Side = $q_h \cdot G \cdot Cp_{SW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1] | Leeward = $q_h \cdot G \cdot Cp_{LW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]

Windward = $q_z \cdot G \cdot Cp_{WW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1] | Total = Windward - Leeward

- Minimum Pressure: § 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
- Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface

Roof Wind Pressures [Parallel to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Component	Description	Location	Start ft	End ft	GC_{pi}	C_{pMin}	C_{pMax}	$P_{C_{pMin}}$ psf	$P_{C_{pMax}}$ psf	P_{min} psf
OH_Bot	Overhang Bottom	5	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top (0 to h)	3,4,5	0.000	18.251	0	-0.900	-0.180	-11.69	-2.34	4.80
OH_Top	Overhang Top (h to 2*h)	3,4	18.251	36.502	0	-0.500	-0.180	-6.49	-2.34	4.80
OH_Top	Overhang Top (>= 2*h)	3,4,6	36.502	60.000	0	-0.300	-0.180	-3.90	-2.34	4.80
Roof	Roof (0 to h)	All	2.000	18.251	+0.18	-0.900	-0.180	-14.44	-5.09	4.80
Roof	Roof (h to 2*h)	All	18.251	36.502	+0.18	-0.500	-0.180	-9.24	-5.09	4.80
Roof	Roof (>= 2*h)	All	36.502	58.000	+0.18	-0.300	-0.180	-6.64	-5.09	4.80
OH_Bot	Overhang Bottom	5	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top (0 to h)	3,4,5	0.000	18.251	0	-0.900	-0.180	-11.69	-2.34	4.80
OH_Top	Overhang Top (h to 2*h)	3,4	18.251	36.502	0	-0.500	-0.180	-6.49	-2.34	4.80
OH_Top	Overhang Top (>= 2*h)	3,4,6	36.502	60.000	0	-0.300	-0.180	-3.90	-2.34	4.80
Roof	Roof (0 to h)	All	2.000	18.251	-0.18	-0.900	-0.180	-8.94	0.41	4.80

Roof	Roof (h to 2*h)	All	18.251	36.502	-0.18	-0.500	-0.180	-3.74	0.41	4.80
Roof	Roof (>= 2*h)	All	36.502	58.000	-0.18	-0.300	-0.180	-1.15	0.41	4.80

Roof Pressures based upon Ch 27 Pt1:

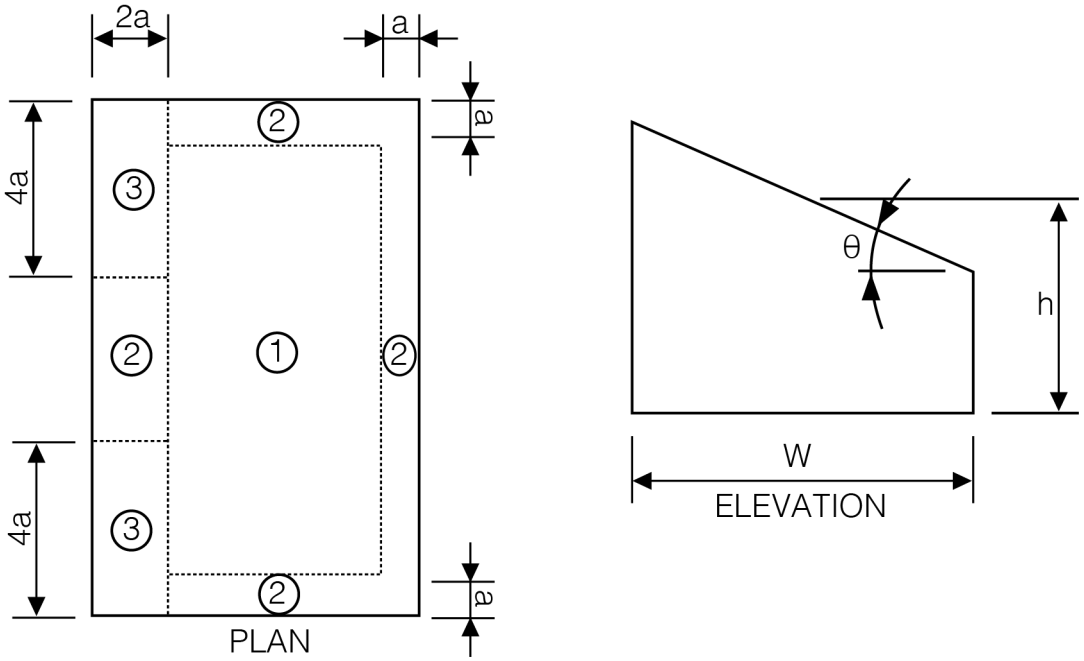
Component = The building component for pressures
Start = Start Dist from Windward Edge
C_{pMin} = Smallest Coefficient Magnitude
P_{cpMin} = $q_h \cdot G \cdot C_{pMin} - q_{ip} \cdot GC_{pi}$ [Eq 27.3-1]

Location = Reference Graphic in Output for Values
End = End Dist from Windward Edge
C_{pMax} = Largest Coefficient Magnitude
P_{cpMax} = $q_h \cdot G \cdot C_{pMax} - q_{in} \cdot GC_{pi}$ [Eq 27.3-1]

P_{min} = Min Press projected on vertical plane [§ 27.1.5]

- *No reduction factor was applicable*
- *The smaller uplift pressures due to C_{pMin} can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Components and Cladding (C&C) Wind Loads per Ch 30 Part 1 Roof & Wall



h/W	=	Ratio of mean roof height to building width	= 0.537
h/L	=	Ratio of mean roof height to building length	= 0.326
h	=	Mean structure height	= 18.251 ft
h_{grade}	=	Elevation from Grade to Top of Structure	= 18.251 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	= 0.885
K_{zt}	=	No Topographic feature specified	= 1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	= 0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	= +0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	= -0.18
LF	=	Load Factor based upon ASD Design	= 0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	= 1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	= 15.28 psf
LHD	=	Least Horizontal Dimension: Min(B, L)	= 34.000 ft
a_1	=	Min(0.1•LHD, 0.4•h)	= 3.400 ft
a	=	Max(a_1, 0.04•LHD, 3 ft [0.9 m])	= 3.400 ft
h/B	=	Ratio of mean roof height to least horizontal dim: h/B	= 0.537

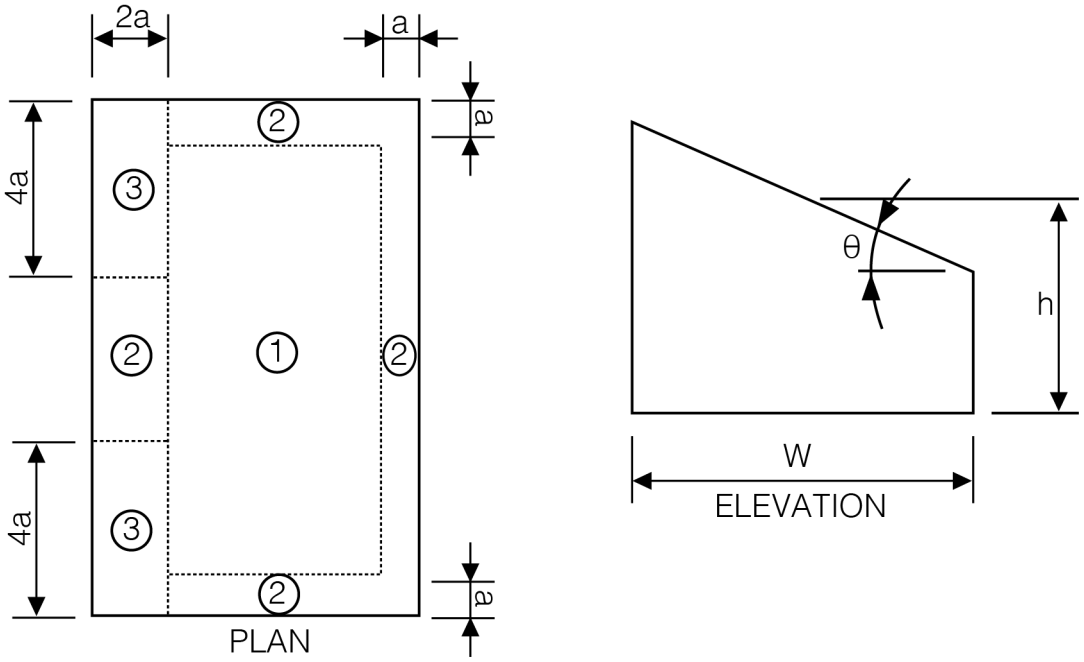
Wind Pressures for C&C Ch 30 Pt 1 Roof & Wall
All wind pressures include a Load Factor (LF) of 0.6

Description	Zone	Width ft	Span ft	Area ft^2	1/3 Rule	Figure	GCp Max	GCp Min	p Max psf	p Min psf
Purlins	2	2.000	12.000	48.00	Yes	30.3-5B	0.332	-1.328	9.60	-23.03
Bents	2	12.000	12.000	144.00	No	30.3-5B	0.300	-1.200	9.60	-21.08
Studs	4	1.333	10.000	33.33	Yes	30.3-1	0.908	-1.008	16.61	-18.14
Columns	4	4.000	10.000	40.00	No	30.3-1	0.894	-0.994	16.40	-17.93

Area = Span Length x Effective Width
1/3 Rule = Effective width need not be less than 1/3 of the span length
GCp = External Pressure Coefficients taken from Figures 30.3-1 through 30.3-7
p = Wind Pressure: $q_h \cdot [GC_p - GC_{pi}]$ [[Eq 30.3-1]]
** Per § 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}*

Components and Cladding (C&C) Zone Summary per Ch 30 Pt 1:

h/W	=	Ratio of mean roof height to building width	=	0.537
h/L	=	Ratio of mean roof height to building length	=	0.326
h	=	Mean structure height	=	18.251 ft
h_{grade}	=	Elevation from Grade to Top of Structure	=	18.251 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	=	0.885
K_{zt}	=	No Topographic feature specified	=	1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	=	0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	=	+0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	=	-0.18
LF	=	Load Factor based upon ASD Design	=	0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	=	1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	15.28 psf
LHD	=	Least Horizontal Dimension: Min(B, L)	=	34.000 ft
a_1	=	Min(0.1•LHD, 0.4•h)	=	3.400 ft
a	=	Max(a_1, 0.04•LHD, 3 ft [0.9 m])	=	3.400 ft
h/B	=	Ratio of mean roof height to least horizontal dim: h/B	=	0.537



Wind Pressure Summary for C&C Zones based Upon Areas Ch 30 Pt 1 (Table 1 of 2)
All wind pressures include a Load Factor (LF) of 0.6

Zone	Figure	Pos A ≤ 10 ft² psf	Neg A ≤ 10 ft² psf	Pos A = 20 ft² psf	Neg A = 20 ft² psf	Pos A = 50 ft² psf	Neg A = 50 ft² psf
1	30.3-5B	9.60	-22.61	9.60	-21.69	9.60	-20.47
2	30.3-5B	9.60	-27.19	9.60	-25.35	9.60	-22.92
3	30.3-5B	9.60	-47.05	9.60	-42.91	9.60	-37.44
4	30.3-1	18.02	-19.55	17.21	-18.74	16.14	-17.67
5	30.3-1	18.02	-24.13	17.21	-22.51	16.14	-20.36
1_OH	30.3-5B/30.3-1	9.60	-35.13	9.60	-33.40	9.60	-31.11
2_OH	30.3-5B/30.3-1	9.60	-39.72	9.60	-37.06	9.60	-33.56
3_OH	30.3-5B/30.3-1	9.60	-59.57	9.60	-54.62	9.60	-48.08

Wind Pressure Summary for C&C Zones based Upon Areas Ch 30 Pt 1 (Table 2 of 2)
All wind pressures include a Load Factor (LF) of 0.6

Zone	Figure	Pos A = 100 ft² psf	Neg A = 100 ft² psf	Pos A = 200 ft² psf	Neg A = 200 ft² psf	Pos A > 500 ft² psf	Neg A > 500 ft² psf
1	30.3-5B	9.60	-19.55	9.60	-19.55	9.60	-19.55
2	30.3-5B	9.60	-21.08	9.60	-21.08	9.60	-21.08
3	30.3-5B	9.60	-33.30	9.60	-33.30	9.60	-33.30
4	30.3-1	15.33	-16.86	14.52	-16.04	13.44	-14.97
5	30.3-1	15.33	-18.74	14.52	-17.12	13.44	-14.97

1_OH	30.3-5B/30.3-1	9.60	-29.38	9.60	-28.57	9.60	-27.50
2_OH	30.3-5B/30.3-1	9.60	-30.91	9.60	-30.10	9.60	-29.02
3_OH	30.3-5B/30.3-1	9.60	-43.13	9.60	-42.32	9.60	-41.24

** A is effective wind area for C&C: Span Length * Effective Width*
** Effective width need not be less than 1/3 of the span length*
** Maximum and minimum values of pressure shown.*
** + Pressures acting toward surface, - Pressures acting away from surface*
** Per § 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}*
** Interpolation can be used for values of A that are between those values shown.*

FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Rushmore	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Purlins

Dead Load:	20	PSF
Snow/Live Load:	101	PSF
$Wind_1$:	9.6	PSF
$Wind_2$:	-23.03	PSF

Load Combinations

D + L:	121	PSF
D + 0.6W$_1$:	25.8	PSF
D + 0.6W$_2$:	6.2	PSF
D+0.75(0.6W$_1$)+0.75L:	100.1	PSF
D+0.75(0.6W$_2$)+0.75L:	85.4	PSF
0.6D + 0.6W$_1$:	17.8	PSF
0.6D + 0.6W$_2$:	-1.8	PSF

Roof Bents

Dead Load:	20	PSF
Snow/Live Load:	101	PSF
$Wind_1$:	9.6	PSF
$Wind_2$:	-21.08	PSF

Load Combinations

D + L:	121	PSF
D + 0.6W$_1$:	25.8	PSF
D + 0.6W$_2$:	7.4	PSF
D+0.75(0.6W$_1$)+0.75L:	100.1	PSF
D+0.75(0.6W$_2$)+0.75L:	86.3	PSF
0.6D + 0.6W$_1$:	17.8	PSF
0.6D + 0.6W$_2$:	-0.6	PSF

Floor Load

Dead Load:	10	PSF
Live Load:	40	PSF

Load Combinations

D + L:	50	PSF

Studs

Dead Load:	N/A	PSF
Snow/Live Load:	N/A	PSF
$Wind_1$:	16.61	PSF
$Wind_2$:	-18.14	PSF

Load Combinations

W$_1$:	16.61	PSF
W$_2$:	-18.14	PSF

Columns

Dead Load:	N/A	PSF
Snow/Live Load:	N/A	PSF
$Wind_1$:	16.4	PSF
$Wind_2$:	-17.93	PSF

Load Combinations

W$_1$:	16.4	PSF
W$_2$:	-17.93	PSF

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Rushmore	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Analysis Transverse

Roof Height: 0 ft End Zone: 6.8 ft

Upper Level: Walls not to be less than 16 psf and roofs less than 8 psf.

17.35 psf x 5.5 ' x 6.8 ' = 649 # (Zone Wall)
17.35 psf x 5.5 ' x 21.2 ' = 2023 # (Zone Wall)
Total Shear = 2672 #

Main Level: Roof Height: 0 ft

17.35 psf x 10.5 ' x 6.8 ' = 1239 # (Zone Wall)
17.35 psf x 10.5 ' x 21.2 ' = 3862 # (Zone Wall)
Total Shear = 5101 #
Total Shear (Upper + Main) = 7773 #

Seismic Shear < Wind Shear -> Use Wind Shear 7773 #

Wall Height: 10 ft

West Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 10 ft

Openings In wall: 14 ft Total Wall Length: 34 ft
Shear = 7773 lb / 20 ft = 389 PLF
Shear capacity of 1/2" OSB with 8D nails @ 4" O.C. edge = 396 plf
396 plf > 389 plf -> OKAY
Overturning = 7773 # - 7 psf x 20 ft x 10.0 ft = 6373 #
= 6373 # x 10.0 ft / 20 ft = 3187 # @ Openings
Overturning Corners Only: 3187 # / 0.55 = 5764 #
Tension Capacity of Simpson HDU8-SDS2.5 into 3.5" wood w/ 0.875" x 12" A.B. 5995# > 5764# -> Okay
Tension Capacity of Simpson CMST14 Straps 6,475# > 5764# -> Okay

Wall Height: 10 ft

East Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 10 ft

Openings In wall: 8.75 ft Total Wall Length: 34 ft
Shear = 7773 lb / 25.25 ft = 308 PLF
Shear capacity of 1/2" OSB with 8D nails @ 4" O.C. edge = 396 plf
396 plf > 308 plf -> OKAY
Overturning = 7773 # - 7 psf x 25.25 ft x 10.0 ft = 6006 #
= 6005.5 # x 10.0 ft / 25.25 ft = 2378 # @ Openings
Overturning Corners Only: 2378 # / 0.66 = 3581 #
Tension Capacity of Simpson HDU5-SDS2.5 into 3.5" wood w/ 0.625" x 12" A.B. 4340# > 3581# -> Okay
Tension Capacity of Simpson CMST14 Straps 6,475# > 3581# -> Okay

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Rushmore	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Analysis Longitudinal

End Zone: 0 ft

Upper Level:

16.46 psf x 17.0 ' x 2.0 ' = 560 # (Zone Wall)
16.46 psf x 17.0 ' x 4.3 ' = 1189 # (Zone Wall)
Total Shear = 1749 #

Main Level:

16.46 psf x 10.5 ' x 17.0 ' = 2938 # (Zone Wall)
Total Shear = 2938 #
Total Shear (Upper + Main) = 4687 #

Seismic Shear > Wind Shear -> Use Seismic Shear 5500 PSF

North Wall Shear Capacity: Wall Weight: 7 psf Wall Height: 10 ft Opening Height: 4 ft
Openings In wall: 20 ft Total Wall Length: 56 ft
Shear = 5500 lb / 36 ft = 153 PLF
Shear capacity of 1/2" OSB with 8D nails @ 6" O.C. edge = 258 plf
257.6 plf > 153 plf -> OKAY
Overturning = 5500 # - 7 psf x 36 ft x 10.0 ft = 2980 #
= 2980 # x 10.0 ft / 36 ft = 828 # @ Openings
Overturning Corners Only: 828 # / 0.85 = 977 #
Tension Capacity of Simpson HDU8-SDS2.5 into 3.5" wood w/ 0.875" x 12" A.B. 5995# > 977# -> Okay

South Wall Shear Capacity: Wall Weight: 7 psf Wall Height: 12 ft Opening Height: 7 ft
Openings In wall: 30.5 ft Total Wall Length: 56 ft
Shear = 5500 lb / 25.5 ft = 216 PLF
Shear capacity of 1/2" OSB with 8D nails @ 3" O.C. edge = 506 plf
506 plf > 216 plf -> OKAY
Overturning = 5500 # - 7 psf x 25.5 ft x 12.0 ft = 3358 #
= 3358 # x 12.0 ft / 25.5 ft = 1580 # @ Openings
Overturning Corners Only: 1580 # / 0.65 = 2423 #
Tension Capacity of Simpson HDU5-SDS2.5 into 3.5" wood w/ 0.625" x 12" A.B. 4340# > 2423# -> Okay
Tension Capacity of Simpson CMST14 Straps 6,475# > 2423# -> Okay

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Rushmore	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Analysis Longitudinal

End Zone: 0 ft

Upper Level:

16.46 psf x 17.0 ' x 2.0 ' = 560 # (Zone Wall)
16.46 psf x 17.0 ' x 4.3 ' = 1189 # (Zone Wall)
Total Shear = 1749 #

Main Level:

16.46 psf x 10.5 ' x 17.0 ' = 2938 # (Zone Wall)
Total Shear = 2938 #
Total Shear (Upper + Main) = 4687 #

Lower Level:

16.46 psf x 17.0 ' x 11.0 ' = 3078.02 # (Zone Wall)
Total Shear = 3078.02 PSF
Total Shear (Main + Lower) = 6016.13 PSF
Total Shear (Upper + Main + Lower) = 7765.005 PSF

Seismic Shear < Wind Shear -> Use Wind Shear 7765 PSF

Wall Height: 10 ft

South Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 10 ft

Openings In wall: 26 ft Total Wall Length: 56 ft

Shear = 7765 lb / 30 ft = 259 PLF

Shear capacity of 1/2" OSB with 8D nails @ 3" O.C. edge = 506 plf

506 plf > 259 plf -> OKAY

Overturning = 7765 # - 7 psf x 30 ft x 10.0 ft = 5665 #

= 5665 # x 10.0 ft / 30 ft = 1888 # @ Openings

Overturning Corners Only: 1888 # / 0.52 = 3621 #

Tension Capacity of Simpson HDU8-SDS2.5 into 3.5" wood w/ 0.875" x 12" A.B. 5995# > 3621# -> Okay

FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Rushmore	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Seismic Loading

R = Timber Frame w/ Stick Framing w/ sheathing(Table 12.2-1 B 22)

Shear = 1.1 x SDS x Weight / R SDS = 0.521 R = 7.0

20	psf	x	60	ft	x	38.5	ft			=	46200	# Roof
10	psf	x	12	ft	x	13	ft			=	1560	# Roof
10	psf	x	56	ft	x	34	ft			=	19040	# Floor
101	psf	x	60	ft	x	38.5	ft	x	0.2	=	46662	# Snow
101	psf	x	10	ft	x	11	ft	x	0.2	=	2222	# Snow
101	psf	x	12	ft	x	13	ft	x	0.2	=	3151	# Snow
7	psf	x	56	ft	x	16	ft	x	1	=	6272	# Side Wall
7	psf	x	56	ft	x	6	ft	x	1	=	2352	# Side Wall
7	psf	x	34	ft	x	6	ft	x	2	=	2856	# End Wall
7	psf	x	34	ft	x	8.5	ft	x	2	=	4046	# End Wall

Total Seismic Weight: 134361 #

1.1 x 0.521 x 134361 / 7.0 = 11000 # / Direction

11000 # / Direction / 2 = 5500 # / Wall

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Purlins

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

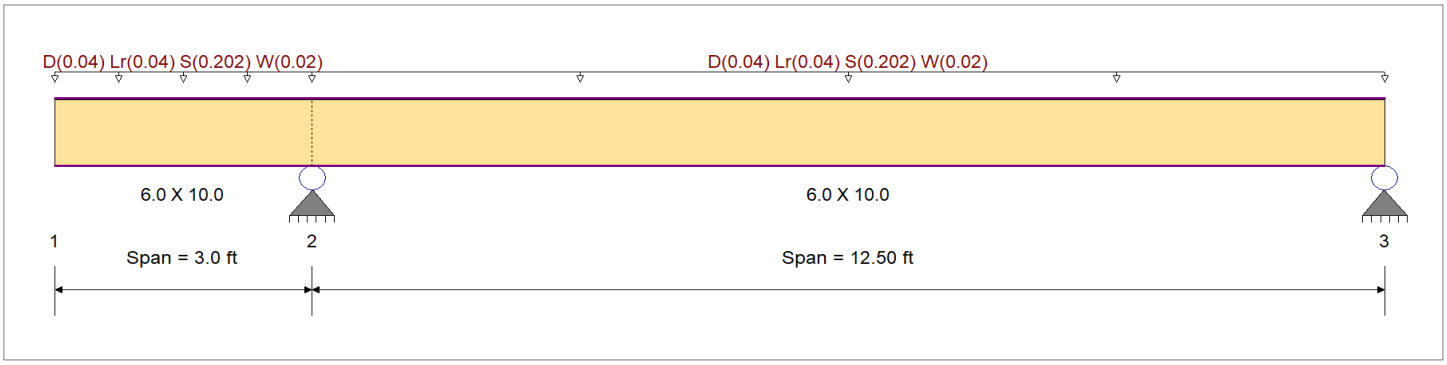
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1350 psi
Fb -	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.21 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft
Load for Span Number 2
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.342 : 1	Maximum Shear Stress Ratio	=	0.190 : 1
Section used for this span		6.0 X 10.0	Section used for this span		6.0 X 10.0
fb: Actual	=	530.79 psi	fv: Actual	=	37.24 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.634 ft	Location of maximum on span	=	3.000 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.121 in	Ratio =	1244 >=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.078 in	Ratio =	928 >=360	Span: 1 : S Only
Max Downward Total Deflection	0.152 in	Ratio =	985 >=180	Span: 2 : +D+S
Max Upward Total Deflection	-0.098 in	Ratio =	734 >=180	Span: 1 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.024	0.051	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.24	28.6	1,215.0	0.31	7.7	153.0
Length = 12.50 ft	2	0.091	0.051	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.92	110.3	1,215.0	0.31	7.7	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.030	0.064	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.42	50.2	1,687.5	0.54	13.6	212.5
Length = 12.50 ft	2	0.115	0.064	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.61	193.6	1,687.5	0.54	13.6	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Purlins

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 3.0 ft	1	0.089	0.190	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.15	137.7	1,552.5	1.49	37.2	195.5
Length = 12.50 ft	2	0.342	0.190	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.42	530.8	1,552.5	1.49	37.2	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.027	0.057	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.37	44.8	1,687.5	0.48	12.1	212.5
Length = 12.50 ft	2	0.102	0.057	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.44	172.8	1,687.5	0.48	12.1	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.071	0.153	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.92	110.4	1,552.5	1.19	29.9	195.5
Length = 12.50 ft	2	0.274	0.153	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.55	425.7	1,552.5	1.19	29.9	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.016	0.035	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.29	35.1	2,160.0	0.38	9.5	272.0
Length = 12.50 ft	2	0.063	0.035	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.13	135.3	2,160.0	0.38	9.5	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.023	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.41	49.7	2,160.0	0.54	13.4	272.0
Length = 12.50 ft	2	0.089	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.60	191.5	2,160.0	0.54	13.4	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.053	0.115	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.96	115.3	2,160.0	1.25	31.2	272.0
Length = 12.50 ft	2	0.206	0.115	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.70	444.4	2,160.0	1.25	31.2	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.011	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.20	23.7	2,160.0	0.26	6.4	272.0
Length = 12.50 ft	2	0.042	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.76	91.2	2,160.0	0.26	6.4	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.008	0.017	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.14	17.2	2,160.0	0.19	4.6	272.0
Length = 12.50 ft	2	0.031	0.017	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.55	66.2	2,160.0	0.19	4.6	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.0979	0.000
+D+S	2	0.1522	6.425		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		2.451	1.502
Max Upward from Load Combinations		2.451	1.502
Max Upward from Load Cases		1.941	1.190
D Only		0.509	0.312
+D+Lr		0.894	0.548
+D+S		2.451	1.502
+D+0.750Lr		0.798	0.489
+D+0.750S		1.965	1.205
+D+0.60W		0.625	0.383
+D+0.750Lr+0.450W		0.884	0.542
+D+0.750S+0.450W		2.052	1.258
+0.60D+0.60W		0.421	0.258
+0.60D		0.306	0.187
Lr Only		0.384	0.236
S Only		1.941	1.190
W Only		0.192	0.118

Wood Beam

Project File: Dan McEntee - Rushmore.ec6

DESCRIPTION: Purlins @ Lean-to

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

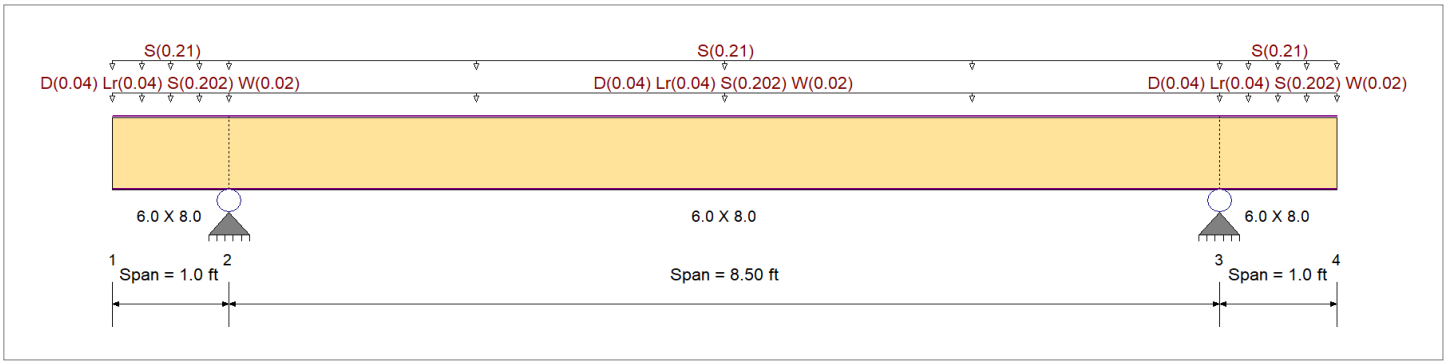
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 2.0 ft, (Drift)
Load for Span Number 2
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 2.0 ft, (Drift)
Load for Span Number 3
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 2.0 ft, (Drift)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.476 : 1	Maximum Shear Stress Ratio	=	0.267 : 1
Section used for this span		6.0 X 8.0	Section used for this span		6.0 X 8.0
fb: Actual	=	739.61 psi	fv: Actual	=	52.12 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.286 ft	Location of maximum on span	=	1.000 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.112 in	Ratio =	912 >=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.041 in	Ratio =	590 >=360	Span: 1 : S Only
Max Downward Total Deflection	0.125 in	Ratio =	813 >=180	Span: 2 : +D+S
Max Upward Total Deflection	-0.046 in	Ratio =	526 >=180	Span: 1 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.0 ft	1	0.004	0.037	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	4.7	1,215.0	0.18	5.7	153.0
Length = 8.50 ft	2	0.066	0.037	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.43	80.6	1,215.0	0.18	5.7	153.0

Wood Beam

Project File: Dan McEntee - Rushmore.ec6

DESCRIPTION: Purlins @ Lean-to

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 1.0 ft	**3**	0.004	0.037	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	4.7	1,215.0	0.02	5.7	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.005	0.048	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.05	8.5	1,687.5	0.33	10.2	212.5
Length = 8.50 ft	**2**	0.086	0.048	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.77	144.6	1,687.5	0.33	10.2	212.5
Length = 1.0 ft	**3**	0.005	0.048	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.05	8.5	1,687.5	0.03	10.2	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.028	0.267	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.23	43.4	1,552.5	1.67	52.1	195.5
Length = 8.50 ft	**2**	0.476	0.267	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.94	739.6	1,552.5	1.67	52.1	195.5
Length = 1.0 ft	**3**	0.028	0.267	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.23	43.4	1,552.5	0.16	52.1	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.004	0.043	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	7.5	1,687.5	0.29	9.1	212.5
Length = 8.50 ft	**2**	0.076	0.043	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.69	128.6	1,687.5	0.29	9.1	212.5
Length = 1.0 ft	**3**	0.004	0.043	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	7.5	1,687.5	0.03	9.1	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.022	0.207	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.18	33.7	1,552.5	1.30	40.5	195.5
Length = 8.50 ft	**2**	0.370	0.207	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.07	574.9	1,552.5	1.30	40.5	195.5
Length = 1.0 ft	**3**	0.022	0.207	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.18	33.7	1,552.5	0.12	40.5	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.003	0.026	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	5.9	2,160.0	0.23	7.0	272.0
Length = 8.50 ft	**2**	0.046	0.026	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.53	99.8	2,160.0	0.23	7.0	272.0
Length = 1.0 ft	**3**	0.003	0.026	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	5.9	2,160.0	0.02	7.0	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.004	0.037	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	8.4	2,160.0	0.32	10.1	272.0
Length = 8.50 ft	**2**	0.066	0.037	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.76	143.0	2,160.0	0.32	10.1	272.0
Length = 1.0 ft	**3**	0.004	0.037	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	8.4	2,160.0	0.03	10.1	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.016	0.153	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.18	34.5	2,160.0	1.33	41.5	272.0
Length = 8.50 ft	**2**	0.273	0.153	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.14	589.3	2,160.0	1.33	41.5	272.0
Length = 1.0 ft	**3**	0.016	0.153	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.18	34.5	2,160.0	0.12	41.5	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.002	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	4.0	2,160.0	0.15	4.8	272.0
Length = 8.50 ft	**2**	0.031	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.36	67.6	2,160.0	0.15	4.8	272.0
Length = 1.0 ft	**3**	0.002	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	4.0	2,160.0	0.01	4.8	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.001	0.013	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	2.8	2,160.0	0.11	3.4	272.0
Length = 8.50 ft	**2**	0.022	0.013	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.26	48.4	2,160.0	0.11	3.4	272.0
Length = 1.0 ft	**3**	0.001	0.013	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	2.8	2,160.0	0.01	3.4	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.0455	0.000
+D+S	2	0.1254	4.286		0.0000	0.000
	3	0.0000	4.286	+D+S	-0.0455	1.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions		2.428	2.428	
Max Upward from Load Combinations		2.428	2.428	
Max Upward from Load Cases		2.163	2.163	
D Only		0.265	0.265	

Wood Beam

Project File: Dan McEntee - Rushmore.ec6

DESCRIPTION: Purlins @ Lean-to

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
+D+Lr		0.475	0.475	
+D+S		2.428	2.428	
+D+0.750Lr		0.422	0.422	
+D+0.750S		1.887	1.887	
+D+0.60W		0.328	0.328	
+D+0.750Lr+0.450W		0.469	0.469	
+D+0.750S+0.450W		1.934	1.934	
+0.60D+0.60W		0.222	0.222	
+0.60D		0.159	0.159	
Lr Only		0.210	0.210	
S Only		2.163	2.163	
W Only		0.105	0.105	

Wood Beam

Project File: Dan McEntee.ec6

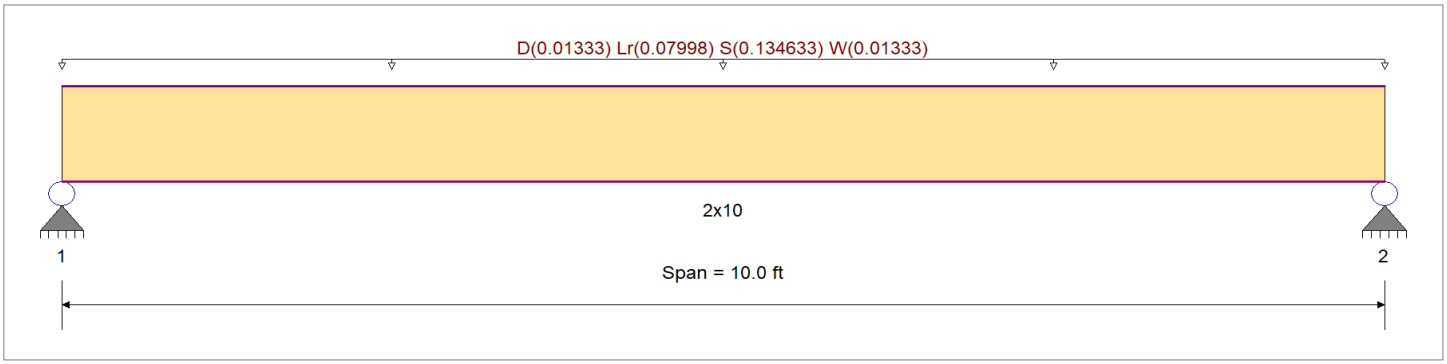
DESCRIPTION: Deck Joists

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 +	1050 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-16	Fb -	1050 psi	Ebend- xx	1600 ksi
		Fc - Prll	1450 psi	Eminbend - xx	580 ksi
Wood Species :	Southern Pine	Fc - Perp	565 psi		
Wood Grade :	No.1: 2"-4" Thick: 10" Wide	Fv	175 psi		
		Ft	700 psi	Density	34.33 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, Lr = 0.060, S = 0.1010, W = 0.010 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.878 : 1	Maximum Shear Stress Ratio	=	0.344 : 1	
Section used for this span		2x10	Section used for this span		2x10	
fb: Actual	=	1,060.77 psi	fv: Actual	=	69.23 psi	
F'b	=	1,207.50 psi	F'v	=	201.25 psi	
Load Combination		+D+S	Load Combination		+D+S	
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	0.192 in	Ratio =	623 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.216 in	Ratio =	554 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.123	0.048	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.21	116.7	945.0	0.07	7.6	157.5
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.516	0.202	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.21	677.5	1,312.5	0.41	44.2	218.8
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.878	0.344	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.89	1,060.8	1,207.5	0.64	69.2	201.3
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.409	0.160	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.96	537.3	1,312.5	0.32	35.1	218.8
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.683	0.267	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.47	824.7	1,207.5	0.50	53.8	201.3

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Deck Joists

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.103	0.040	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.31	172.8	1,680.0	0.10	11.3	280.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.345	0.135	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.03	579.4	1,680.0	0.35	37.8	280.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.516	0.202	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.55	866.8	1,680.0	0.52	56.6	280.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.075	0.029	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.22	126.1	1,680.0	0.08	8.2	280.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.042	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.12	70.0	1,680.0	0.04	4.6	280.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2163	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.756	0.756
Max Upward from Load Combinations	0.756	0.756
Max Upward from Load Cases	0.673	0.673
D Only	0.083	0.083
+D+Lr	0.483	0.483
+D+S	0.756	0.756
+D+0.750Lr	0.383	0.383
+D+0.750S	0.588	0.588
+D+0.60W	0.123	0.123
+D+0.750Lr+0.450W	0.413	0.413
+D+0.750S+0.450W	0.618	0.618
+0.60D+0.60W	0.090	0.090
+0.60D	0.050	0.050
Lr Only	0.400	0.400
S Only	0.673	0.673
W Only	0.067	0.067

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Joist Header

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

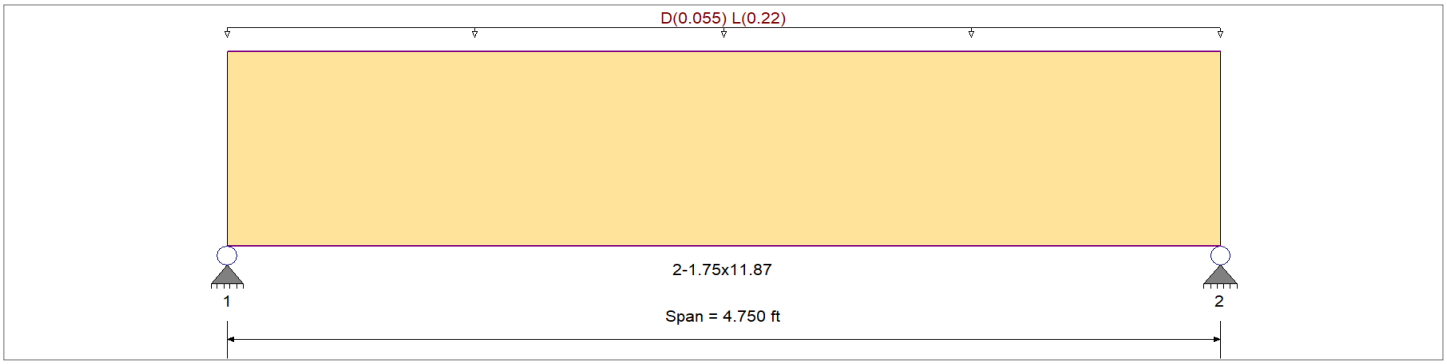
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2600 psi
Fb -	2600 psi
Fc - Prll	2510 psi
Fc - Perp	750 psi
Fv	285 psi
Ft	1555 psi

E : Modulus of Elasticity

Ebend- xx	1900 ksi
Eminbend - xx	965.71 ksi
Density	42.01 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 5.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.045 : 1	Maximum Shear Stress Ratio	=	0.050 : 1
Section used for this span		2-1.75x11.87	Section used for this span		2-1.75x11.87
fb: Actual	=	118.13 psi	fv: Actual	=	14.37 psi
F'b	=	2,603.71 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.375 ft	Location of maximum on span	=	3.762 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.003 in	Ratio =	20869	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.004 in	Ratio =	15990	>=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.012	0.013	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.19	27.6	2,343.3	0.09	3.4	256.5
+D+L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.045	0.050	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.81	118.1	2,603.7	0.40	14.4	285.0
+D+0.750L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.029	0.033	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.65	95.5	3,254.6	0.32	11.6	356.3
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.004	0.004	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.11	16.6	4,165.9	0.06	2.0	456.0

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Joist Header

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0036	2.392		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.682	0.682
Max Upward from Load Combinations	0.682	0.682
Max Upward from Load Cases	0.523	0.523
D Only	0.159	0.159
+D+L	0.682	0.682
+D+0.750L	0.551	0.551
+0.60D	0.096	0.096
L Only	0.523	0.523

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: LVL Header

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

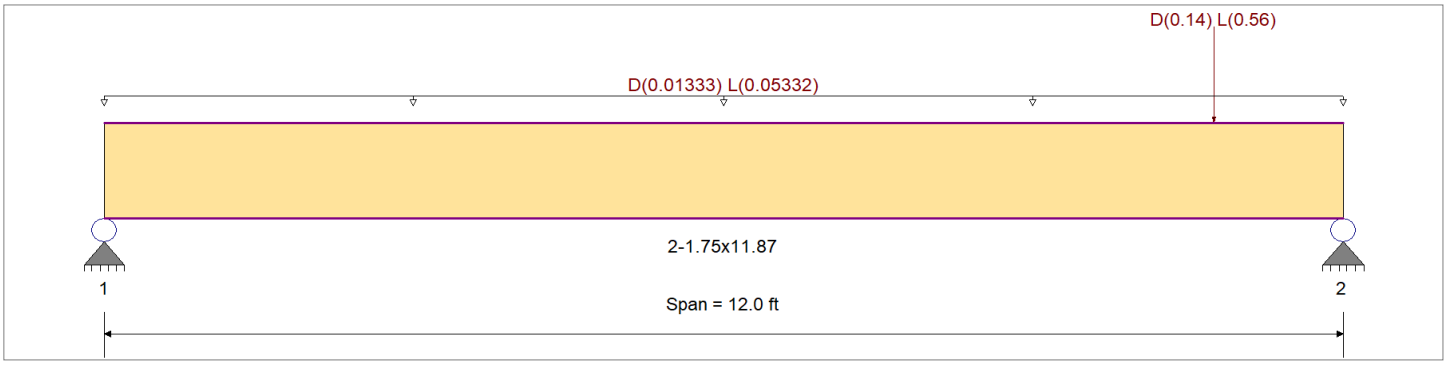
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.333 ft
Point Load : D = 0.140, L = 0.560 k @ 10.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.106 : 1	Maximum Shear Stress Ratio	=	0.130 : 1
Section used for this span		2-1.75x11.87	Section used for this span		2-1.75x11.87
fb: Actual	=	275.60 psi	fv: Actual	=	36.95 psi
F'b	=	2,603.71 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.920 ft	Location of maximum on span	=	11.036 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.039 in	Ratio =	3724 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.054 in	Ratio =	2644 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.034	0.036	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.55	80.2	2,343.3	0.25	9.2	256.5
+D+L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.106	0.130	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.89	275.6	2,603.7	1.02	37.0	285.0
+D+0.750L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.070	0.084	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.55	226.7	3,254.6	0.83	30.0	356.3
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.012	0.012	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.33	48.1	4,165.9	0.15	5.5	456.0

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: LVL Header

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0544	6.263		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.546	1.100
Max Upward from Load Combinations	0.546	1.100
Max Upward from Load Cases	0.378	0.822
D Only	0.167	0.278
+D+L	0.546	1.100
+D+0.750L	0.451	0.894
+0.60D	0.100	0.167
L Only	0.378	0.822

Wood Ledger

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: Ledger

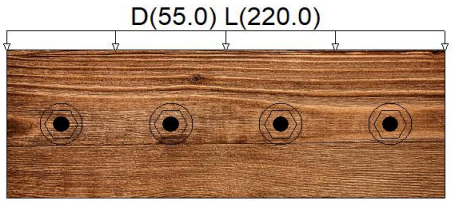
Code Reference

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

General Information

Ledger Width	1.50 in	Design Method: ASD (using Service Load Combinations	
Ledger Depth	11.250 in	Wood Stress Grade :	Southern Pine, No.2: 2"-4" Thick: 12" W
Ledger Wood Specie	Southern Pine	Fb Allow	750 psi
G : Specific Gravity	0.55	Fv Allow	175 psi
Bolt Diameter	1/2" in	Fyb : Bolt Bending Yield	45,000 psi
Bolt Spacing	8.0 in		
Cm - Wet Service Factor	1.0		
Ct - Temperature Factor	1.0		
Cg - Group Action Factor	1.0		
C /\ - Geometry Factor	1.0		

Concrete as Main Supporting Member
Using 6" anchor embedment length in equations.
Using dowel bearing strength fixed at 7.5 ksi per NDS Table 11E



Analytical model uses 100 spans to ensure that all possible combinations of bolt location and load location are evaluated.
Final results are an envelope solution.

Load Data

	Dead	Roof Live	Floor Live	Snow	Wind	Seismic	Earth
Uniform Load...	55.0 plf	plf	220.0 plf	plf	plf	plf	plf
Point Load...	lbs	lbs	lbs	lbs	lbs	lbs	lbs
Spacing	in						
Offset	in						
Horizontal Shear	plf	plf	plf	plf	plf	plf	plf

Wood Ledger

Project File: Dan McEntee.ec6

DESCRIPTION: Ledger

DESIGN SUMMARY

Design OK

Maximum Ledger Bending

Load Combination . . .	+D+L	
Moment	10.185	ft-lb
fb : Actual Stress	3.863	psi
Fb : Allowable Stress	750.0	psi
Stress Ratio	**0.005150**	:1

Maximum Bolt Bearing Summary

Load Combination . . .	+D+L	
Max. Vertical Load	183.333	lbs
Bolt Allow Vertical Load	411.070	lbs
Max. Horizontal Load	0.0	lbs
Bolt Allow Horizontal Load	683.50	lbs

Dowel Bearing Strengths

(for specific gravity & bolt diameter)

Ledger, Perp to Grain	7,500.0 psi
Ledger, Parallel to Grain	7,500.0 psi
Supporting Member, Perp to Gra	3,650.0 psi
Supporting Member, Parallel to Gr	6,150.0 psi

Maximum Ledger Shear

Load Combination . . .		+D+L
Shear	91.667	lbs
fv : Actual Stress	10.864	psi
Fv : Allowable Stress	116.667	psi
Stress Ratio	**0.09312**	**:1**

Angle of Resultant	90.0	deg
Diagonal Component	183.333	lbs
Allow Diagonal Bolt Force	411.070	lbs
Stress Ratio, Wood @ Bolt	**0.4460**	:1

Allowable Bolt Capacity

Note ! Refer to NDS Section 11.3 for Bolt Capacity calculation method.

Governing Load Combination **+D+L**

Resutant Load Angle : Theta = 90.0 deg Ktheta = 1.250 Fe theta = 411.070

Bolt Capacity - Load Perpendicular to Grain

Fem	7,500.0	Fes	3,650.0	Fyb	45,000.0			
Re	2.055	Rt	4.0					
k1	2.476	k2	1.50	k3	1.185			
Im	: Eq 11.3-1	Rd =	5.0	Z =	0.0	lbs		
Is	: Eq 11.3-2	Rd =	5.0	Z =	547.50	lbs		
II	: Eq 11.3-3	Rd =	4.50	Z =	1,506.32	lbs		
IIIm	: Eq 11.3-4	Rd =	4.0	Z =	1,651.64	lbs		
IIIs	: Eq 11.3-5	Rd =	4.0	Z =	411.070	lbs		
IV	: Eq 11.3-6	Rd =	4.0	Z =	536.39	lbs		
	min : Basic Design Value =				411.070	lbs		

Reference design value - Perpendicular to Grain :

Z * CM * CD* Ct * Cg * Cdelta = **411.070 lbs**

Bolt Capacity - Load Parallel to Grain

Fem	7,500.0	Fes	6,150.0	Fyb	45,000.0			
Re	1.220	Rt	4.0					
k1	1.591	k2	1.129	k3	1.252			
Im	: Eq 11.3-1	Rd =	4.0	Z =	0.0	lbs		
Is	: Eq 11.3-2	Rd =	4.0	Z =	1,153.13	lbs		
II	: Eq 11.3-3	Rd =	3.60	Z =	2,038.08	lbs		
IIIm	: Eq 11.3-4	Rd =	3.20	Z =	2,309.21	lbs		
IIIs	: Eq 11.3-5	Rd =	3.20	Z =	683.50	lbs		
IV	: Eq 11.3-6	Rd =	3.20	Z =	786.60	lbs		
	Zmin : Basic Design Value =				683.50	lbs		

Reference design value - Parallel to Grain :

Z * CM * CD* Ct * Cg * Cdelta = **683.50 lbs**

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Studs

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	12 ft		
(Used for non-slender calculations)			
Wood Species	Spruce-Pine-Fir		
Wood Grade	No. 1/No. 2		
Fb +	875 psi	Fv	135 psi
Fb -	875 psi	Ft	450 psi
Fc - Prll	1150 psi	Density	26.22 pcf
Fc - Perp	425 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1400	1400	1400 ksi
Minimum	510	510	

Wood Section Name	**2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**1.50** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	8.250 in^2	Cf or Cv for Compressior	1.10
Ix	20.797 in^4	Cf or Cv for Tension	1.30
Iy	1.547 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 18.026 lbs * Dead Load Factor
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0250 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4042 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	5.960 ft
At maximum location values are . .	
Applied Axial	0.01803 k
Applied Mx	0.270 k-ft
Applied My	0.0 k-ft
Fc : Allowable	2,024.0 psi

PASS Maximum Shear Stress Ratio = **0.07576 : 1**

Load Combination	+D+0.60W
Location of max.above base	12.0 ft
Applied Design Shear	24.545 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.150 k	Bottom along Y-Y	0.150 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.4049 in at 6.040 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.001919	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W	1.600	1.000	0.4042	PASS	5.960 ft	0.07576	PASS	12.0 ft
+D+0.450W	1.600	1.000	0.3031	PASS	5.960 ft	0.05682	PASS	0.0 ft
+0.60D+0.60W	1.600	1.000	0.4042	PASS	5.960 ft	0.07576	PASS	12.0 ft
+0.60D	1.600	1.000	0.000648	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	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					0.018				
+D+0.60W			0.090	0.090	0.018				

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Studs

Maximum Reactions

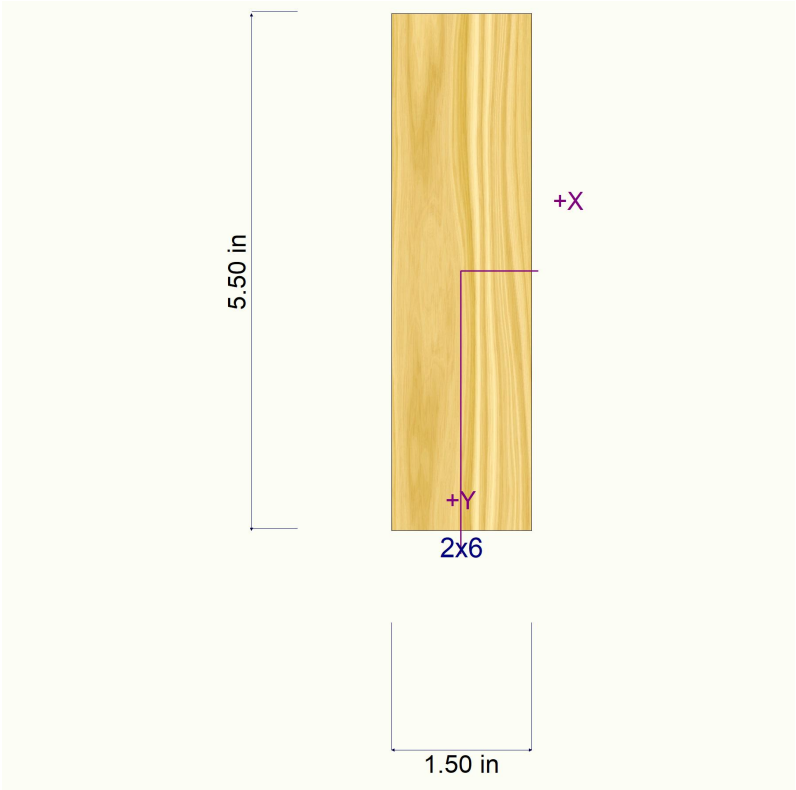
Note: Only non-zero reactions are listed.

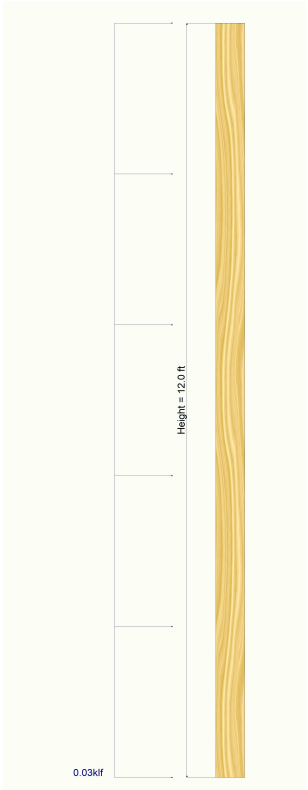
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+0.450W				0.068	0.068	0.018					
+0.60D+0.60W				0.090	0.090	0.011					
+0.60D						0.011					
W Only				0.150	0.150						

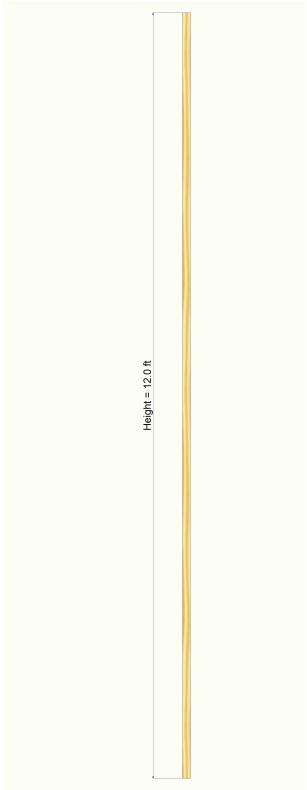
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.243 in	6.040 ft
+D+0.450W	0.0000 in	0.000ft	0.182 in	6.040 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.243 in	6.040 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.405 in	6.040 ft

Sketches







Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: King Studs 4' Openings

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	12 ft		
(Used for non-slender calculations)			
Wood Species	Spruce-Pine-Fir		
Wood Grade	No. 1/No. 2		
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Wood Section Name	**2-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**3.0** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	16.50 in^2	Cf or Cv for Compressior	1.10
Ix	41.594 in^4	Cf or Cv for Tension	1.30
Iy	12.375 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 36.053 lbs * Dead Load Factor
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0480 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2332 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	5.960 ft
At maximum location values are . .	
Applied Axial	0.03605 k
Applied Mx	0.5184 k-ft
Applied My	0.0 k-ft
Fc : Allowable	2,024.0 psi

PASS Maximum Shear Stress Ratio = **0.07273 : 1**

Load Combination	+D+0.60W
Location of max.above base	12.0 ft
Applied Design Shear	23.564 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.2880 k	Bottom along Y-Y	0.2880 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.3887 in at 6.040 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.001919	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W	1.600	1.000	0.2332	PASS	5.960 ft	0.07273	PASS	12.0 ft
+D+0.450W	1.600	1.000	0.1749	PASS	6.040 ft	0.05455	PASS	12.0 ft
+0.60D+0.60W	1.600	1.000	0.2332	PASS	5.960 ft	0.07273	PASS	12.0 ft
+0.60D	1.600	1.000	0.000648	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	@ Top	Y-Y Axis Reaction k @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					0.036				
+D+0.60W			0.173	0.173	0.036				

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: King Studs 4' Openings

Maximum Reactions

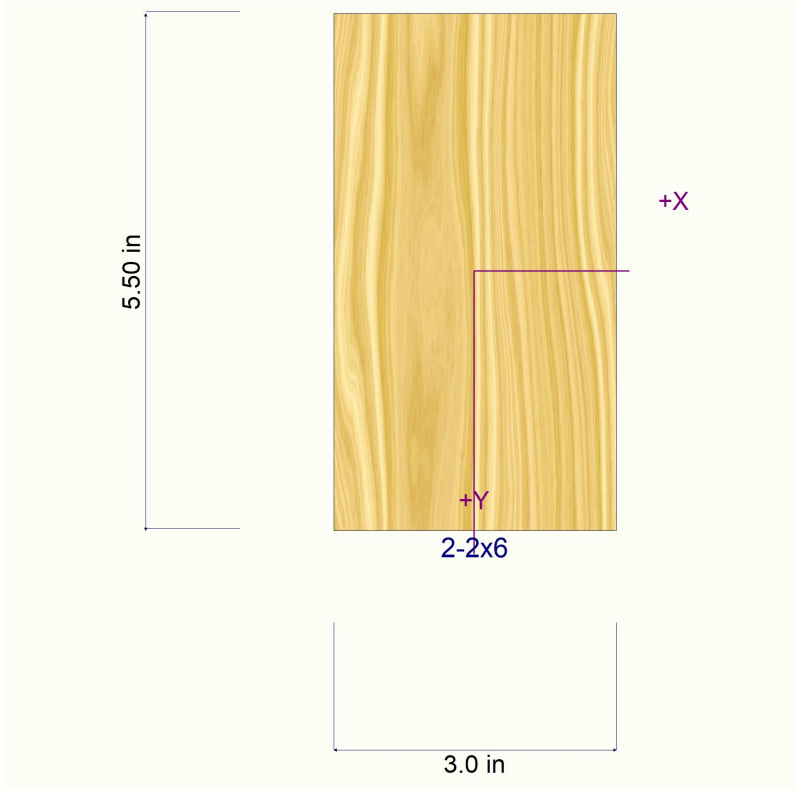
Note: Only non-zero reactions are listed.

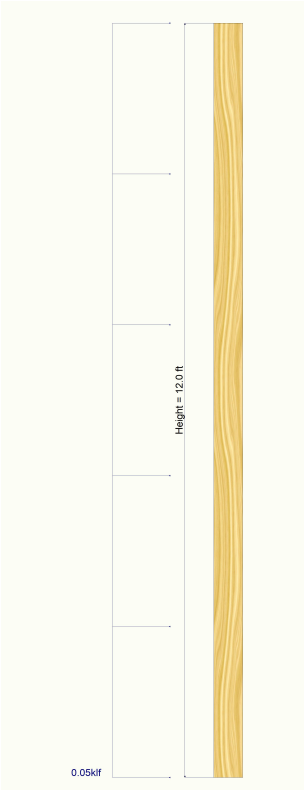
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+0.450W				0.130	0.130	0.036					
+0.60D+0.60W				0.173	0.173	0.022					
+0.60D						0.022					
W Only				0.288	0.288						

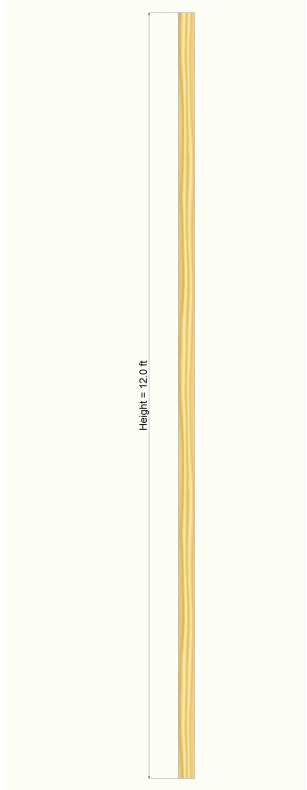
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.233 in	6.040 ft
+D+0.450W	0.0000 in	0.000ft	0.175 in	6.040 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.233 in	6.040 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.389 in	6.040 ft

Sketches







Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: King Studs 7' Openings

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	**3-2x6**
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	Spruce-Pine-Fir	Exact Width	**4.50** in
Wood Grade	No. 1/No. 2	Exact Depth	**5.50** in
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

Area	24.750 in^2	Allow Stress Modification Factors	
Ix	62.391 in^4	Cf or Cv for Bending	1.30
Iy	41.766 in^4	Cf or Cv for Compressior	1.10
		Cf or Cv for Tension	1.30
		Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 54.079 lbs * Dead Load Factor
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0750 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2379 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	6.040 ft
At maximum location values are . .	
Applied Axial	0.05408 k
Applied Mx	0.810 k-ft
Applied My	0.0 k-ft
Fc : Allowable	2,024.0 psi

PASS Maximum Shear Stress Ratio = **0.07576 : 1**

Load Combination	+D+0.60W
Location of max.above base	12.0 ft
Applied Design Shear	24.545 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.450 k	Bottom along Y-Y	0.450 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.4049 in at 6.040 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.001919	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W	1.600	1.000	0.2379	PASS	6.040 ft	0.07576	PASS	12.0 ft
+D+0.450W	1.600	1.000	0.1784	PASS	5.960 ft	0.05682	PASS	12.0 ft
+0.60D+0.60W	1.600	1.000	0.2379	PASS	6.040 ft	0.07576	PASS	12.0 ft
+0.60D	1.600	1.000	0.000648	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	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					0.054				
+D+0.60W			0.270	0.270	0.054				

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: King Studs 7' Openings

Maximum Reactions

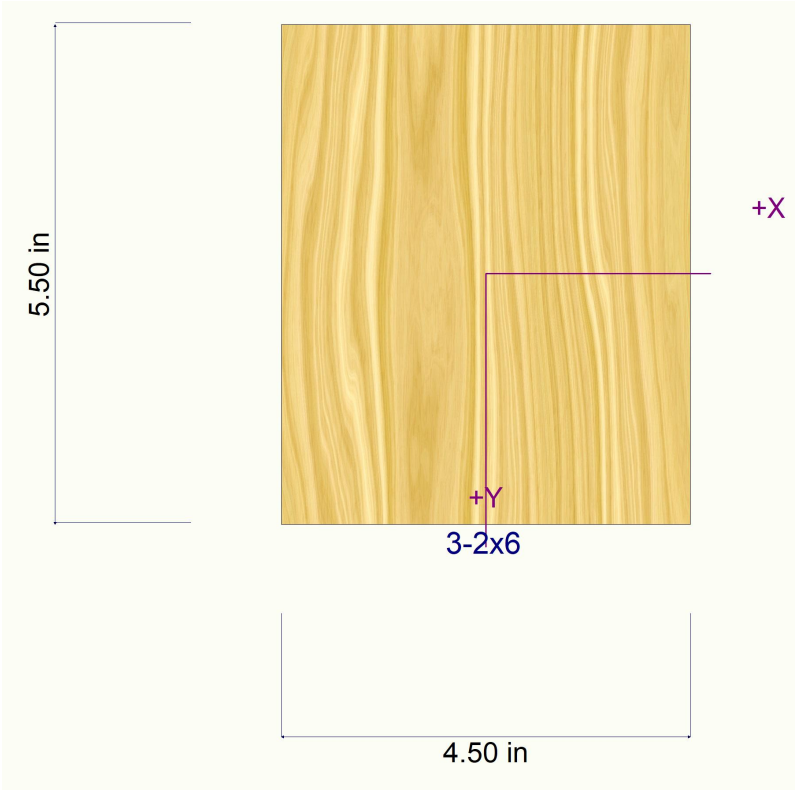
Note: Only non-zero reactions are listed.

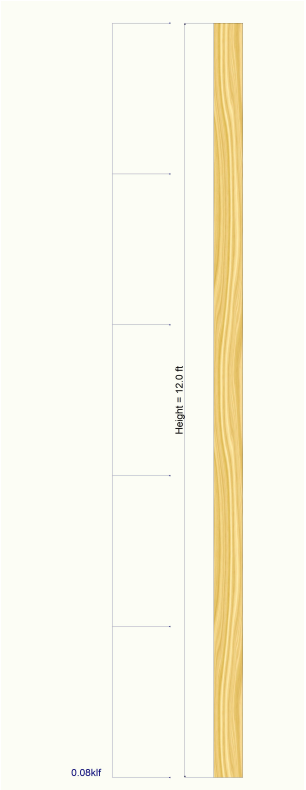
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+0.450W				0.203	0.203	0.054					
+0.60D+0.60W				0.270	0.270	0.032					
+0.60D						0.032					
W Only				0.450	0.450						

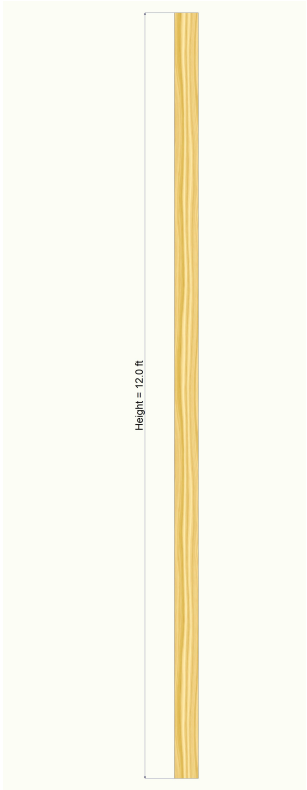
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.243 in	6.040 ft
+D+0.450W	0.0000 in	0.000ft	0.182 in	6.040 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.243 in	6.040 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.405 in	6.040 ft

Sketches







Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Roof Beam Bents 7/8

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

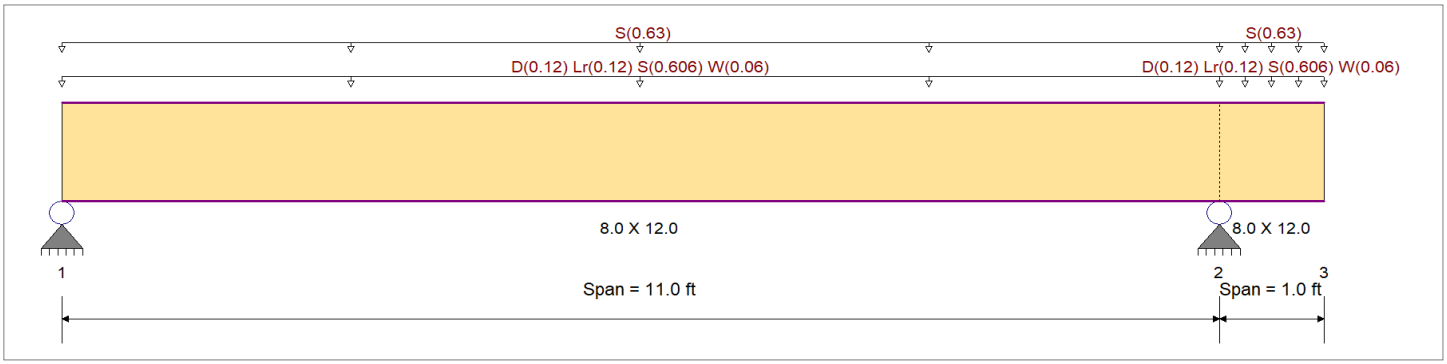
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1350 psi
Fb -	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.21 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 6.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 6.0 ft, (Drift)
Load for Span Number 2
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 6.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 6.0 ft, (Drift)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.825 : 1	Maximum Shear Stress Ratio	=	0.502 : 1
Section used for this span		8.0 X 12.0	Section used for this span		8.0 X 12.0
fb: Actual	=	1,280.08 psi	fv: Actual	=	98.15 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.469 ft	Location of maximum on span	=	10.017 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.218 in	Ratio =	604 >=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.062 in	Ratio =	386 >=360	Span: 2 : S Only
Max Downward Total Deflection	0.243 in	Ratio =	542 >=180	Span: 1 : +D+S
Max Upward Total Deflection	-0.069 in	Ratio =	346 >=180	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.108	0.066	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.09	130.9	1,215.0	0.64	10.0	153.0
Length = 1.0 ft	2	0.004	0.066	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.07	4.4	1,215.0	0.14	10.0	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.144	0.087	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.88	242.5	1,687.5	1.19	18.6	212.5

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Roof Beam Bents 7/8

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 1.0 ft	**2**	0.005	0.087	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.13	8.2	1,687.5	0.26	18.6	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	**1**	0.825	0.502	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	20.48	1,280.1	1,552.5	6.28	98.1	195.5
Length = 1.0 ft	**2**	0.028	0.502	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.69	43.0	1,552.5	1.38	98.1	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	**1**	0.127	0.077	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.43	214.6	1,687.5	1.05	16.5	212.5
Length = 1.0 ft	**2**	0.004	0.077	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.12	7.2	1,687.5	0.23	16.5	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	**1**	0.639	0.389	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.88	992.8	1,552.5	4.87	76.1	195.5
Length = 1.0 ft	**2**	0.021	0.389	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.53	33.4	1,552.5	1.07	76.1	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	**1**	0.076	0.046	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.63	164.4	2,160.0	0.81	12.6	272.0
Length = 1.0 ft	**2**	0.003	0.046	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.09	5.5	2,160.0	0.18	12.6	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	**1**	0.111	0.068	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.84	239.7	2,160.0	1.18	18.4	272.0
Length = 1.0 ft	**2**	0.004	0.068	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.13	8.1	2,160.0	0.26	18.4	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	**1**	0.471	0.287	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	16.29	1,017.9	2,160.0	4.99	78.0	272.0
Length = 1.0 ft	**2**	0.016	0.287	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.55	34.2	2,160.0	1.09	78.0	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	**1**	0.052	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.79	112.0	2,160.0	0.55	8.6	272.0
Length = 1.0 ft	**2**	0.002	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.06	3.8	2,160.0	0.12	8.6	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	**1**	0.036	0.022	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.26	78.5	2,160.0	0.39	6.0	272.0
Length = 1.0 ft	**2**	0.001	0.022	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	2.6	2,160.0	0.08	6.0	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2434	5.531		0.0000	0.000
	2	0.0000	5.531	+D+S	-0.0691	1.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	7.510	9.012	
Max Upward from Load Combinations	7.510	9.012	
Max Upward from Load Cases	6.742	8.090	
D Only	0.768	0.922	
+D+Lr	1.423	1.707	
+D+S	7.510	9.012	
+D+0.750Lr	1.259	1.511	
+D+0.750S	5.824	6.989	
+D+0.60W	0.964	1.157	
+D+0.750Lr+0.450W	1.406	1.687	
+D+0.750S+0.450W	5.972	7.166	
+0.60D+0.60W	0.657	0.789	
+0.60D	0.461	0.553	
Lr Only	0.655	0.785	
S Only	6.742	8.090	
W Only	0.327	0.393	

Wood Column

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: Columns Bent 7/8

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	9.25 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.1		
Fb +	1200 psi	Fv	170 psi
Fb -	1200 psi	Ft	825 psi
Fc - Prll	1000 psi	Density	31.21 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name	**8x8**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**8** in	Allow Stress Modification Factors	
Exact Depth	**8** in	Cf or Cv for Bending	1.0
Area	64.0 in^2	Cf or Cv for Compressior	1.0
Ix	341.333 in^4	Cf or Cv for Tension	1.0
Iy	341.333 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 9.25 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 9.25 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 128.308 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.250 ft, D = 0.840, Lr = 0.840, S = 8.652, W = 0.420 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1487 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	9.620 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,010.64 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	9.250 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 Only	0.900	0.910	0.01847	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+Lr	1.250	0.866	0.02611	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+S	1.150	0.879	0.1487	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.750Lr	1.250	0.866	0.02308	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.750S	1.150	0.879	0.1153	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.60W	1.600	0.817	0.01458	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.750Lr+0.450W	1.600	0.817	0.02136	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.750S+0.450W	1.600	0.817	0.09138	PASS	0.0 ft	0.0	PASS	9.250 ft
+0.60D+0.60W	1.600	0.817	0.009954	PASS	0.0 ft	0.0	PASS	9.250 ft
+0.60D	1.600	0.817	0.006943	PASS	0.0 ft	0.0	PASS	9.250 ft

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Columns Bent 7/8

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						0.968					
+D+Lr						1.808					
+D+S						9.620					
+D+0.750Lr						1.598					
+D+0.750S						7.457					
+D+0.60W						1.220					
+D+0.750Lr+0.450W						1.787					
+D+0.750S+0.450W						7.646					
+0.60D+0.60W						0.833					
+0.60D						0.581					
Lr Only						0.840					
S Only						8.652					
W Only						0.420					

Maximum Deflections for Load Combinations

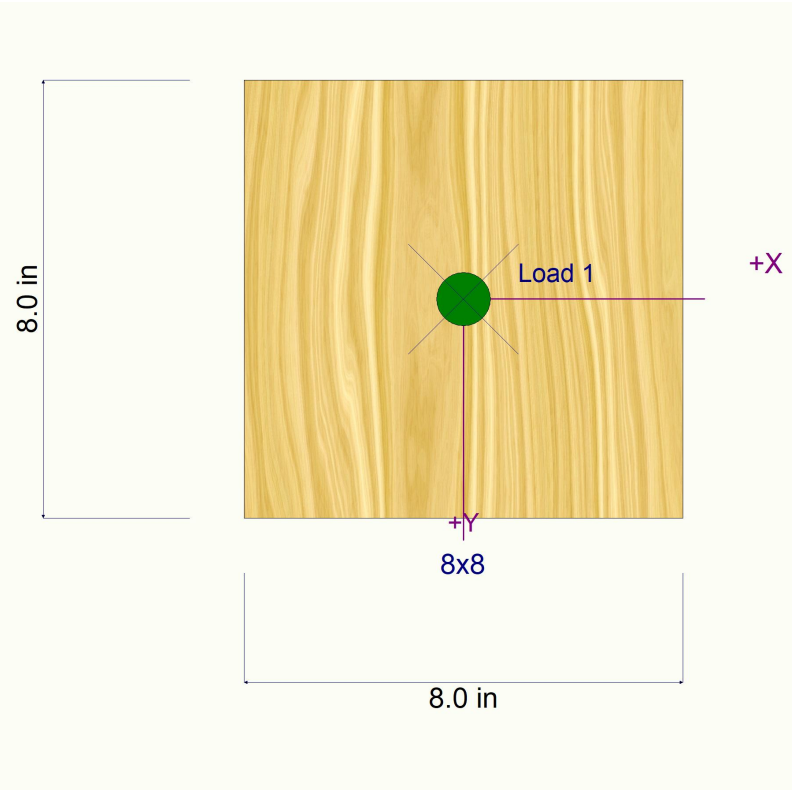
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W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

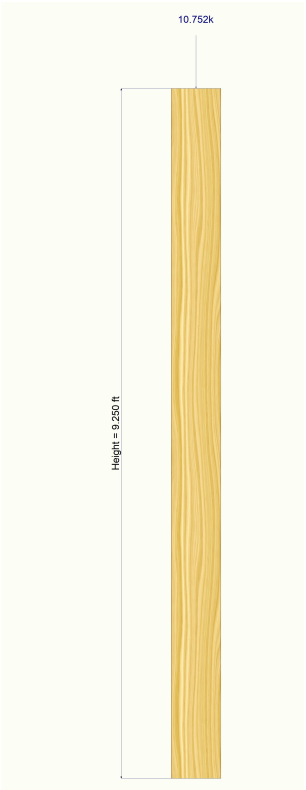
Wood Column

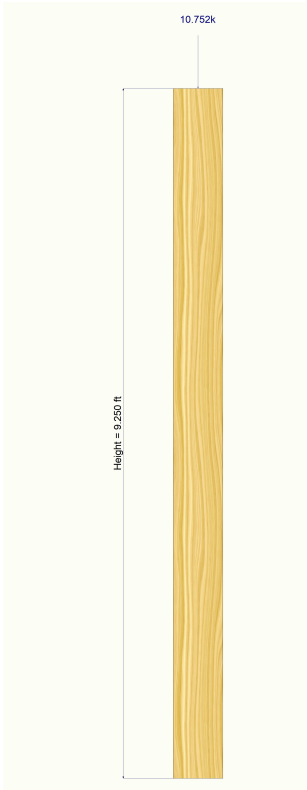
Project File: Dan McEntee.ec6

DESCRIPTION: Columns Bent 7/8

Sketches







Wood Beam

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: Roof Beams Bents 1-5

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

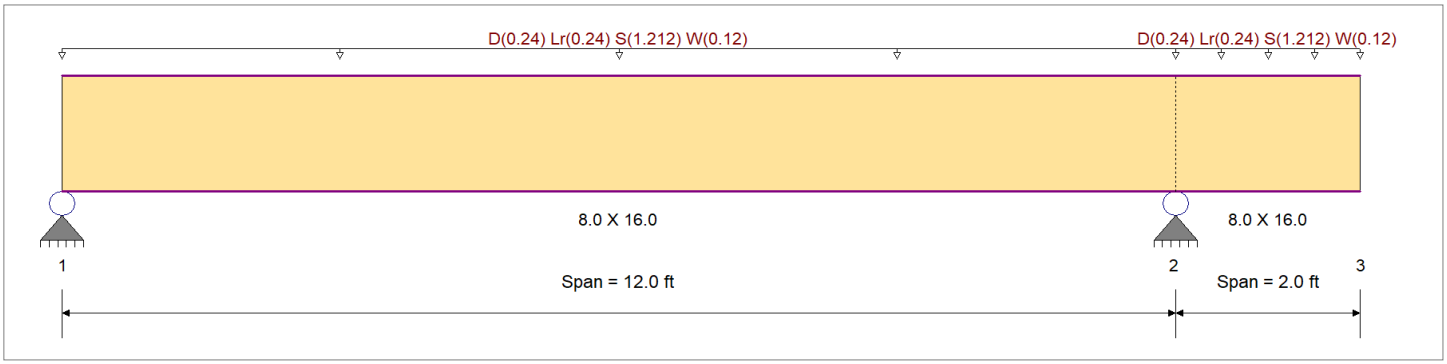
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1350 psi
Fb -	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.21 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 12.0 ft
Load for Span Number 2
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 12.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.587 : 1	Maximum Shear Stress Ratio	=	0.434 : 1
Section used for this span		8.0 X 16.0	Section used for this span		8.0 X 16.0
fb: Actual	=	885.10 psi	fv: Actual	=	84.85 psi
F'b	=	1,508.97 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.832 ft	Location of maximum on span	=	10.726 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.122 in	Ratio =	1181 >=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.060 in	Ratio =	794 >=360	Span: 2 : S Only
Max Downward Total Deflection	0.149 in	Ratio =	967 >=180	Span: 1 : +D+S
Max Upward Total Deflection	-0.074 in	Ratio =	650 >=180	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.136	0.100	0.90	1.00	1.00	1.00	0.972	1.00	1.00	1.00	4.56	160.1	1,180.9	1.31	15.4	153.0
Length = 2.0 ft	2	0.016	0.100	0.90	1.00	1.00	1.00	0.972	1.00	1.00	1.00	0.54	18.8	1,180.9	0.18	15.4	153.0
+D+Lr					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.185	0.137	1.25	1.00	1.00	1.00	0.972	1.00	1.00	1.00	8.64	303.7	1,640.2	2.48	29.1	212.5
Length = 2.0 ft	2	0.022	0.137	1.25	1.00	1.00	1.00	0.972	1.00	1.00	1.00	1.02	35.7	1,640.2	0.34	29.1	212.5
+D+S					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Roof Beams Bents 1-5

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 12.0 ft	**1**	0.587	0.434	1.15	1.00	1.00	1.00	0.972	1.00	1.00	1.00	25.18	885.1	1,509.0	7.24	84.8	195.5
Length = 2.0 ft	**2**	0.069	0.434	1.15	1.00	1.00	1.00	0.972	1.00	1.00	1.00	2.96	104.0	1,509.0	0.99	84.8	195.5
+D+0.750Lr					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.163	0.121	1.25	1.00	1.00	1.00	0.972	1.00	1.00	1.00	7.62	267.8	1,640.2	2.19	25.7	212.5
Length = 2.0 ft	**2**	0.019	0.121	1.25	1.00	1.00	1.00	0.972	1.00	1.00	1.00	0.90	31.5	1,640.2	0.30	25.7	212.5
+D+0.750S					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.466	0.345	1.15	1.00	1.00	1.00	0.972	1.00	1.00	1.00	20.02	703.9	1,509.0	5.76	67.5	195.5
Length = 2.0 ft	**2**	0.055	0.345	1.15	1.00	1.00	1.00	0.972	1.00	1.00	1.00	2.35	82.7	1,509.0	0.79	67.5	195.5
+D+0.60W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.097	0.072	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	5.78	203.2	2,099.4	1.66	19.5	272.0
Length = 2.0 ft	**2**	0.011	0.072	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	0.68	23.9	2,099.4	0.23	19.5	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.143	0.106	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	8.54	300.1	2,099.4	2.45	28.8	272.0
Length = 2.0 ft	**2**	0.017	0.106	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	1.00	35.3	2,099.4	0.34	28.8	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.351	0.259	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	20.94	736.2	2,099.4	6.02	70.6	272.0
Length = 2.0 ft	**2**	0.041	0.259	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	2.46	86.5	2,099.4	0.83	70.6	272.0
+0.60D+0.60W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.066	0.049	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	3.96	139.2	2,099.4	1.14	13.3	272.0
Length = 2.0 ft	**2**	0.008	0.049	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	0.47	16.4	2,099.4	0.16	13.3	272.0
+0.60D					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	**1**	0.046	0.034	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	2.73	96.1	2,099.4	0.79	9.2	272.0
Length = 2.0 ft	**2**	0.005	0.034	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	0.32	11.3	2,099.4	0.11	9.2	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1488	5.966		0.0000	0.000
	2	0.0000	5.966	+D+S	-0.0737	2.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	8.632	12.085	
Max Upward from Load Combinations	8.632	12.085	
Max Upward from Load Cases	7.070	9.898	
D Only	1.562	2.187	
+D+Lr	2.962	4.147	
+D+S	8.632	12.085	
+D+0.750Lr	2.612	3.657	
+D+0.750S	6.864	9.610	
+D+0.60W	1.982	2.775	
+D+0.750Lr+0.450W	2.927	4.098	
+D+0.750S+0.450W	7.179	10.051	
+0.60D+0.60W	1.357	1.900	
+0.60D	0.937	1.312	
Lr Only	1.400	1.960	
S Only	7.070	9.898	
W Only	0.700	0.980	

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Deck Beam Bent 6

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

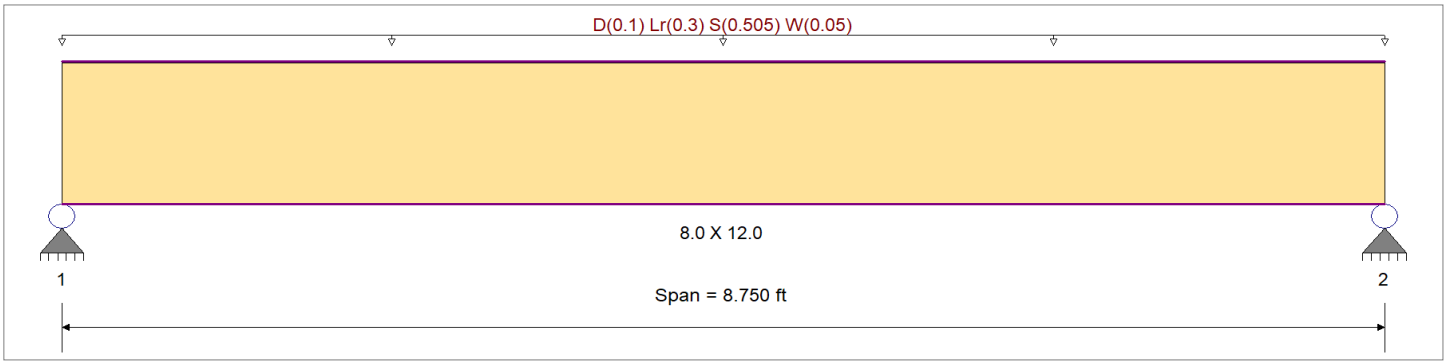
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.060, S = 0.1010, W = 0.010 ksf, Tributary Width = 5.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.241 : 1	Maximum Shear Stress Ratio	=	0.169 : 1
Section used for this span		8.0 X 12.0	Section used for this span		8.0 X 12.0
fb: Actual	=	374.32 psi	fv: Actual	=	33.10 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.375 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	0.036 in	Ratio =	2888 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.045 in	Ratio =	2331 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.059	0.042	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.16	72.3	1,215.0	0.41	6.4	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.149	0.105	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.03	251.7	1,687.5	1.42	22.3	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.241	0.169	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.99	374.3	1,552.5	2.12	33.1	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.123	0.086	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.31	206.8	1,687.5	1.17	18.3	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.192	0.135	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.78	298.8	1,552.5	1.69	26.4	195.5

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Deck Beam Bent 6

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.042	0.029	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.44	90.2	2,160.0	0.51	8.0	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.102	0.072	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.52	220.3	2,160.0	1.25	19.5	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.145	0.102	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.00	312.3	2,160.0	1.77	27.6	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.028	0.020	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.98	61.3	2,160.0	0.35	5.4	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.750 ft	1	0.020	0.014	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.69	43.4	2,160.0	0.25	3.8	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0450	4.407		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.738	2.738
Max Upward from Load Combinations	2.738	2.738
Max Upward from Load Cases	2.209	2.209
D Only	0.529	0.529
+D+Lr	1.841	1.841
+D+S	2.738	2.738
+D+0.750Lr	1.513	1.513
+D+0.750S	2.186	2.186
+D+0.60W	0.660	0.660
+D+0.750Lr+0.450W	1.611	1.611
+D+0.750S+0.450W	2.284	2.284
+0.60D+0.60W	0.448	0.448
+0.60D	0.317	0.317
Lr Only	1.313	1.313
S Only	2.209	2.209
W Only	0.219	0.219

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Bent #6 Columns

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	5 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.1		
Fb +	1200 psi	Fv	170 psi
Fb -	1200 psi	Ft	825 psi
Fc - Prll	1000 psi	Density	31.21 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name	**8x8**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**8** in	Allow Stress Modification Factors	
Exact Depth	**8** in	Cf or Cv for Bending	1.0
Area	64.0 in^2	Cf or Cv for Compressior	1.0
Ix	341.333 in^4	Cf or Cv for Tension	1.0
Iy	341.333 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 5 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 5 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 69.356 lbs * Dead Load Factor
AXIAL LOADS . . .
Deck: Axial Load at 5.0 ft, D = 0.50, Lr = 1.50, S = 2.525, W = 0.250 k
Roof: Axial Load at 5.0 ft, D = 1.120, Lr = 1.120, S = 5.656, W = 0.560 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1382 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	9.870 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,116.15 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	5.0 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 Only	0.900	0.977	0.03001	PASS	0.0 ft	0.0	PASS	5.0 ft
+D+Lr	1.250	0.968	0.05566	PASS	0.0 ft	0.0	PASS	5.0 ft
+D+S	1.150	0.971	0.1382	PASS	0.0 ft	0.0	PASS	5.0 ft
+D+0.750Lr	1.250	0.968	0.04720	PASS	0.0 ft	0.0	PASS	5.0 ft
+D+0.750S	1.150	0.971	0.1095	PASS	0.0 ft	0.0	PASS	5.0 ft
+D+0.60W	1.600	0.958	0.02218	PASS	0.0 ft	0.0	PASS	5.0 ft
+D+0.750Lr+0.450W	1.600	0.958	0.04098	PASS	0.0 ft	0.0	PASS	5.0 ft
+D+0.750S+0.450W	1.600	0.958	0.08351	PASS	0.0 ft	0.0	PASS	5.0 ft
+0.60D+0.60W	1.600	0.958	0.01529	PASS	0.0 ft	0.0	PASS	5.0 ft
+0.60D	1.600	0.958	0.01034	PASS	0.0 ft	0.0	PASS	5.0 ft

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Bent #6 Columns

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						1.689					
+D+Lr						4.309					
+D+S						9.870					
+D+0.750Lr						3.654					
+D+0.750S						7.825					
+D+0.60W						2.175					
+D+0.750Lr+0.450W						4.019					
+D+0.750S+0.450W						8.190					
+0.60D+0.60W						1.500					
+0.60D						1.014					
Lr Only						2.620					
S Only						8.181					
W Only						0.810					

Maximum Deflections for Load Combinations

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

Wood Column

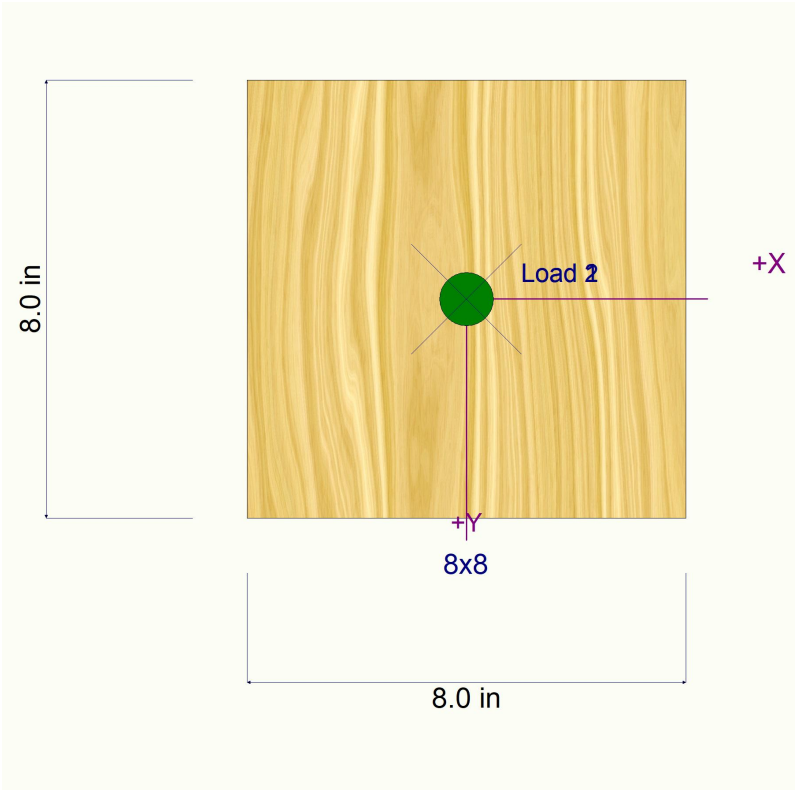
Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01

Frame Engineering

DESCRIPTION: Bent #6 Columns

Sketches



Wood Column

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: Bents #1-5 Columns

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	19.5 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.1		
Fb +	1200 psi	Fv	170 psi
Fb -	1200 psi	Ft	825 psi
Fc - Prll	1000 psi	Density	31.21 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name	**8x8**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	8 in	Allow Stress Modification Factors	
Exact Depth	8 in	Cf or Cv for Bending	1.0
Area	64.0 in^2	Cf or Cv for Compressior	1.0
Ix	341.333 in^4	Cf or Cv for Tension	1.0
Iy	341.333 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 19.5 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 19.5 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 270.487 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 19.50 ft, D = 2.760, Lr = 2.760, S = 13.938, W = 1.380 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5455 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	16.968 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	486.074 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	19.50 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 Only	0.900	0.512	0.1028	PASS	0.0 ft	0.0	PASS	19.50 ft
+D+Lr	1.250	0.394	0.1835	PASS	0.0 ft	0.0	PASS	19.50 ft
+D+S	1.150	0.423	0.5455	PASS	0.0 ft	0.0	PASS	19.50 ft
+D+0.750Lr	1.250	0.394	0.1616	PASS	0.0 ft	0.0	PASS	19.50 ft
+D+0.750S	1.150	0.423	0.4334	PASS	0.0 ft	0.0	PASS	19.50 ft
+D+0.60W	1.600	0.319	0.1183	PASS	0.0 ft	0.0	PASS	19.50 ft
+D+0.750Lr+0.450W	1.600	0.319	0.1754	PASS	0.0 ft	0.0	PASS	19.50 ft
+D+0.750S+0.450W	1.600	0.319	0.4325	PASS	0.0 ft	0.0	PASS	19.50 ft
+0.60D+0.60W	1.600	0.319	0.08114	PASS	0.0 ft	0.0	PASS	19.50 ft
+0.60D	1.600	0.319	0.05575	PASS	0.0 ft	0.0	PASS	19.50 ft

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Bents #1-5 Columns

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						3.030					
+D+Lr						5.790					
+D+S						16.968					
+D+0.750Lr						5.100					
+D+0.750S						13.484					
+D+0.60W						3.858					
+D+0.750Lr+0.450W						5.721					
+D+0.750S+0.450W						14.105					
+0.60D+0.60W						2.646					
+0.60D						1.818					
Lr Only						2.760					
S Only						13.938					
W Only						1.380					

Maximum Deflections for Load Combinations

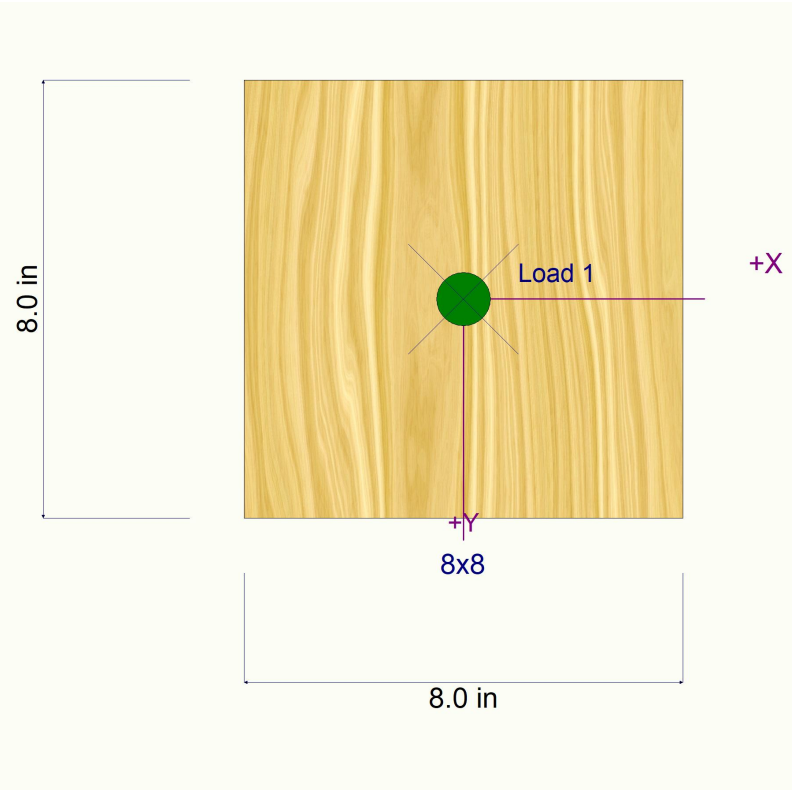
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W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

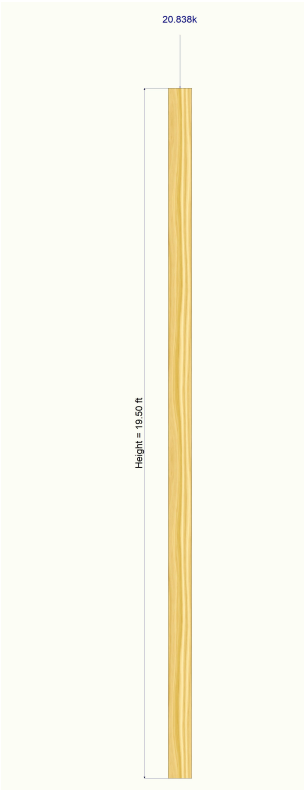
Wood Column

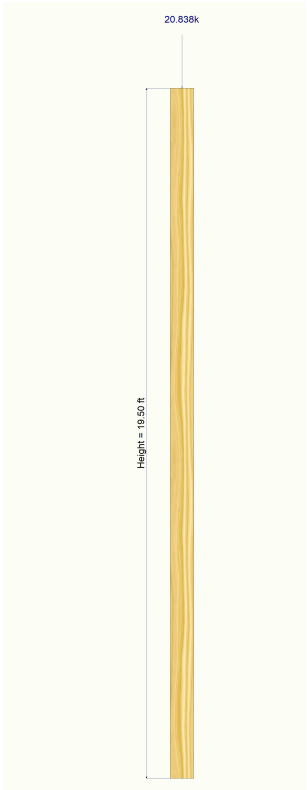
Project File: Dan McEntee.ec6

DESCRIPTION: Bents #1-5 Columns

Sketches







Wood Beam

Project File: Dan McEntee.ec6

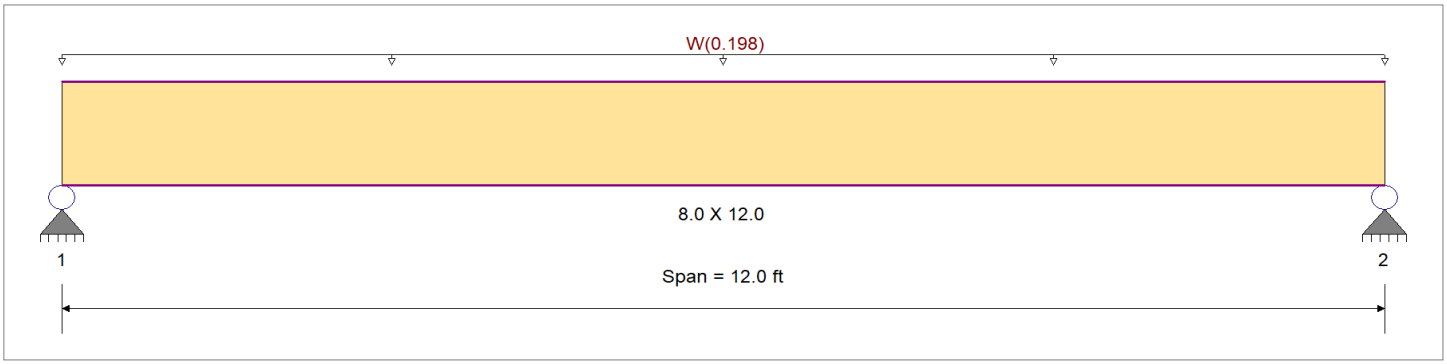
DESCRIPTION: Bent Spacer

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 +	1350 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-16	Fb -	1350 psi	Ebend- xx	1600 ksi
		Fc - Prll	925 psi	Eminbend - xx	580 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade :	No.1	Fv	170 psi		
		Ft	675 psi	Density	31.21 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : W = 0.0180 ksf, Tributary Width = 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.093 : 1	Maximum Shear Stress Ratio	=	0.034 : 1
Section used for this span		**8.0 X 12.0** *(weak orientation)*	Section used for this span		**8.0 X 12.0** *(weak orientation)*
fb: Actual	=	200.48 psi	fv: Actual	=	9.35 psi
F'b	=	2,160.00 psi	F'v	=	272.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	6.000 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	0.113 in	Ratio =	1269 >=360	Span: 1 : W Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.068 in	Ratio =	2115 >=180	Span: 1 : +0.60W
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 12.0 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			1,215.0	0.00	0.0	153.0
+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.093	0.034	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.14	200.5	2,160.0	0.60	9.3	272.0
+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.070	0.026	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.60	150.4	2,160.0	0.45	7.0	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.1134	6.044		0.0000	0.000

Wood Beam

DESCRIPTION: Bent Spacer

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.188	1.188
Max Upward from Load Combinations	0.713	0.713
Max Upward from Load Cases	1.188	1.188
+0.60W	0.713	0.713
+0.450W	0.535	0.535
W Only	1.188	1.188

Wood Beam

Project File: Dan McEntee.ec6

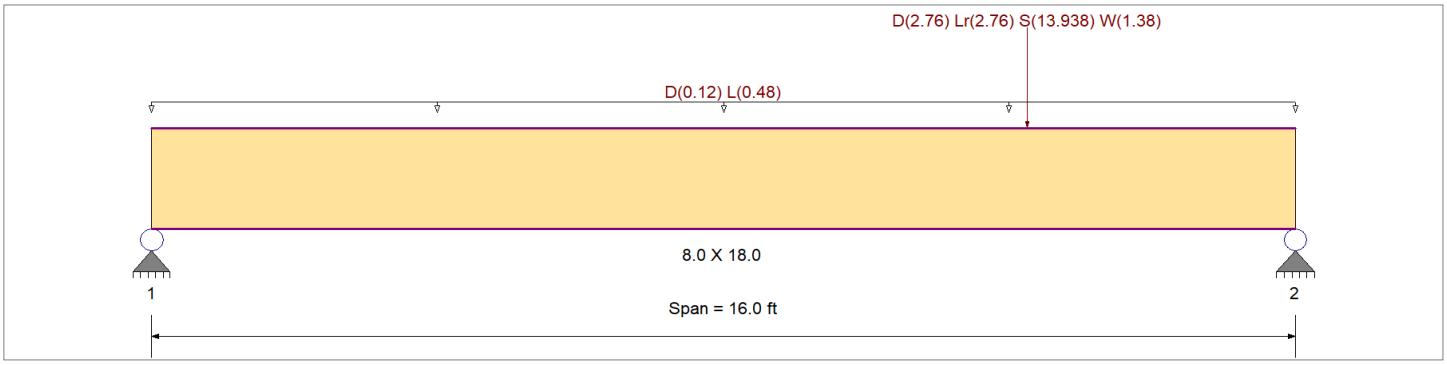
DESCRIPTION: Girder #3 Beams

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 +	1,350.0 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-16	Fb -	1,350.0 psi	Ebend- xx	1,600.0 ksi
		Fc - Prll	925.0 psi	Eminbend - xx	580.0 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.1	Fv	170.0 psi		
		Ft	675.0 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.

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 12.0 ft
Point Load : D = 2.760, Lr = 2.760, S = 13.938, W = 1.380 k @ 12.250 ft, (Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.917 : 1	Maximum Shear Stress Ratio	=	0.734 : 1
Section used for this span		8.0 X 18.0	Section used for this span		8.0 X 18.0
fb: Actual	=	1,424.03 psi	fv: Actual	=	143.47 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	12.204 ft	Location of maximum on span	=	14.540 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.220 in	Ratio =	872 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.339 in	Ratio =	566 >=180	Span: 1 : +D+0.750L+0.750S+0.450W
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.261	0.211	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.40	316.6	1,215.0	3.10	32.3	153.0
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.529	0.382	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	25.70	714.0	1,350.0	6.24	65.0	170.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.318	0.256	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	19.29	535.9	1,687.5	5.22	54.3	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.917	0.734	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	51.27	1,424.0	1,552.5	13.77	143.5	195.5
+D+0.750Lr+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Girder #3 Beams

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 16.0 ft	**1**	0.439	0.345	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	26.67	740.8	1,687.5	7.04	73.3	212.5
+D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	**1**	0.888	0.717	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	49.64	1,378.8	1,552.5	13.46	140.2	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	**1**	0.177	0.143	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.77	382.4	2,160.0	3.74	38.9	272.0
+D+0.750Lr+0.750L+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	**1**	0.362	0.288	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	28.18	782.7	2,160.0	7.52	78.3	272.0
+D+0.750L+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	**1**	0.661	0.534	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	51.41	1,428.1	2,160.0	13.94	145.2	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	**1**	0.118	0.096	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.21	255.7	2,160.0	2.50	26.0	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	**1**	0.088	0.071	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.84	189.9	2,160.0	1.86	19.4	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.450W	1	0.3390	8.642		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	7.332	14.682
Max Upward from Load Combinations	7.332	14.682
Max Upward from Load Cases	3.840	10.671
D Only	1.857	3.323
+D+L	5.697	7.163
+D+Lr	2.503	5.436
+D+S	5.123	13.994
+D+0.750Lr+0.750L	5.222	7.788
+D+0.750L+0.750S	7.187	14.206
+D+0.60W	2.051	3.957
+D+0.750Lr+0.750L+0.450W	5.367	8.263
+D+0.750L+0.750S+0.450W	7.332	14.682
+0.60D+0.60W	1.308	2.628
+0.60D	1.114	1.994
Lr Only	0.647	2.113
L Only	3.840	3.840
S Only	3.267	10.671
W Only	0.323	1.057

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Copy of Girder #3 Beams

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

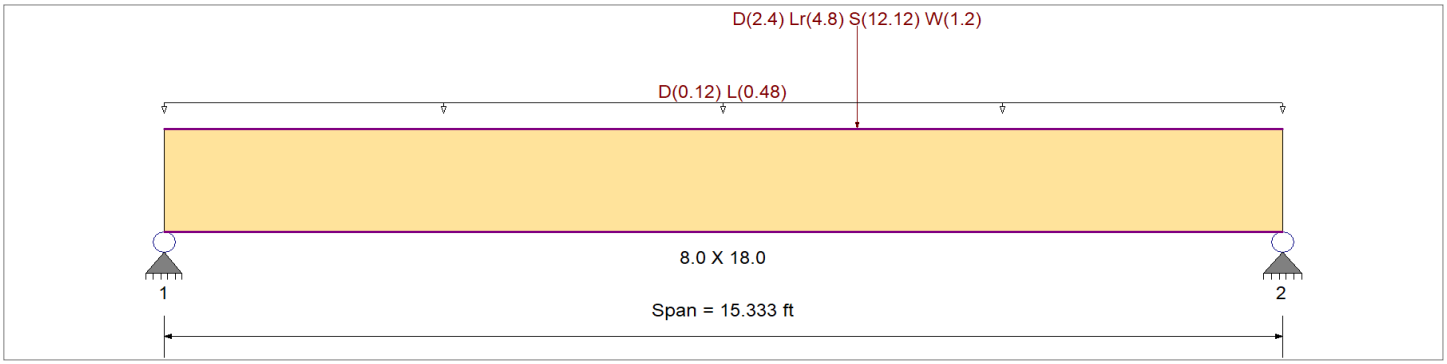
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 12.0 ft
Point Load : D = 2.40, Lr = 4.80, S = 12.120, W = 1.20 k @ 9.50 ft, (Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.996 : 1	Maximum Shear Stress Ratio	=	0.538 : 1
Section used for this span		8.0 X 18.0	Section used for this span		8.0 X 18.0
fb: Actual	=	1,546.63 psi	fv: Actual	=	105.21 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	9.513 ft	Location of maximum on span	=	13.878 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.235 in	Ratio =	781 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.330 in	Ratio =	557 >=180	Span: 1 : +D+0.750L+0.750S+0.450W
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.274	0.152	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.98	332.7	1,215.0	2.23	23.3	153.0
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.521	0.319	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	25.33	703.5	1,350.0	5.21	54.3	170.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.482	0.255	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	29.28	813.4	1,687.5	5.21	54.2	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.996	0.519	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	55.68	1,546.6	1,552.5	9.74	101.5	195.5
+D+0.750Lr+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Copy of Girder #3 Beams

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 15.333 ft	1	0.575	0.328	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	34.92	970.1	1,687.5	6.70	69.8	212.5
+D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.979	0.538	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	54.72	1,520.0	1,552.5	10.10	105.2	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.187	0.103	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	14.57	404.8	2,160.0	2.68	27.9	272.0
+D+0.750Lr+0.750L+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.474	0.269	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	36.87	1,024.2	2,160.0	7.03	73.3	272.0
+D+0.750L+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.729	0.400	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	56.67	1,574.1	2,160.0	10.44	108.7	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.126	0.068	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.78	271.7	2,160.0	1.79	18.6	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.333 ft	1	0.092	0.051	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.19	199.6	2,160.0	1.34	14.0	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.450W	1	0.3299	8.058		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	8.256	11.133
Max Upward from Load Combinations	8.256	11.133
Max Upward from Load Cases	4.611	7.509
D Only	1.833	2.407
+D+L	5.513	6.087
+D+Lr	3.659	5.381
+D+S	6.444	9.916
+D+0.750Lr+0.750L	5.962	7.397
+D+0.750L+0.750S	8.051	10.799
+D+0.60W	2.107	2.853
+D+0.750Lr+0.750L+0.450W	6.168	7.732
+D+0.750L+0.750S+0.450W	8.256	11.133
+0.60D+0.60W	1.374	1.890
+0.60D	1.100	1.444
Lr Only	1.826	2.974
L Only	3.680	3.680
S Only	4.611	7.509
W Only	0.457	0.743

Wood Column

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: Girder #3 Columns

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	9 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.1		
Fb +	1200 psi	Fv	170 psi
Fb -	1200 psi	Ft	825 psi
Fc - Prll	1000 psi	Density	31.21 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name	**8x8**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	8 in	Allow Stress Modification Factors	
Exact Depth	8 in	Cf or Cv for Bending	1.0
Area	64.0 in^2	Cf or Cv for Compressior	1.0
Ix	341.333 in^4	Cf or Cv for Tension	1.0
Iy	341.333 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 9 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 9 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 124.840 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.0 ft, D = 5.730, Lr = 5.087, L = 7.520, S = 18.180, W = 1.80 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3851 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	25.130 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,019.72 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	9.0 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 Only	0.900	0.916	0.1110	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+L	1.000	0.904	0.2311	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+Lr	1.250	0.874	0.1564	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+S	1.150	0.887	0.3683	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750Lr+0.750L	1.250	0.874	0.2188	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L+0.750S	1.150	0.887	0.3851	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.60W	1.600	0.829	0.08166	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750Lr+0.750L+0.450W	1.600	0.829	0.1898	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L+0.750S+0.450W	1.600	0.829	0.3055	PASS	0.0 ft	0.0	PASS	9.0 ft
+0.60D+0.60W	1.600	0.829	0.05409	PASS	0.0 ft	0.0	PASS	9.0 ft
+0.60D	1.600	0.829	0.04137	PASS	0.0 ft	0.0	PASS	9.0 ft

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Girder #3 Columns

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					5.855				
+D+L					13.375				
+D+Lr					10.942				
+D+S					24.035				
+D+0.750Lr+0.750L					15.310				
+D+0.750L+0.750S					25.130				
+D+0.60W					6.935				
+D+0.750Lr+0.750L+0.450W					16.120				
+D+0.750L+0.750S+0.450W					25.940				
+0.60D+0.60W					4.593				
+0.60D					3.513				
Lr Only					5.087				
L Only					7.520				
S Only					18.180				
W Only					1.800				

Maximum Deflections for Load Combinations

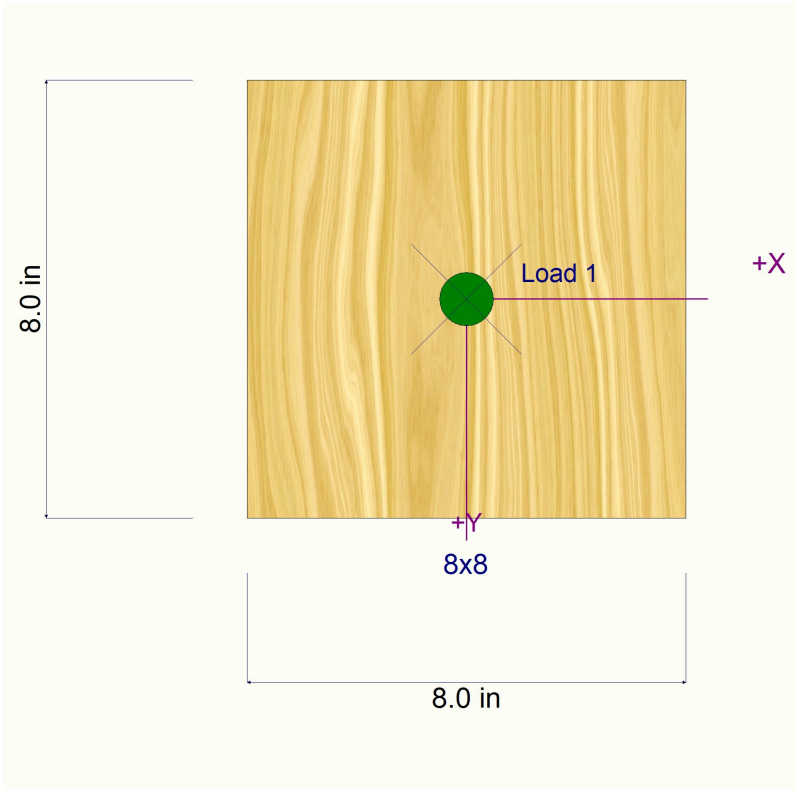
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L+0.750S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

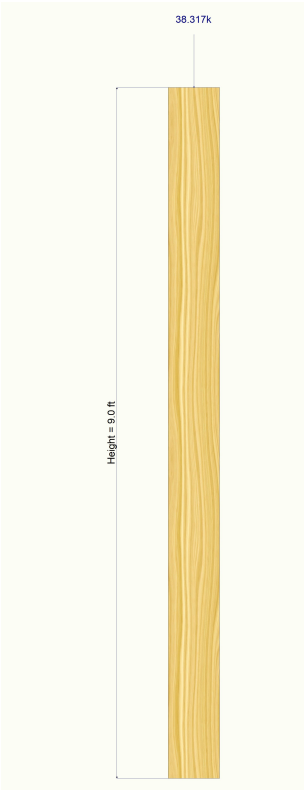
Wood Column

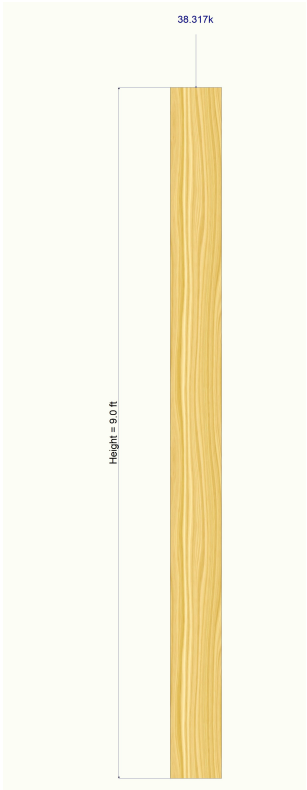
Project File: Dan McEntee.ec6

DESCRIPTION: Girder #3 Columns

Sketches







Wood Beam

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: Girder #1 Beams

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

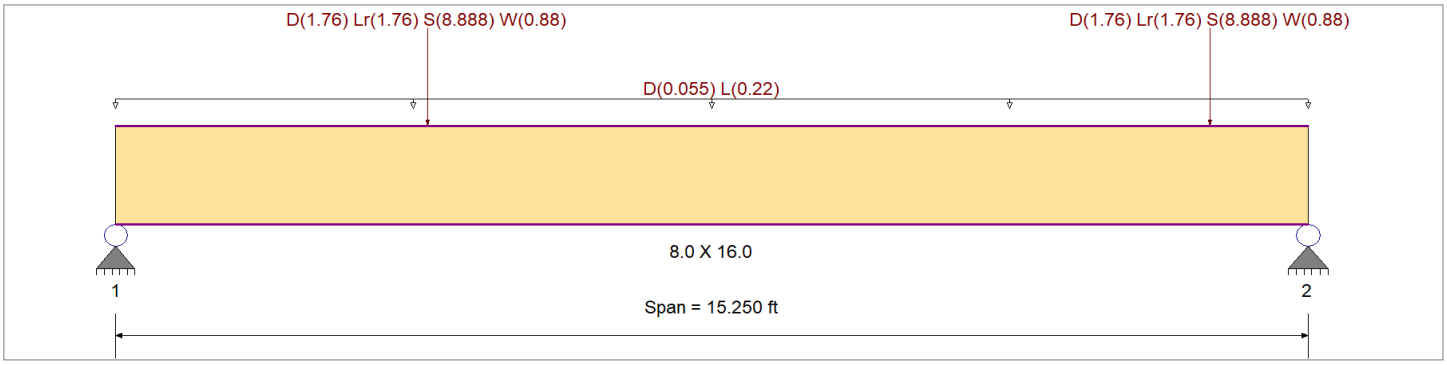
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 5.50 ft
Point Load : D = 1.760, Lr = 1.760, S = 8.888, W = 0.880 k @ 4.0 ft, (Roof)
Point Load : D = 1.760, Lr = 1.760, S = 8.888, W = 0.880 k @ 14.0 ft, (Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.832 : 1	Maximum Shear Stress Ratio	=	0.555 : 1
Section used for this span		8.0 X 16.0	Section used for this span		8.0 X 16.0
fb: Actual	=	1,292.39 psi	fv: Actual	=	108.43 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.007 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	0.251 in	Ratio =	728 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.324 in	Ratio =	564 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.221	0.151	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.63	268.3	1,215.0	1.97	23.1	153.0
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.354	0.232	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.59	477.7	1,350.0	3.36	39.4	170.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.279	0.188	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.40	471.1	1,687.5	3.41	40.0	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.832	0.555	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	36.76	1,292.4	1,552.5	9.25	108.4	195.5

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Girder #1 Beams

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750Lr+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.331	0.226	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.91	559.3	1,687.5	4.10	48.0	212.5
+D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.752	0.508	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	33.20	1,167.0	1,552.5	8.48	99.4	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.152	0.103	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.36	329.2	2,160.0	2.40	28.1	272.0
+D+0.750Lr+0.750L+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.279	0.190	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	17.12	601.9	2,160.0	4.42	51.8	272.0
+D+0.750L+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.561	0.379	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	34.49	1,212.7	2,160.0	8.80	103.2	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.103	0.070	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.31	221.8	2,160.0	1.61	18.9	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.250 ft	1	0.075	0.051	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	161.0	2,160.0	1.18	13.8	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3241	7.291		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	9.359	13.199
Max Upward from Load Combinations	9.359	13.199
Max Upward from Load Cases	7.285	10.491
D Only	2.074	2.708
+D+L	3.751	4.386
+D+Lr	3.516	4.786
+D+S	9.359	13.199
+D+0.750Lr+0.750L	4.414	5.524
+D+0.750L+0.750S	8.796	11.834
+D+0.60W	2.506	3.331
+D+0.750Lr+0.750L+0.450W	4.738	5.992
+D+0.750L+0.750S+0.450W	9.120	12.302
+0.60D+0.60W	1.677	2.248
+0.60D	1.244	1.625
Lr Only	1.443	2.077
L Only	1.678	1.678
S Only	7.285	10.491
W Only	0.721	1.039

FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Steamboat	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Building Code:	2021	International Residential Code	
Roof Dead Load:	20	PSF	
Ground Snow Load:	130	PSF	
Roof Snow/Live Load:	101	PSF	= 130 psf x 0.7 x 1.1
Floor Dead Load:	10	PSF	
Floor Live Load:	40	PSF	
Deck Live load:	60	PSF	
Wind Speed (Basic):	115	MPH	
Building Enclosure:	Fully Enclosed		
Exposure:	C		
Seismic Design Category:	C		
Importance Category:	II		

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Steamboat	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Drifting on Lower Roofs:

Drift Weight:

$$\gamma = 0.13p_g + 14\ (Not\ to\ exceed\ 30\ psf)$$
$$\gamma = 0.13 * 130 + 14$$
$$\gamma = 30psf$$

Drift Height (lean-to):

$$h_d = \left(0.43\sqrt[3]{l_u}\sqrt[4]{p_g + 10}\right) - 1.5$$
$$h_d = \left(0.43\sqrt[3]{39}\sqrt[4]{130 + 10}\right) - 1.5$$
$$h_d = 3.5\ ft$$

Drift Load (lean-to):

$$p_d = h_d * \gamma$$
$$p_d = 3.5ft * 30psf$$
$$p_d = 105psf$$

Drift Width (lean-to):

$$w = 4 * h_d$$
$$w = 4 * 3.5ft$$
$$w = 14\ ft$$

Sliding Snow:

$$S = 0.4p_f W/15'$$
$$S = 0.4 * 101psf\ *39'/15'$$
$$S = 105\ \text{psf}$$

MecaWind v2478

Calculations Prepared by:
Date: Aug 20, 2024
File Location: Current Project Not Saved

General:

Wind Load Standard	=	ASCE 7-16	Basic Wind Speed	=	115.0 mph
Exposure Classification	=	C	Risk Category	=	II
Structure Type	=	Building	Design Basis for Wind Pressures	=	ASD
MWFRS Analysis Method	=	Ch 27 Pt 1	C&C Analysis Method	=	Ch 30 Pt 1
Dynamic Type of Structure	=	Rigid	Show Advanced Options	=	True
Reset Advanced Options to Default Values	=	Defaults	Simple Diaphragm Building	=	False
Show Base Reactions in Output	=	None	Altitude above Sea Level	=	0.000 ft
Base Elevation Of Structure	=	0.000 ft	MWFRS Pressure Elevations	=	Mean Ht
Topographic Effects	=	None	Override Directionality Factor K_d	=	False
Override the Gust Factor G	=	False	Override Minimum Pressure	=	False

Building:

Roof	=	Roof Type	= Monoslope	Encl	=	Enclosure Classification	= Enclosed
Help	=	Help on Building Roof Type	= Help	Pitch	=	Pitch of Roof	= 3.0 :12
θ	=	Slope of Roof	= 14.04 Deg	R_{Ht}	=	Ridge Height	= 22.502 ft
E_{Ht}	=	Eave Height	= 14.000 ft	W	=	Building Width	= 34.000 ft
L	=	Building Length	= 44.000 ft	OH	=	Type of Overhang	= All Overhang
Par	=	Parapet	= None	HT_{over}	=	Override Mean Roof Height	= False
Ht_{man}	=	Mean Roof Height	= 18.251 ft	RA_{over}	=	Override Roof Area	= False
GC_{pi_o}	=	Override GC_{pi} value	= False		=		

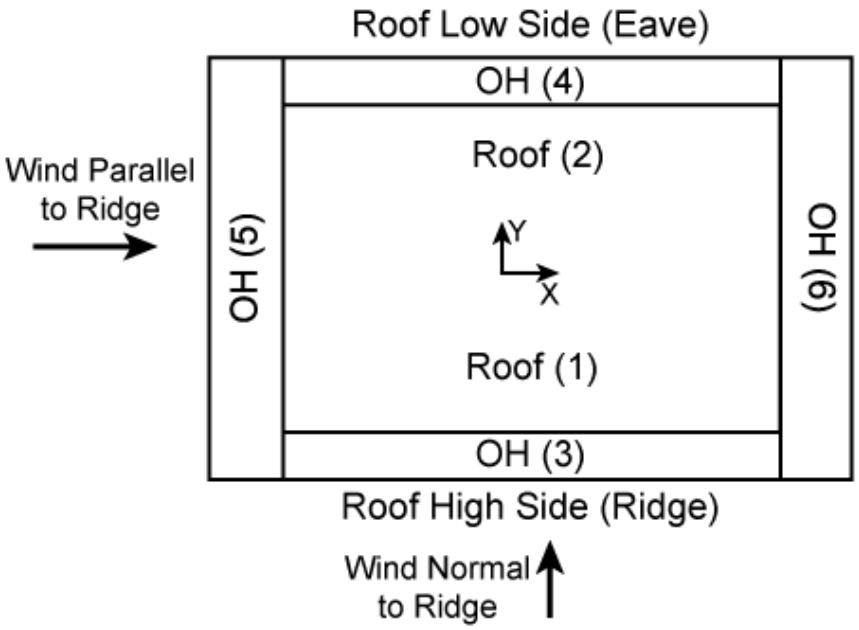
Exposure Constants [Tbl 26.11-1]:

α = 3-s Gust-speed exponent	=	9.500	Z_g = Nominal Ht of Boundary Layer	=	900.000 ft
â = Reciprocal of α	=	0.105	b = 3 sec gust speed factor	=	1.000
α_m = Mean hourly Wind-Speed Exponent	=	0.154	b_m = Mean hourly Windspeed Exponent	=	0.650
c = Turbulence Intensity Factor	=	0.200	ε = Integral Length Scale Exponent	=	0.2000

Overhang Inputs:

Std	=	Overhangs on all sides are the same	=	True
OHType	=	Type of Roof Wall Intersections	=	Overhang
OH	=	Overhang of Roof Beyond Wall	=	2.000 ft

Main Wind Force Resisting System (MWFRS) Wind Calculations per Ch 27 Pt1



h	=	Mean structure height	=	18.251 ft
h_{grade}	=	Elevation from Grade to Top of Structure	=	18.251 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	=	0.885
K_{zt}	=	No Topographic feature specified	=	1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	=	0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	=	+0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	=	-0.18
LF	=	Load Factor based upon ASD Design	=	0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	=	1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	15.28 psf
RA	=	Roof Area	=	1880.16 ft^2
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	15.28 psf
q_{in}	=	Negative Internal Pressure: $q_h \cdot LF$	=	15.28 psf
q_{ip}	=	Positive Internal Pressure: $q_h \cdot LF$	=	15.28 psf

MWFRS Wind Loads [Normal to Ridge]

h	=	Mean Roof Height Of Building	=	18.251 ft
RHt	=	Ridge Height Of Roof	=	22.502 ft
B	=	Horizontal Dimension Of Building Normal To Wind Direction	=	44.000 ft
L	=	Horizontal Dimension Of building Parallel To Wind Direction	=	34.000 ft
L/B	=	Ratio Of L/B used For Cp determination	=	0.773
h/L	=	Ratio Of h/L used For Cp determination	=	0.537
Slope	=	Slope Of Roof	=	14.04 Deg

Gust Factor Calculation for Wind: [Normal to Ridge]

Gust Factor Category I Rigid Structures - Simplified Method

G_1	=	Simplified: For Rigid Structures can use 0.85	=	0.85

Gust Factor Category II Rigid Structures - Complete Analysis

Z_m	=	Equiv Struc Height: Max(0.6•h, Z_{min})	=	15.000 ft
I_{zm}	=	Turbulence Intensity: $c \cdot (33/Z_m)^{1/6}$ [Eq 26.11-1]	=	0.228
L_{zm}	=	Turbulence Integral Length Scale: $\ell \cdot (Z_m/33)^{\varepsilon}$ [Eq 26.11-9]	=	427.057 ft
B	=	Building Width Width Normal to Wind Direction	=	44.000 ft
Q	=	$[1/(1+0.63 \cdot [(B+h)/L_{zm}]^{0.63})]^{0.5}$ [Eq 26.11-8]	=	0.918
G_2	=	Detailed: $0.925 \cdot [(1+1.7 \cdot g_q \cdot I_{zm} \cdot Q)/(1+1.7 \cdot g_v \cdot I_{zm})]$ [Eq 26.11-6]	=	0.882

Gust Factor Used in Analysis

G	=	Gust Factor: Min(G_1, G_2)	=	0.850

Cp_{WW}	=	Windward Wall Coefficient (All L/B Values)	=	0.800
Cp_{LW}	=	Leeward Wall Coefficient using L/B	=	-0.500
Cp_{SW}	=	Side Wall Coefficient (All L/B values)	=	-0.700

Wind Pressures [Normal to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Elev ft	GC_{pi} Windward	GC_{pi} Leeward	q_i psf	K_z	K_{zt}	q_z psf	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
22.502	+0.18	+0.18	15.28	0.925	1.000	15.96	8.11	-9.24	-11.84	17.35	9.60
18.251	+0.18	+0.18	15.28	0.885	1.000	15.28	7.64	-9.24	-11.84	16.88	9.60
14.000	+0.18	+0.18	15.28	0.849	1.000	14.66	7.22	-9.24	-11.84	16.46	9.60
22.502	-0.18	-0.18	15.28	0.925	1.000	15.96	13.60	-3.74	-6.34	17.35	9.60
18.251	-0.18	-0.18	15.28	0.885	1.000	15.28	13.14	-3.74	-6.34	16.88	9.60
14.000	-0.18	-0.18	15.28	0.849	1.000	14.66	12.72	-3.74	-6.34	16.46	9.60

K_z = $2.01 \cdot (z_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]
GC_{pi} = Enclosed Internal Pressure Tbl 26.13-1
q_{ip} = Positive Internal Pressure: $q_h \cdot LF$
Side = $q_h \cdot G \cdot Cp_{SW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Windward = $q_z \cdot G \cdot Cp_{WW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]

K_{zt} = No Topographic feature specified
q_z = $0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]
q_{in} = Negative Internal Pressure: $q_h \cdot LF$
Leeward = $q_h \cdot G \cdot Cp_{LW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Total = Windward - Leeward

- *Minimum Pressure: § 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Roof Wind Pressures [Normal to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Component	Description	Location	Start ft	End ft	GC_{pi}	C_{pMin}	C_{pMax}	$P_{C_{pMin}}$ psf	$P_{C_{pMax}}$ psf	P_{min} psf
OH_Bot	Overhang Bottom	3	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top	3,4,5,6	All	All	+0.18	-0.509	-0.509	-9.36	-9.36	4.80
Roof	Roof Leeward	4	All	All	+0.18	-0.509	-0.509	-9.36	-9.36	4.80
OH_Bot	Overhang Bottom	3	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top	3,4,5,6	All	All	-0.18	-0.509	-0.509	-3.86	-3.86	4.80

Roof	Roof Leeward	4	All	All	-0.18	-0.509	-0.509	-3.86	-3.86	4.80

Roof Pressures based upon Ch 27 Pt1:

Component = The building component for pressures | *Location = Reference Graphic in Output for Values*

Start = Start Dist from Windward Edge | *End = End Dist from Windward Edge*

C_{pMin} = Smallest Coefficient Magnitude | *C_{pMax} = Largest Coefficient Magnitude*

P_{CpMin} = $q_h \cdot G \cdot C_{pMin} - q_{ip} \cdot GC_{pi}$ [Eq 27.3-1] | *P_{CpMax} = $q_h \cdot G \cdot C_{pMax} - q_{in} \cdot GC_{pi}$ [Eq 27.3-1]*

P_{min} = Min Press projected on vertical plane [§ 27.1.5]

- *0.800 Reduction Factor applied for h/L>=1 & 10<=Slope<=15 Deg*
- *The smaller uplift pressures due to C_{pMin} can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

MWFRS Wind Loads [Normal to Eave]

h	=	Mean Roof Height Of Building	= 18.251 ft
RHt	=	Ridge Height Of Roof	= 22.502 ft
B	=	Horizontal Dimension Of Building Normal To Wind Direction	= 44.000 ft
L	=	Horizontal Dimension Of building Parallel To Wind Direction	= 34.000 ft
L/B	=	Ratio Of L/B used For Cp determination	= 0.773
h/L	=	Ratio Of h/L used For Cp determination	= 0.537
Slope	=	Slope Of Roof	= 14.04 Deg

Gust Factor Calculation for Wind: [Normal to Eave]

Gust Factor Category I Rigid Structures - Simplified Method

G_1	=	Simplified: For Rigid Structures can use 0.85	= 0.85

Gust Factor Category II Rigid Structures - Complete Analysis

Z_m	=	Equiv Struc Height: Max(0.6•h, Z_{min})	= 15.000 ft
I_{zm}	=	Turbulence Intensity: $c \cdot (33/Z_m)^{1/6}$ [Eq 26.11-1]	= 0.228
L_{zm}	=	Turbulence Integral Length Scale: $\ell \cdot (Z_m/33)^{\varepsilon}$ [Eq 26.11-9]	= 427.057 ft
B	=	Building Width Width Normal to Wind Direction	= 44.000 ft
Q	=	$[1/(1+0.63 \cdot [(B+h)/L_{zm}]^{0.63})]^{0.5}$ [Eq 26.11-8]	= 0.918
G_2	=	Detailed: $0.925 \cdot [(1+1.7 \cdot g_q \cdot I_{zm} \cdot Q)/(1+1.7 \cdot g_v \cdot I_{zm})]$ [Eq 26.11-6]	= 0.882

Gust Factor Used in Analysis

G	=	Gust Factor: Min(G_1, G_2)	= 0.850

Cp_{WW}	=	Windward Wall Coefficient (All L/B Values)	= 0.800
Cp_{LW}	=	Leeward Wall Coefficient using L/B	= -0.500
Cp_{SW}	=	Side Wall Coefficient (All L/B values)	= -0.700

Wind Pressures [Normal to Eave]
All wind pressures include a Load Factor (LF) of 0.6

Elev ft	GC_{pi} Windward	GC_{pi} Leeward	q_i psf	K_z	K_{zt}	q_z psf	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
14.000	+0.18	+0.18	15.28	0.849	1.000	14.66	7.22	-9.24	-11.84	16.46	9.60
14.000	-0.18	-0.18	15.28	0.849	1.000	14.66	12.72	-3.74	-6.34	16.46	9.60

K_z = $2.01 \cdot (z_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1] | *K_{zt} = No Topographic feature specified*

GC_{pi} = Enclosed Internal Pressure Tbl 26.13-1 | *q_z = $0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]*

q_{ip} = Positive Internal Pressure: $q_h \cdot LF$ | *q_{in} = Negative Internal Pressure: $q_h \cdot LF$*

Side = $q_h \cdot G \cdot Cp_{SW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1] | *Leeward = $q_h \cdot G \cdot Cp_{LW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]*

Windward = $q_z \cdot G \cdot Cp_{WW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1] | *Total = Windward - Leeward*

- *Minimum Pressure: § 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Roof Wind Pressures [Normal to Eave]
All wind pressures include a Load Factor (LF) of 0.6

Component	Description	Location	Start ft	End ft	GC_{pi}	C_{pMin}	C_{pMax}	P_{CpMin} psf	P_{CpMax} psf	P_{min} psf
OH_Bot	Overhang Bottom	4	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top	4,5,6	All	All	0	-0.180	-0.762	-2.34	-9.89	4.80
Roof	Roof Windward	3	All	All	+0.18	-0.180	-0.762	-5.09	-12.64	4.80
OH_Bot	Overhang Bottom	4	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top	4,5,6	All	All	0	-0.180	-0.762	-2.34	-9.89	4.80
Roof	Roof Windward	3	All	All	-0.18	-0.180	-0.762	0.41	-7.14	4.80

Roof Pressures based upon Ch 27 Pt1:

Component = The building component for pressures | *Location = Reference Graphic in Output for Values*

Start = Start Dist from Windward Edge | *End = End Dist from Windward Edge*

C_{pMin} = Smallest Coefficient Magnitude | C_{pMax} = Largest Coefficient Magnitude

$P_{C_{pMin}}$ = $q_h \cdot G \cdot C_{pMin} - q_{ip} \cdot GC_{pi}$ [Eq 27.3-1] | $P_{C_{pMax}}$ = $q_h \cdot G \cdot C_{pMax} - q_{in} \cdot GC_{pi}$ [Eq 27.3-1]

P_{min} = Min Press projected on vertical plane [§ 27.1.5]

- 0.800 Reduction Factor applied for h/L>=1 & (0 to h/2)
- The smaller uplift pressures due to C_{pMin} can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7
- Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface

MWFRS Wind Loads [Parallel to Ridge]

h	=	Mean Roof Height Of Building	=	18.251 ft
RHt	=	Ridge Height Of Roof	=	22.502 ft
B	=	Horizontal Dimension Of Building Normal To Wind Direction	=	34.000 ft
L	=	Horizontal Dimension Of building Parallel To Wind Direction	=	44.000 ft
L/B	=	Ratio Of L/B used For Cp determination	=	1.294
h/L	=	Ratio Of h/L used For Cp determination	=	0.415
Slope	=	Slope Of Roof	=	14.04 Deg

Gust Factor Calculation for Wind: [Parallel to Ridge]

Gust Factor Category I Rigid Structures - Simplified Method

G_1	=	Simplified: For Rigid Structures can use 0.85	=	0.85

Gust Factor Category II Rigid Structures - Complete Analysis

Z_m	=	Equiv Struc Height: Max(0.6•h, Z_{min})	=	15.000 ft
I_{zm}	=	Turbulence Intensity: $c \cdot (33/Z_m)^{1/6}$ [Eq 26.11-1]	=	0.228
L_{zm}	=	Turbulence Integral Length Scale: $\ell \cdot (Z_m/33)^{\varepsilon}$ [Eq 26.11-9]	=	427.057 ft
B	=	Building Width Width Normal to Wind Direction	=	34.000 ft
Q	=	$[1/(1+0.63 \cdot [(B+h)/L_{zm}]^{0.63})]^{0.5}$ [Eq 26.11-8]	=	0.925
G_2	=	Detailed: $0.925 \cdot [(1+1.7 \cdot g_q \cdot I_{zm} \cdot Q)/(1+1.7 \cdot g_v \cdot I_{zm})]$ [Eq 26.11-6]	=	0.886

Gust Factor Used in Analysis

G	=	Gust Factor: Min(G_1, G_2)	=	0.850

Cp_{WW}	=	Windward Wall Coefficient (All L/B Values)	=	0.800
Cp_{LW}	=	Leeward Wall Coefficient using L/B	=	-0.441
Cp_{SW}	=	Side Wall Coefficient (All L/B values)	=	-0.700

Wind Pressures [Parallel to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Elev ft	GC_{pi} Windward	GC_{pi} Leeward	q_i psf	K_z	K_{zt}	q_z psf	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
22.502	+0.18	+0.18	15.28	0.925	1.000	15.96	8.11	-8.48	-11.84	16.58	9.60
18.251	+0.18	+0.18	15.28	0.885	1.000	15.28	7.64	-8.48	-11.84	16.12	9.60
14.000	+0.18	+0.18	15.28	0.849	1.000	14.66	7.22	-8.48	-11.84	15.70	9.60
22.502	-0.18	-0.18	15.28	0.925	1.000	15.96	13.60	-2.98	-6.34	16.58	9.60
18.251	-0.18	-0.18	15.28	0.885	1.000	15.28	13.14	-2.98	-6.34	16.12	9.60
14.000	-0.18	-0.18	15.28	0.849	1.000	14.66	12.72	-2.98	-6.34	15.70	9.60

K_z = 2.01•$(z_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1] | K_{zt} = No Topographic feature specified

GC_{pi} = Enclosed Internal Pressure Tbl 26.13-1 | q_z = $0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]

q_{ip} = Positive Internal Pressure: $q_h \cdot LF$ | q_{in} = Negative Internal Pressure: $q_h \cdot LF$

Side = $q_h \cdot G \cdot Cp_{SW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1] | Leeward = $q_h \cdot G \cdot Cp_{LW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]

Windward = $q_z \cdot G \cdot Cp_{WW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1] | Total = Windward - Leeward

- Minimum Pressure: § 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls
- Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface

Roof Wind Pressures [Parallel to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Component	Description	Location	Start ft	End ft	GC_{pi}	C_{pMin}	C_{pMax}	$P_{C_{pMin}}$ psf	$P_{C_{pMax}}$ psf	P_{min} psf
OH_Bot	Overhang Bottom	5	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top (0 to h)	3,4,5	0.000	18.251	0	-0.900	-0.180	-11.69	-2.34	4.80
OH_Top	Overhang Top (h to 2*h)	3,4	18.251	36.502	0	-0.500	-0.180	-6.49	-2.34	4.80
OH_Top	Overhang Top (>= 2*h)	3,4,6	36.502	48.000	0	-0.300	-0.180	-3.90	-2.34	4.80
Roof	Roof (0 to h)	All	2.000	18.251	+0.18	-0.900	-0.180	-14.44	-5.09	4.80
Roof	Roof (h to 2*h)	All	18.251	36.502	+0.18	-0.500	-0.180	-9.24	-5.09	4.80
Roof	Roof (>= 2*h)	All	36.502	46.000	+0.18	-0.300	-0.180	-6.64	-5.09	4.80
OH_Bot	Overhang Bottom	5	All	All	0	0.800	0.800	10.39	10.39	4.80
OH_Top	Overhang Top (0 to h)	3,4,5	0.000	18.251	0	-0.900	-0.180	-11.69	-2.34	4.80
OH_Top	Overhang Top (h to 2*h)	3,4	18.251	36.502	0	-0.500	-0.180	-6.49	-2.34	4.80
OH_Top	Overhang Top (>= 2*h)	3,4,6	36.502	48.000	0	-0.300	-0.180	-3.90	-2.34	4.80
Roof	Roof (0 to h)	All	2.000	18.251	-0.18	-0.900	-0.180	-8.94	0.41	4.80

Roof	Roof (h to 2*h)	All	18.251	36.502	-0.18	-0.500	-0.180	-3.74	0.41	4.80
Roof	Roof (>= 2*h)	All	36.502	46.000	-0.18	-0.300	-0.180	-1.15	0.41	4.80

Roof Pressures based upon Ch 27 Pt1:

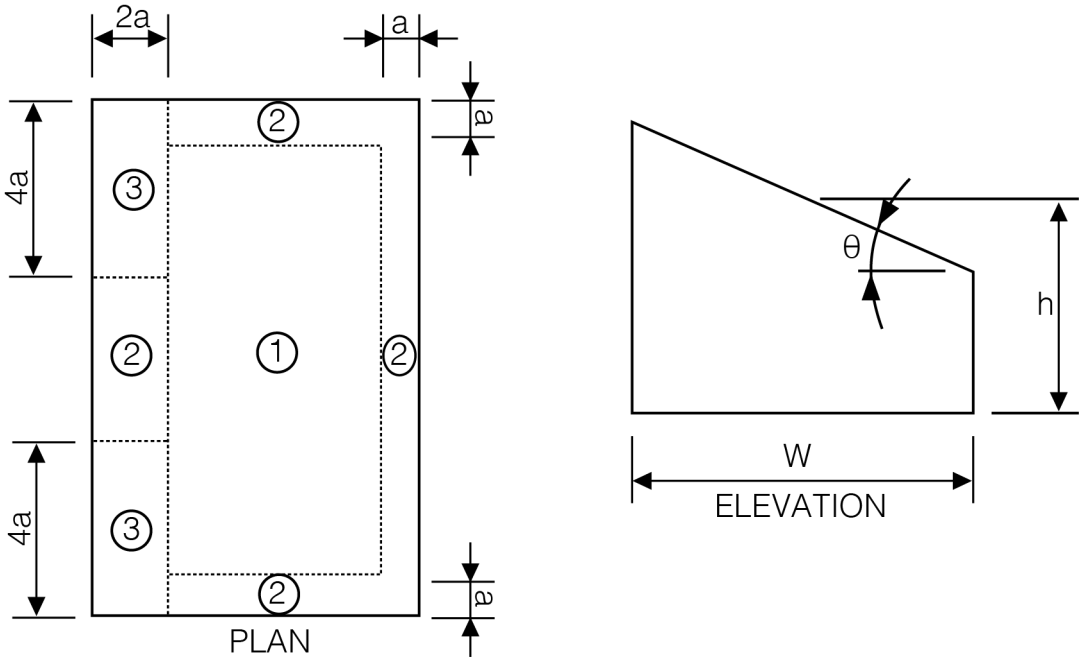
Component = The building component for pressures
Start = Start Dist from Windward Edge
C_{pMin} = Smallest Coefficient Magnitude
P_{cpMin} = $q_h \cdot G \cdot C_{pMin} - q_{ip} \cdot GC_{pi}$ [Eq 27.3-1]

Location = Reference Graphic in Output for Values
End = End Dist from Windward Edge
C_{pMax} = Largest Coefficient Magnitude
P_{cpMax} = $q_h \cdot G \cdot C_{pMax} - q_{in} \cdot GC_{pi}$ [Eq 27.3-1]

P_{min} = Min Press projected on vertical plane [§ 27.1.5]

- *No reduction factor was applicable*
- *The smaller uplift pressures due to C_{pMin} can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Components and Cladding (C&C) Wind Loads per Ch 30 Part 1 Roof & Wall



h/W	=	Ratio of mean roof height to building width	= 0.537
h/L	=	Ratio of mean roof height to building length	= 0.415
h	=	Mean structure height	= 18.251 ft
h_{grade}	=	Elevation from Grade to Top of Structure	= 18.251 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	= 0.885
K_{zt}	=	No Topographic feature specified	= 1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	= 0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	= +0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	= -0.18
LF	=	Load Factor based upon ASD Design	= 0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	= 1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	= 15.28 psf
LHD	=	Least Horizontal Dimension: Min(B, L)	= 34.000 ft
a_1	=	Min(0.1•LHD, 0.4•h)	= 3.400 ft
a	=	Max(a_1, 0.04•LHD, 3 ft [0.9 m])	= 3.400 ft
h/B	=	Ratio of mean roof height to least horizontal dim: h/B	= 0.537

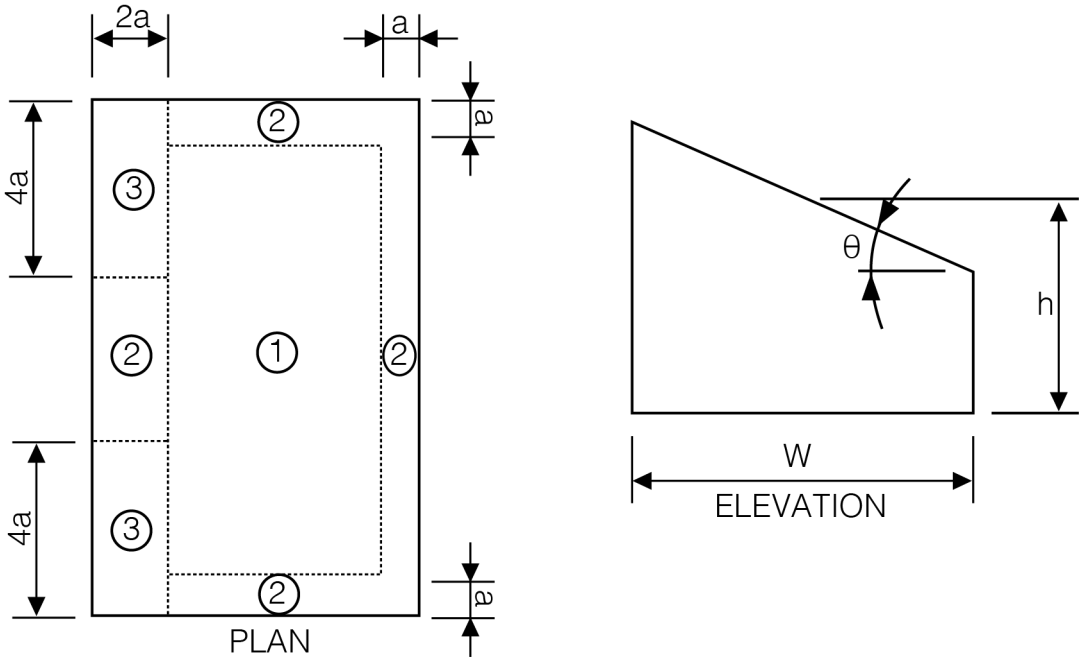
Wind Pressures for C&C Ch 30 Pt 1 Roof & Wall
All wind pressures include a Load Factor (LF) of 0.6

Description	Zone	Width ft	Span ft	Area ft^2	1/3 Rule	Figure	GCp Max	GCp Min	p Max psf	p Min psf
Purlins	2	2.000	13.000	56.33	Yes	30.3-5B	0.325	-1.300	9.60	-22.60
Bents	2	12.000	12.000	144.00	No	30.3-5B	0.300	-1.200	9.60	-21.08
Studs	4	1.333	10.000	33.33	Yes	30.3-1	0.908	-1.008	16.61	-18.14
Columns	4	4.000	10.000	40.00	No	30.3-1	0.894	-0.994	16.40	-17.93

Area = Span Length x Effective Width
1/3 Rule = Effective width need not be less than 1/3 of the span length
GCp = External Pressure Coefficients taken from Figures 30.3-1 through 30.3-7
p = Wind Pressure: $q_h \cdot [GC_p - GC_{pi}]$ [[Eq 30.3-1]]
** Per § 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}*

Components and Cladding (C&C) Zone Summary per Ch 30 Pt 1:

h/W	=	Ratio of mean roof height to building width	=	0.537
h/L	=	Ratio of mean roof height to building length	=	0.415
h	=	Mean structure height	=	18.251 ft
h_{grade}	=	Elevation from Grade to Top of Structure	=	18.251 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	=	0.885
K_{zt}	=	No Topographic feature specified	=	1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	=	0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	=	+0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	=	-0.18
LF	=	Load Factor based upon ASD Design	=	0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	=	1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	15.28 psf
LHD	=	Least Horizontal Dimension: Min(B, L)	=	34.000 ft
a_1	=	Min(0.1•LHD, 0.4•h)	=	3.400 ft
a	=	Max(a_1, 0.04•LHD, 3 ft [0.9 m])	=	3.400 ft
h/B	=	Ratio of mean roof height to least horizontal dim: h/B	=	0.537



Wind Pressure Summary for C&C Zones based Upon Areas Ch 30 Pt 1 (Table 1 of 2)
All wind pressures include a Load Factor (LF) of 0.6

Zone	Figure	Pos A ≤ 10 ft² psf	Neg A ≤ 10 ft² psf	Pos A = 20 ft² psf	Neg A = 20 ft² psf	Pos A = 50 ft² psf	Neg A = 50 ft² psf
1	30.3-5B	9.60	-22.61	9.60	-21.69	9.60	-20.47
2	30.3-5B	9.60	-27.19	9.60	-25.35	9.60	-22.92
3	30.3-5B	9.60	-47.05	9.60	-42.91	9.60	-37.44
4	30.3-1	18.02	-19.55	17.21	-18.74	16.14	-17.67
5	30.3-1	18.02	-24.13	17.21	-22.51	16.14	-20.36
1_OH	30.3-5B/30.3-1	9.60	-35.13	9.60	-33.40	9.60	-31.11
2_OH	30.3-5B/30.3-1	9.60	-39.72	9.60	-37.06	9.60	-33.56
3_OH	30.3-5B/30.3-1	9.60	-59.57	9.60	-54.62	9.60	-48.08

Wind Pressure Summary for C&C Zones based Upon Areas Ch 30 Pt 1 (Table 2 of 2)
All wind pressures include a Load Factor (LF) of 0.6

Zone	Figure	Pos A = 100 ft² psf	Neg A = 100 ft² psf	Pos A = 200 ft² psf	Neg A = 200 ft² psf	Pos A > 500 ft² psf	Neg A > 500 ft² psf
1	30.3-5B	9.60	-19.55	9.60	-19.55	9.60	-19.55
2	30.3-5B	9.60	-21.08	9.60	-21.08	9.60	-21.08
3	30.3-5B	9.60	-33.30	9.60	-33.30	9.60	-33.30
4	30.3-1	15.33	-16.86	14.52	-16.04	13.44	-14.97
5	30.3-1	15.33	-18.74	14.52	-17.12	13.44	-14.97

1_OH	30.3-5B/30.3-1	9.60	-29.38	9.60	-28.57	9.60	-27.50
2_OH	30.3-5B/30.3-1	9.60	-30.91	9.60	-30.10	9.60	-29.02
3_OH	30.3-5B/30.3-1	9.60	-43.13	9.60	-42.32	9.60	-41.24

** A is effective wind area for C&C: Span Length * Effective Width*
** Effective width need not be less than 1/3 of the span length*
** Maximum and minimum values of pressure shown.*
** + Pressures acting toward surface, - Pressures acting away from surface*
** Per § 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}*
** Interpolation can be used for values of A that are between those values shown.*

FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Steamboat	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Purlins

Dead Load:	20	PSF
Snow/Live Load:	101	PSF
$Wind_1$:	9.6	PSF
$Wind_2$:	-22.6	PSF

Load Combinations

D + L:	121	PSF
D + 0.6W$_1$:	25.8	PSF
D + 0.6W$_2$:	6.4	PSF
D+0.75(0.6W$_1$)+0.75L:	100.1	PSF
D+0.75(0.6W$_2$)+0.75L:	85.6	PSF
0.6D + 0.6W$_1$:	17.8	PSF
0.6D + 0.6W$_2$:	-1.6	PSF

Roof Bents

Dead Load:	20	PSF
Snow/Live Load:	101	PSF
$Wind_1$:	9.6	PSF
$Wind_2$:	-21.08	PSF

Load Combinations

D + L:	121	PSF
D + 0.6W$_1$:	25.8	PSF
D + 0.6W$_2$:	7.4	PSF
D+0.75(0.6W$_1$)+0.75L:	100.1	PSF
D+0.75(0.6W$_2$)+0.75L:	86.3	PSF
0.6D + 0.6W$_1$:	17.8	PSF
0.6D + 0.6W$_2$:	-0.6	PSF

Floor Load

Dead Load:	10	PSF
Live Load:	40	PSF

Load Combinations

D + L:	50	PSF

Studs

Dead Load:	N/A	PSF
Snow/Live Load:	N/A	PSF
$Wind_1$:	16.61	PSF
$Wind_2$:	-18.14	PSF

Load Combinations

W$_1$:	16.61	PSF
W$_2$:	-18.14	PSF

Columns

Dead Load:	N/A	PSF
Snow/Live Load:	N/A	PSF
$Wind_1$:	16.4	PSF
$Wind_2$:	-17.93	PSF

Load Combinations

W$_1$:	16.4	PSF
W$_2$:	-17.93	PSF

FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Steamboat	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Analysis Transverse

Roof Height: 0 ft End Zone: 6.8 ft

Upper Level: Walls not to be less than 16 psf and roofs less than 8 psf.

17.35 psf x 5.5 ' x 6.8 ' = 649 # (Zone Wall)
17.35 psf x 5.5 ' x 15.2 ' = 1450 # (Zone Wall)
Total Shear = 2099 #

Main Level: Roof Height: 0 ft

17.35 psf x 10.5 ' x 6.8 ' = 1239 # (Zone Wall)
17.35 psf x 10.5 ' x 15.2 ' = 2769 # (Zone Wall)
Total Shear = 4008 #
Total Shear (Upper + Main) = 6107 #

Seismic Shear < Wind Shear -> Use Wind Shear 6107 #

Wall Height: 10 ft

West Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 7 ft

Openings In wall: 8.75 ft Total Wall Length: 34 ft

Shear = 6107 lb / 25.25 ft = 242 PLF

Shear capacity of 1/2" OSB with 8D nails @ 4" O.C. edge = 396 plf

396 plf > 242 plf -> OKAY

Overturning = 6107 # - 7 psf x 25.25 ft x 10.0 ft = 4340 #

= 4339.5 # x 10.0 ft / 25.25 ft = 1719 # @ Openings

Overturning Corners Only: 1719 # / 0.72 = 2374 #

Tension Capacity of Simpson HDU8-SDS2.5 into 3.5" wood w/ 0.875" x 12" A.B. 5995# > 2374# -> Okay

Tension Capacity of Simpson CMST14 Straps 6,475# > 5764# -> Okay

Wall Height: 10 ft

East Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 10 ft

Openings In wall: 15 ft Total Wall Length: 34 ft

Shear = 6107 lb / 19 ft = 321 PLF

Shear capacity of 1/2" OSB with 8D nails @ 4" O.C. edge = 396 plf

396 plf > 321 plf -> OKAY

Overturning = 6107 # - 7 psf x 19 ft x 10.0 ft = 4777 #

= 4777 # x 10.0 ft / 19 ft = 2514 # @ Openings

Overturning Corners Only: 2514 # / 0.54 = 4696 #

Tension Capacity of Simpson HDU5-SDS2.5 into 3.5" wood w/ 0.625" x 12" A.B. 4340# > 4696# -> Okay

Tension Capacity of Simpson CMST14 Straps 6,475# > 3581# -> Okay

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Steamboat	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Analysis Longitudinal

End Zone: 0 ft

Upper Level:

16.46 psf x 17.0 ' x 2.0 ' = 560 # (Zone Wall)

16.46 psf x 17.0 ' x 4.3 ' = 1189 # (Zone Wall)

Total Shear = 1749 #

Main Level:

16.46 psf x 10.5 ' x 17.0 ' = 2938 # (Zone Wall)

Total Shear = 2938 #

Total Shear (Upper + Main) = 4687 #

Seismic Shear < Wind Shear -> Use Wind Shear 4687 PSF

Wall Height: 10 ft

North Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 7 ft

Openings In wall: 9 ft Total Wall Length: 44 ft

Shear = 4687 lb / 35 ft = 134 PLF

Shear capacity of 1/2" OSB with 8D nails @ 6" O.C. edge = 258 plf

257.6 plf > 134 plf -> OKAY

Overturning = 4687 # - 7 psf x 35 ft x 10.0 ft = 2237 #

= 2237 # x 10.0 ft / 35 ft = 639 # @ Openings

Overturning Corners Only: 639 # / 0.77 = 834 #

Wall Height: 12 ft

South Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 7 ft

Openings In wall: 23.25 ft Total Wall Length: 44 ft

Shear = 4687 lb / 20.75 ft = 226 PLF

Shear capacity of 1/2" OSB with 8D nails @ 3" O.C. edge = 506 plf

506 plf > 226 plf -> OKAY

Overturning = 4687 # - 7 psf x 20.75 ft x 12.0 ft = 2944 #

= 2944 # x 12.0 ft / 20.75 ft = 1703 # @ Openings

Overturning Corners Only: 1703 # / 0.66 = 2586 #

Tension Capacity of Simpson HDU5-SDS2.5 into 3.5" wood w/ 0.625" x 12" A.B. 4340# > 2586# -> Okay

Tension Capacity of Simpson CMST14 Straps 6,475# > 2423# -> Okay

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Steamboat	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Analysis Longitudinal

End Zone: 0 ft

Upper Level:

16.46 psf x 17.0 ' x 2.0 ' = 560 # (Zone Wall)
16.46 psf x 17.0 ' x 4.3 ' = 1189 # (Zone Wall)
Total Shear = 1749 #

Main Level:

16.46 psf x 10.5 ' x 17.0 ' = 2938 # (Zone Wall)
Total Shear = 2938 #
Total Shear (Upper + Main) = 4687 #

Lower Level:

16.46 psf x 17.0 ' x 11.0 ' = 3078.02 # (Zone Wall)
Total Shear = 3078.02 PSF
Total Shear (Main + Lower) = 6016.13 PSF
Total Shear (Upper + Main + Lower) = 7765.005 PSF

Seismic Shear < Wind Shear -> Use Wind Shear 7765 PSF

Wall Height: 10 ft

South Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 10 ft

Openings In wall: 21 ft Total Wall Length: 44 ft

Shear = 7765 lb / 23 ft = 338 PLF

Shear capacity of 1/2" OSB with 8D nails @ 3" O.C. edge = 506 plf

506 plf > 338 plf -> OKAY

Overturning = 7765 # - 7 psf x 23 ft x 10.0 ft = 6155 #

= 6155 # x 10.0 ft / 23 ft = 2676 # @ Openings

Overturning Corners Only: 2676 # / 0.51 = 5210 #

Tension Capacity of Simpson HDU8-SDS2.5 into 3.5" wood w/ 0.875" x 12" A.B. 5995# > 5210# -> Okay

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Steamboat	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Seismic Loading

R = Timber Frame w/ Stick Framing w/ sheathing(Table 12.2-1 B 22)

Shear = 1.1 x SDS x Weight / R SDS = 0.521 R = 7.0

20	psf	x	38.5	ft	x	47	ft			=	36190	# Roof
10	psf	x	14	ft	x	10	ft			=	1400	# Roof
10	psf	x	11	ft	x	6	ft			=	660	# Roof
10	psf	x	44	ft	x	34	ft			=	14960	# Floor
101	psf	x	38.5	ft	x	47	ft	x	0.2	=	36552	# Snow
101	psf	x	14	ft	x	10	ft	x	0.2	=	2828	# Snow
101	psf	x	11	ft	x	6	ft	x	0.2	=	1333	# Snow
7	psf	x	44	ft	x	16	ft	x	1	=	4928	# Side Wall
7	psf	x	44	ft	x	6	ft	x	1	=	1848	# Side Wall
7	psf	x	34	ft	x	6	ft	x	2	=	2856	# End Wall
7	psf	x	34	ft	x	8.5	ft	x	2	=	4046	# End Wall
									Total Seismic Weight:		107601	#

1.1 x 0.521 x 107601 / 7.0 = 8809 # / Direction

8809 # / Direction / 2 = 4405 # / Wall

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Purlins

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

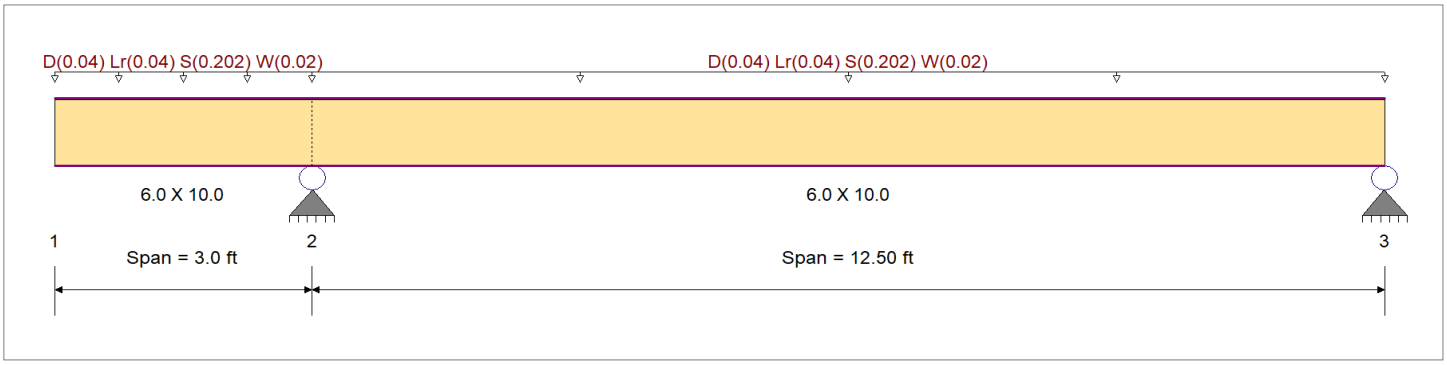
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1350 psi
Fb -	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.21 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft
Load for Span Number 2
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.342 : 1	Maximum Shear Stress Ratio	=	0.190 : 1
Section used for this span		6.0 X 10.0	Section used for this span		6.0 X 10.0
fb: Actual	=	530.79 psi	fv: Actual	=	37.24 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.634 ft	Location of maximum on span	=	3.000 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.121 in	Ratio =	1244 >=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.078 in	Ratio =	928 >=360	Span: 1 : S Only
Max Downward Total Deflection	0.152 in	Ratio =	985 >=180	Span: 2 : +D+S
Max Upward Total Deflection	-0.098 in	Ratio =	734 >=180	Span: 1 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.024	0.051	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.24	28.6	1,215.0	0.31	7.7	153.0
Length = 12.50 ft	2	0.091	0.051	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.92	110.3	1,215.0	0.31	7.7	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.030	0.064	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.42	50.2	1,687.5	0.54	13.6	212.5
Length = 12.50 ft	2	0.115	0.064	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.61	193.6	1,687.5	0.54	13.6	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Purlins

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 3.0 ft	**1**	0.089	0.190	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.15	137.7	1,552.5	1.49	37.2	195.5
Length = 12.50 ft	**2**	0.342	0.190	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.42	530.8	1,552.5	1.49	37.2	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.027	0.057	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.37	44.8	1,687.5	0.48	12.1	212.5
Length = 12.50 ft	**2**	0.102	0.057	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.44	172.8	1,687.5	0.48	12.1	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.071	0.153	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.92	110.4	1,552.5	1.19	29.9	195.5
Length = 12.50 ft	**2**	0.274	0.153	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.55	425.7	1,552.5	1.19	29.9	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.016	0.035	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.29	35.1	2,160.0	0.38	9.5	272.0
Length = 12.50 ft	**2**	0.063	0.035	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.13	135.3	2,160.0	0.38	9.5	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.023	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.41	49.7	2,160.0	0.54	13.4	272.0
Length = 12.50 ft	**2**	0.089	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.60	191.5	2,160.0	0.54	13.4	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.053	0.115	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.96	115.3	2,160.0	1.25	31.2	272.0
Length = 12.50 ft	**2**	0.206	0.115	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.70	444.4	2,160.0	1.25	31.2	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.011	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.20	23.7	2,160.0	0.26	6.4	272.0
Length = 12.50 ft	**2**	0.042	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.76	91.2	2,160.0	0.26	6.4	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.008	0.017	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.14	17.2	2,160.0	0.19	4.6	272.0
Length = 12.50 ft	**2**	0.031	0.017	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.55	66.2	2,160.0	0.19	4.6	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.0979	0.000
+D+S	2	0.1522	6.425		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		2.451	1.502
Max Upward from Load Combinations		2.451	1.502
Max Upward from Load Cases		1.941	1.190
D Only		0.509	0.312
+D+Lr		0.894	0.548
+D+S		2.451	1.502
+D+0.750Lr		0.798	0.489
+D+0.750S		1.965	1.205
+D+0.60W		0.625	0.383
+D+0.750Lr+0.450W		0.884	0.542
+D+0.750S+0.450W		2.052	1.258
+0.60D+0.60W		0.421	0.258
+0.60D		0.306	0.187
Lr Only		0.384	0.236
S Only		1.941	1.190
W Only		0.192	0.118

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Purlins @ Lean-to

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

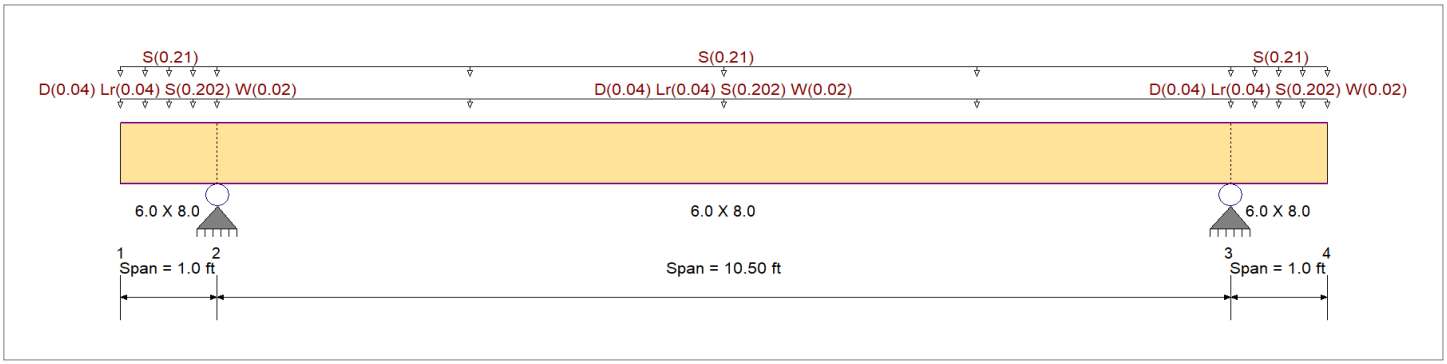
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 2.0 ft, (Drift)
Load for Span Number 2
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 2.0 ft, (Drift)
Load for Span Number 3
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 2.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 2.0 ft, (Drift)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.742** 1	Maximum Shear Stress Ratio	=	**0.342** : 1
Section used for this span		**6.0 X 8.0**	Section used for this span		**6.0 X 8.0**
fb: Actual	=	1,151.41 psi	fv: Actual	=	66.94 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.294 ft	Location of maximum on span	=	9.882 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 2

Maximum Deflection

Max Downward Transient Deflection	0.267 in	Ratio =	472 >=240	Span: 2 : S Only
Max Upward Transient Deflection	-0.079 in	Ratio =	302 >=240	Span: 1 : S Only
Max Downward Total Deflection	0.299 in	Ratio =	421 >=180	Span: 2 : +D+S
Max Upward Total Deflection	-0.089 in	Ratio =	270 >=180	Span: 1 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.0 ft	1	0.004	0.048	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	4.7	1,215.0	0.23	7.3	153.0
Length = 10.50 ft	2	0.103	0.048	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.67	125.5	1,215.0	0.23	7.3	153.0

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Purlins @ Lean-to

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 1.0 ft	**3**	0.004	0.048	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	4.7	1,215.0	0.02	7.3	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.005	0.062	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.05	8.5	1,687.5	0.42	13.1	212.5
Length = 10.50 ft	**2**	0.133	0.062	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.20	225.1	1,687.5	0.42	13.1	212.5
Length = 1.0 ft	**3**	0.005	0.062	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.05	8.5	1,687.5	0.03	13.1	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.028	0.342	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.23	43.4	1,552.5	2.14	66.9	195.5
Length = 10.50 ft	**2**	0.742	0.342	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.14	1,151.4	1,552.5	2.14	66.9	195.5
Length = 1.0 ft	**3**	0.028	0.342	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.23	43.4	1,552.5	0.16	66.9	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.004	0.055	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	7.5	1,687.5	0.37	11.6	212.5
Length = 10.50 ft	**2**	0.119	0.055	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.07	200.2	1,687.5	0.37	11.6	212.5
Length = 1.0 ft	**3**	0.004	0.055	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	7.5	1,687.5	0.03	11.6	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.022	0.266	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.18	33.7	1,552.5	1.66	52.0	195.5
Length = 10.50 ft	**2**	0.576	0.266	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.77	894.9	1,552.5	1.66	52.0	195.5
Length = 1.0 ft	**3**	0.022	0.266	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.18	33.7	1,552.5	0.12	52.0	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.003	0.033	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	5.9	2,160.0	0.29	9.0	272.0
Length = 10.50 ft	**2**	0.072	0.033	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.83	155.4	2,160.0	0.29	9.0	272.0
Length = 1.0 ft	**3**	0.003	0.033	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	5.9	2,160.0	0.02	9.0	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.004	0.048	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	8.4	2,160.0	0.41	12.9	272.0
Length = 10.50 ft	**2**	0.103	0.048	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.19	222.6	2,160.0	0.41	12.9	272.0
Length = 1.0 ft	**3**	0.004	0.048	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	8.4	2,160.0	0.03	12.9	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.016	0.196	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.18	34.5	2,160.0	1.71	53.3	272.0
Length = 10.50 ft	**2**	0.425	0.196	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.89	917.3	2,160.0	1.71	53.3	272.0
Length = 1.0 ft	**3**	0.016	0.196	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.18	34.5	2,160.0	0.12	53.3	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.002	0.022	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	4.0	2,160.0	0.20	6.1	272.0
Length = 10.50 ft	**2**	0.049	0.022	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.56	105.2	2,160.0	0.20	6.1	272.0
Length = 1.0 ft	**3**	0.002	0.022	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	4.0	2,160.0	0.01	6.1	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.0 ft	**1**	0.001	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	2.8	2,160.0	0.14	4.4	272.0
Length = 10.50 ft	**2**	0.035	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.40	75.3	2,160.0	0.14	4.4	272.0
Length = 1.0 ft	**3**	0.001	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	2.8	2,160.0	0.01	4.4	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.0887	0.000
+D+S	2	0.2993	5.294		0.0000	0.000
	3	0.0000	5.294	+D+S	-0.0887	1.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Max Upward from all Load Conditions		2.890	2.890	
Max Upward from Load Combinations		2.890	2.890	
Max Upward from Load Cases		2.575	2.575	
D Only		0.315	0.315	

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Purlins @ Lean-to

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
+D+Lr		0.565	0.565	
+D+S		2.890	2.890	
+D+0.750Lr		0.503	0.503	
+D+0.750S		2.246	2.246	
+D+0.60W		0.390	0.390	
+D+0.750Lr+0.450W		0.559	0.559	
+D+0.750S+0.450W		2.303	2.303	
+0.60D+0.60W		0.264	0.264	
+0.60D		0.189	0.189	
Lr Only		0.250	0.250	
S Only		2.575	2.575	
W Only		0.125	0.125	

Wood Beam

Project File: Dan McEntee.ec6

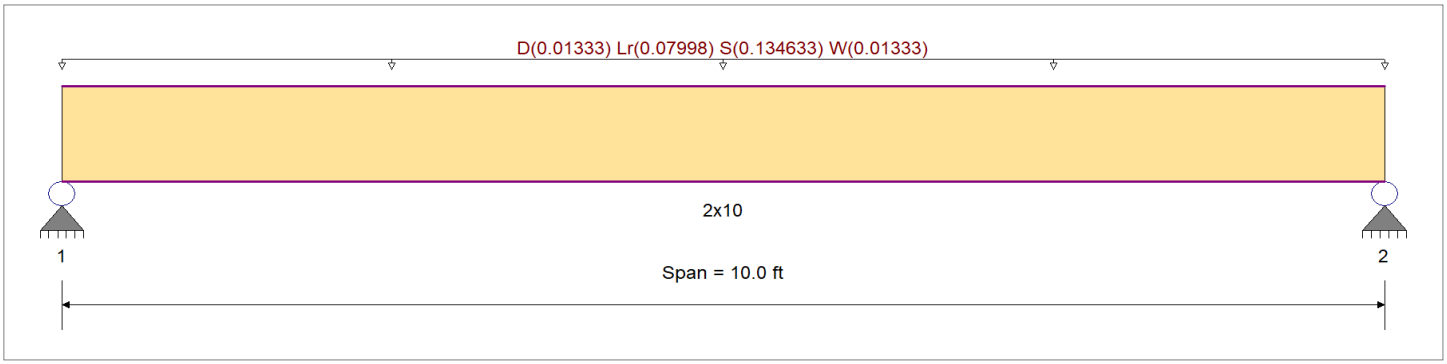
DESCRIPTION: Deck Joists

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 +	1050 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-16	Fb -	1050 psi	Ebend- xx	1600 ksi
		Fc - Prll	1450 psi	Eminbend - xx	580 ksi
Wood Species :	Southern Pine	Fc - Perp	565 psi		
Wood Grade :	No.1: 2"-4" Thick: 10" Wide	Fv	175 psi		
		Ft	700 psi	Density	34.33 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, Lr = 0.060, S = 0.1010, W = 0.010 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.878 : 1	Maximum Shear Stress Ratio	=	0.344 : 1
Section used for this span		2x10	Section used for this span		2x10
fb: Actual	=	1,060.77 psi	fv: Actual	=	69.23 psi
F'b	=	1,207.50 psi	F'v	=	201.25 psi
Load Combination		+D+S	Load Combination		+D+S
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	0.192 in	Ratio =	623 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.216 in	Ratio =	554 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.123	0.048	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.21	116.7	945.0	0.07	7.6	157.5
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.516	0.202	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.21	677.5	1,312.5	0.41	44.2	218.8
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.878	0.344	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.89	1,060.8	1,207.5	0.64	69.2	201.3
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.409	0.160	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.96	537.3	1,312.5	0.32	35.1	218.8
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.683	0.267	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.47	824.7	1,207.5	0.50	53.8	201.3

Wood Beam

Project File: Dan McEntee.ec6

DESCRIPTION: Deck Joists

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.103	0.040	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.31	172.8	1,680.0	0.10	11.3	280.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.345	0.135	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.03	579.4	1,680.0	0.35	37.8	280.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.516	0.202	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.55	866.8	1,680.0	0.52	56.6	280.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.075	0.029	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.22	126.1	1,680.0	0.08	8.2	280.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.042	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.12	70.0	1,680.0	0.04	4.6	280.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2163	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.756	0.756
Max Upward from Load Combinations	0.756	0.756
Max Upward from Load Cases	0.673	0.673
D Only	0.083	0.083
+D+Lr	0.483	0.483
+D+S	0.756	0.756
+D+0.750Lr	0.383	0.383
+D+0.750S	0.588	0.588
+D+0.60W	0.123	0.123
+D+0.750Lr+0.450W	0.413	0.413
+D+0.750S+0.450W	0.618	0.618
+0.60D+0.60W	0.090	0.090
+0.60D	0.050	0.050
Lr Only	0.400	0.400
S Only	0.673	0.673
W Only	0.067	0.067

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Joist Header

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

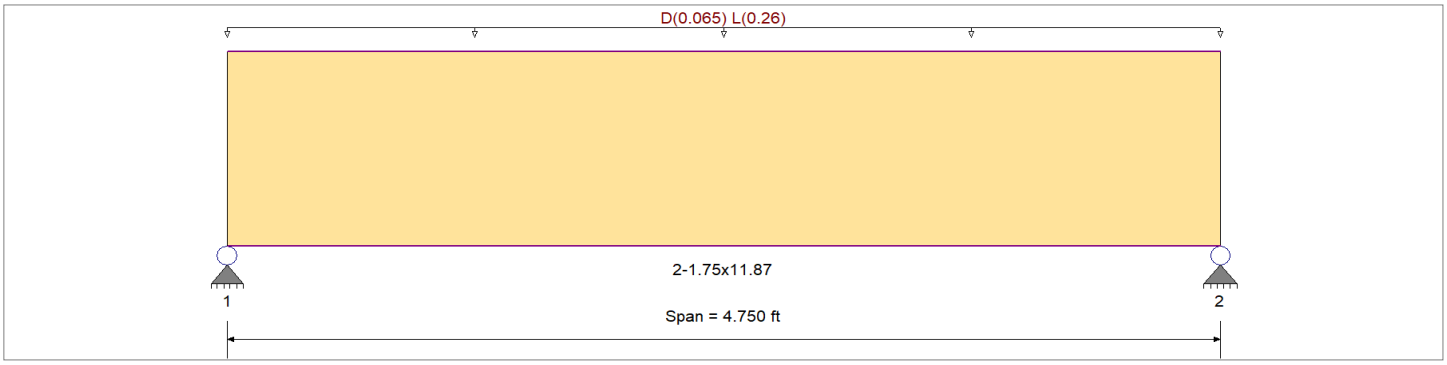
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 6.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.053 : 1	Maximum Shear Stress Ratio	=	0.059 : 1
Section used for this span		2-1.75x11.87	Section used for this span		2-1.75x11.87
fb: Actual	=	138.70 psi	fv: Actual	=	16.87 psi
F'b	=	2,603.71 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.375 ft	Location of maximum on span	=	3.762 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.003 in	Ratio =	17658 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.004 in	Ratio =	13618 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.014	0.015	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.22	31.7	2,343.3	0.11	3.9	256.5
+D+L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.053	0.059	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.95	138.7	2,603.7	0.47	16.9	285.0
+D+0.750L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.034	0.038	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.77	112.0	3,254.6	0.38	13.6	356.3
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.750 ft	1	0.005	0.005	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.13	19.0	4,165.9	0.06	2.3	456.0

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Joist Header

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0042	2.392		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.801	0.801
Max Upward from Load Combinations	0.801	0.801
Max Upward from Load Cases	0.618	0.618
D Only	0.183	0.183
+D+L	0.801	0.801
+D+0.750L	0.646	0.646
+0.60D	0.110	0.110
L Only	0.618	0.618

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: LVL Header

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

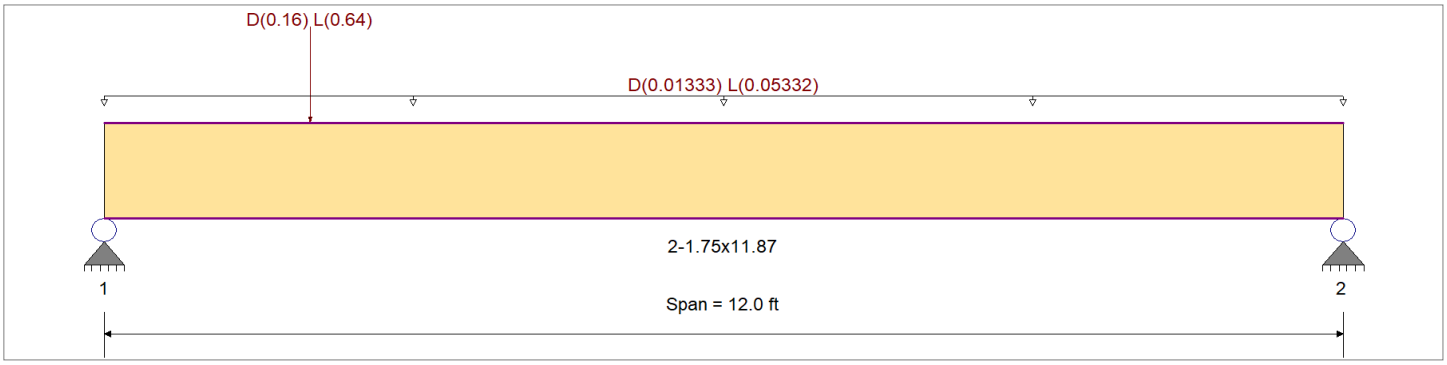
Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

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

Fb +	2,600.0 psi
Fb -	2,600.0 psi
Fc - Prll	2,510.0 psi
Fc - Perp	750.0 psi
Fv	285.0 psi
Ft	1,555.0 psi

E : Modulus of Elasticity

Ebend- xx	1,900.0 ksi
Eminbend - xx	965.71 ksi
Density	42.010 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.333 ft
Point Load : D = 0.160, L = 0.640 k @ 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.131 : 1	Maximum Shear Stress Ratio	=	0.135 : 1
Section used for this span		2-1.75x11.87	Section used for this span		2-1.75x11.87
fb: Actual	=	340.02 psi	fv: Actual	=	38.38 psi
F'b	=	2,603.71 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.292 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	0.048 in	Ratio =	3001 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.066 in	Ratio =	2179 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.039	0.037	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.63	92.2	2,343.3	0.26	9.4	256.5
+D+L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.131	0.135	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.33	340.0	2,603.7	1.06	38.4	285.0
+D+0.750L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.085	0.087	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.90	277.9	3,254.6	0.86	31.1	356.3
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.013	0.012	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.38	55.3	4,165.9	0.16	5.7	456.0

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: LVL Header

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0661	5.693		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.139	0.606
Max Upward from Load Combinations	1.139	0.606
Max Upward from Load Cases	0.853	0.427
D Only	0.286	0.179
+D+L	1.139	0.606
+D+0.750L	0.926	0.499
+0.60D	0.172	0.108
L Only	0.853	0.427

Wood Ledger

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: Ledger

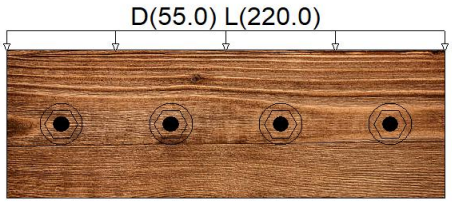
Code Reference

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

General Information

Ledger Width	1.50 in	Design Method: ASD (using Service Load Combinations	
Ledger Depth	11.250 in	Wood Stress Grade :	Southern Pine, No.2: 2"-4" Thick: 12" W
Ledger Wood Specie	Southern Pine	Fb Allow	750 psi
G : Specific Gravity	0.55	Fv Allow	175 psi
Bolt Diameter	1/2" in	Fyb : Bolt Bending Yield	45,000 psi
Bolt Spacing	8.0 in		
Cm - Wet Service Factor	1.0		
Ct - Temperature Factor	1.0		
Cg - Group Action Factor	1.0		
C /\ - Geometry Factor	1.0		

Concrete as Main Supporting Member
Using 6" anchor embedment length in equations.
Using dowel bearing strength fixed at 7.5 ksi per NDS Table 11E



Analytical model uses 100 spans to ensure that all possible combinations of bolt location and load location are evaluated.
Final results are an envelope solution.

Load Data

	Dead	Roof Live	Floor Live	Snow	Wind	Seismic	Earth
Uniform Load...	55.0 plf	plf	220.0 plf	plf	plf	plf	plf
Point Load...	lbs	lbs	lbs	lbs	lbs	lbs	lbs
Spacing	in						
Offset	in						
Horizontal Shear	plf	plf	plf	plf	plf	plf	plf

Wood Ledger

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: Ledger

DESIGN SUMMARY

Design OK

Maximum Ledger Bending

Load Combination . . .	+D+L	
Moment	10.185	ft-lb
fb : Actual Stress	3.863	psi
Fb : Allowable Stress	750.0	psi
Stress Ratio	**0.005150**	:1

Maximum Bolt Bearing Summary

Load Combination . . .	+D+L	
Max. Vertical Load	183.333	lbs
Bolt Allow Vertical Load	411.070	lbs
Max. Horizontal Load	0.0	lbs
Bolt Allow Horizontal Load	683.50	lbs

Dowel Bearing Strengths

(for specific gravity & bolt diameter)

Ledger, Perp to Grain	7,500.0 psi
Ledger, Parallel to Grain	7,500.0 psi
Supporting Member, Perp to Gra	3,650.0 psi
Supporting Member, Parallel to Gr	6,150.0 psi

Maximum Ledger Shear

Load Combination . . .	+D+L	
Shear	91.667	lbs
fv : Actual Stress	10.864	psi
Fv : Allowable Stress	116.667	psi
Stress Ratio	**0.09312**	**:1**

Angle of Resultant	90.0	deg
Diagonal Component	183.333	lbs
Allow Diagonal Bolt Force	411.070	lbs
Stress Ratio, Wood @ Bolt	**0.4460**	:1

Allowable Bolt Capacity

Note ! Refer to NDS Section 11.3 for Bolt Capacity calculation method.

Governing Load Combination **+D+L**

Resutant Load Angle : Theta = 90.0 deg Ktheta = 1.250 Fe theta = 411.070

Bolt Capacity - Load Perpendicular to Grain

Fem	7,500.0	Fes	3,650.0	Fyb	45,000.0		
Re	2.055	Rt	4.0				
k1	2.476	k2	1.50	k3	1.185		
Im : Eq 11.3-1		Rd =	5.0	Z =	0.0	lbs	
Is : Eq 11.3-2		Rd =	5.0	Z =	547.50	lbs	
II : Eq 11.3-3		Rd =	4.50	Z =	1,506.32	lbs	
IIIm : Eq 11.3-4		Rd =	4.0	Z =	1,651.64	lbs	
IIIs : Eq 11.3-5		Rd =	4.0	Z =	411.070	lbs	
IV : Eq 11.3-6		Rd =	4.0	Z =	536.39	lbs	
min : Basic Design Value =					411.070	lbs	

Reference design value - Perpendicular to Grain :

Z * CM * CD* Ct * Cg * Cdelta = **411.070 lbs**

Bolt Capacity - Load Parallel to Grain

Fem	7,500.0	Fes	6,150.0	Fyb	45,000.0		
Re	1.220	Rt	4.0				
k1	1.591	k2	1.129	k3	1.252		
Im : Eq 11.3-1		Rd =	4.0	Z =	0.0	lbs	
Is : Eq 11.3-2		Rd =	4.0	Z =	1,153.13	lbs	
II : Eq 11.3-3		Rd =	3.60	Z =	2,038.08	lbs	
IIIm : Eq 11.3-4		Rd =	3.20	Z =	2,309.21	lbs	
IIIs : Eq 11.3-5		Rd =	3.20	Z =	683.50	lbs	
IV : Eq 11.3-6		Rd =	3.20	Z =	786.60	lbs	
Zmin : Basic Design Value =					683.50	lbs	

Reference design value - Parallel to Grain :

Z * CM * CD* Ct * Cg * Cdelta = **683.50 lbs**

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Studs

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	**2x6**
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	Spruce-Pine-Fir			Exact Width	**1.50** in
Wood Grade	No. 1/No. 2			Exact Depth	**5.50** in
Fb +	875 psi	Fv	135 psi	Area	8.250 in^2
Fb -	875 psi	Ft	450 psi	Ix	20.797 in^4
Fc - Prll	1150 psi	Density	26.22 pcf	Iy	1.547 in^4
Fc - Perp	425 psi				

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1400	1400	1400 ksi
Minimum	510	510	

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compressior	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 18.026 lbs * Dead Load Factor
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0250 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.4042 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	5.960 ft
At maximum location values are . .	
Applied Axial	0.01803 k
Applied Mx	0.270 k-ft
Applied My	0.0 k-ft
Fc : Allowable	2,024.0 psi

PASS Maximum Shear Stress Ratio = **0.07576 : 1**

Load Combination	+D+0.60W
Location of max.above base	12.0 ft
Applied Design Shear	24.545 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.150 k	Bottom along Y-Y	0.150 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.4049 in at 6.040 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.001919	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W	1.600	1.000	0.4042	PASS	5.960 ft	0.07576	PASS	12.0 ft
+D+0.450W	1.600	1.000	0.3031	PASS	5.960 ft	0.05682	PASS	0.0 ft
+0.60D+0.60W	1.600	1.000	0.4042	PASS	5.960 ft	0.07576	PASS	12.0 ft
+0.60D	1.600	1.000	0.000648	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	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					0.018				
+D+0.60W			0.090	0.090	0.018				

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: Studs

Maximum Reactions

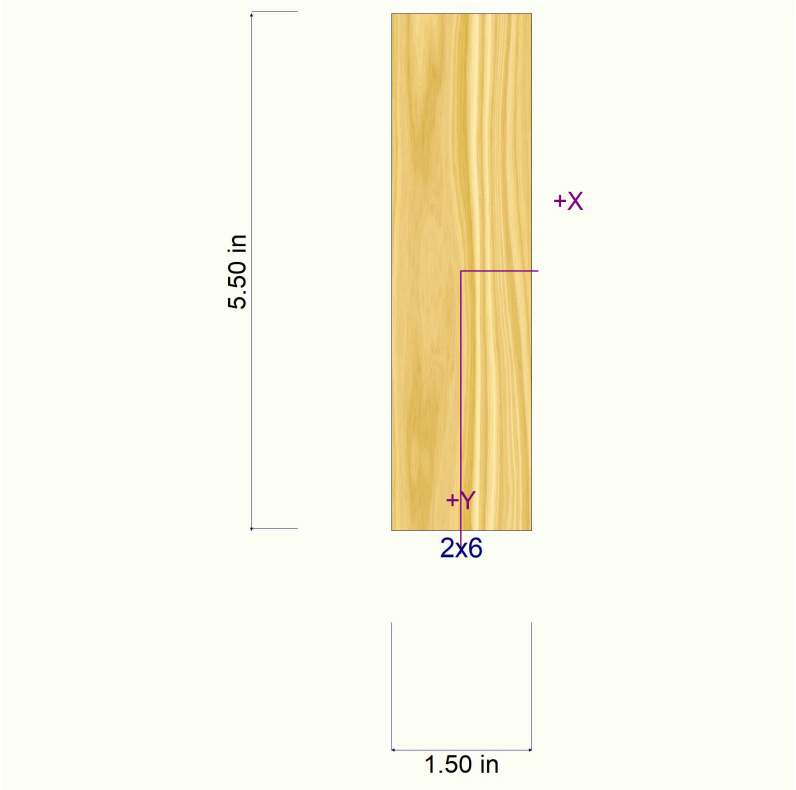
Note: Only non-zero reactions are listed.

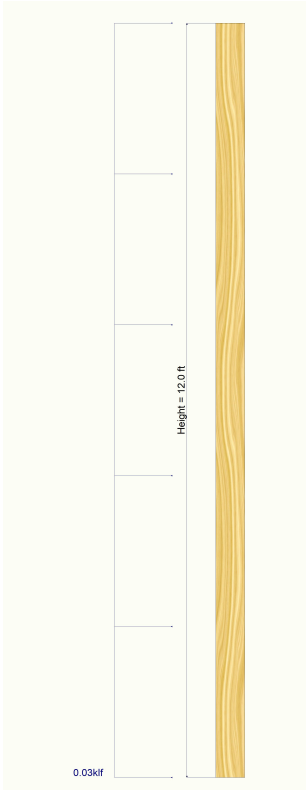
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+0.450W				0.068	0.068	0.018					
+0.60D+0.60W				0.090	0.090	0.011					
+0.60D						0.011					
W Only				0.150	0.150						

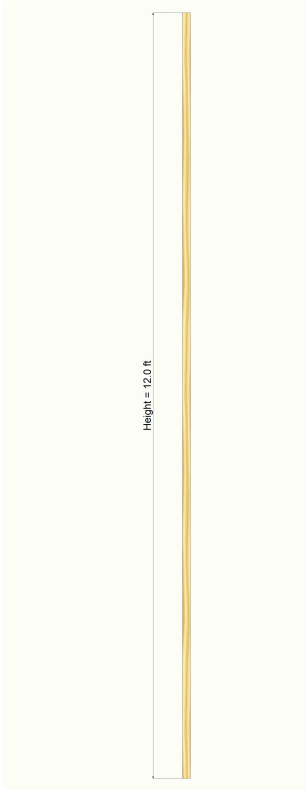
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.243 in	6.040 ft
+D+0.450W	0.0000 in	0.000ft	0.182 in	6.040 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.243 in	6.040 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.405 in	6.040 ft

Sketches







Wood Column

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: King Studs 4' Openings

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	**2-2x6**
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	Spruce-Pine-Fir	Exact Width	**3.0** in
Wood Grade	No. 1/No. 2	Exact Depth	**5.50** in
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

Area	16.50 in^2
Ix	41.594 in^4
Iy	12.375 in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compressior	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 36.053 lbs * Dead Load Factor
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0480 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2332 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	5.960 ft
At maximum location values are . .	
Applied Axial	0.03605 k
Applied Mx	0.5184 k-ft
Applied My	0.0 k-ft
Fc : Allowable	2,024.0 psi

PASS Maximum Shear Stress Ratio = **0.07273 : 1**

Load Combination	+D+0.60W
Location of max.above base	12.0 ft
Applied Design Shear	23.564 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.2880 k	Bottom along Y-Y	0.2880 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.3887 in at 6.040 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.001919	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W	1.600	1.000	0.2332	PASS	5.960 ft	0.07273	PASS	12.0 ft
+D+0.450W	1.600	1.000	0.1749	PASS	6.040 ft	0.05455	PASS	12.0 ft
+0.60D+0.60W	1.600	1.000	0.2332	PASS	5.960 ft	0.07273	PASS	12.0 ft
+0.60D	1.600	1.000	0.000648	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	@ Top	Y-Y Axis Reaction k @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					0.036				
+D+0.60W			0.173	0.173	0.036				

Wood Column

Project File: Dan McEntee.ec6

DESCRIPTION: King Studs 4' Openings

Maximum Reactions

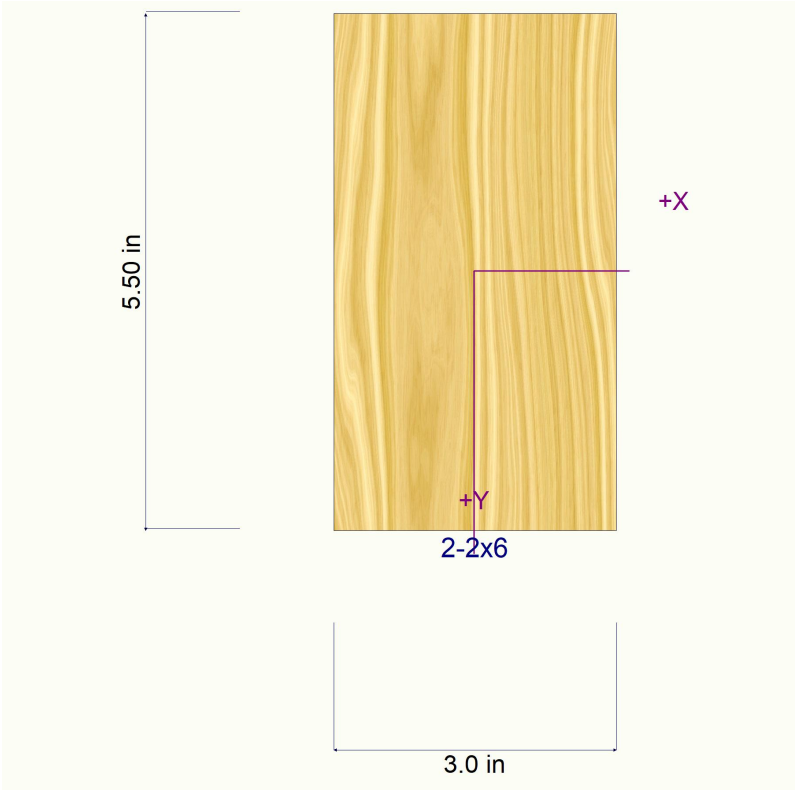
Note: Only non-zero reactions are listed.

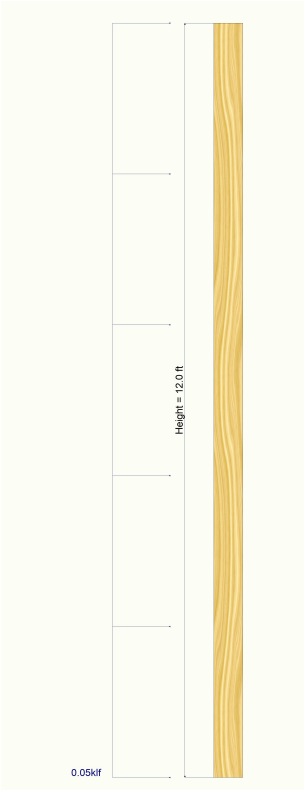
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+0.450W				0.130	0.130	0.036					
+0.60D+0.60W				0.173	0.173	0.022					
+0.60D						0.022					
W Only				0.288	0.288						

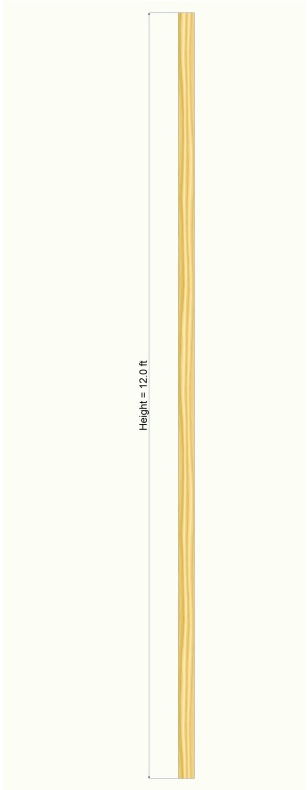
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.233 in	6.040 ft
+D+0.450W	0.0000 in	0.000ft	0.175 in	6.040 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.233 in	6.040 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.389 in	6.040 ft

Sketches







Wood Column

Project File: Dan McEntee - Steamboat.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: King Studs 6' Openings

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	**3-2x6**
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	Spruce-Pine-Fir	Exact Width	**4.50** in
Wood Grade	No. 1/No. 2	Exact Depth	**5.50** in
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

Area	24.750 in^2	Allow Stress Modification Factors	
Ix	62.391 in^4	Cf or Cv for Bending	1.30
Iy	41.766 in^4	Cf or Cv for Compressior	1.10
		Cf or Cv for Tension	1.30
		Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 54.079 lbs * Dead Load Factor
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0750 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2379 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	6.040 ft
At maximum location values are . .	
Applied Axial	0.05408 k
Applied Mx	0.810 k-ft
Applied My	0.0 k-ft
Fc : Allowable	2,024.0 psi

PASS Maximum Shear Stress Ratio = **0.07576 : 1**

Load Combination	+D+0.60W
Location of max.above base	12.0 ft
Applied Design Shear	24.545 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.450 k	Bottom along Y-Y	0.450 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.4049 in at 6.040 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.001919	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W	1.600	1.000	0.2379	PASS	6.040 ft	0.07576	PASS	12.0 ft
+D+0.450W	1.600	1.000	0.1784	PASS	5.960 ft	0.05682	PASS	12.0 ft
+0.60D+0.60W	1.600	1.000	0.2379	PASS	6.040 ft	0.07576	PASS	12.0 ft
+0.60D	1.600	1.000	0.000648	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	@ Top	Y-Y Axis Reaction: @ Base	@ Top	Axial Reaction: @ Base	My - End Moments k-ft: @ Base	@ Top	Mx - End Moments: @ Base	@ Top
D Only					0.054				
+D+0.60W			0.270	0.270	0.054				

Wood Column

Project File: Dan McEntee - Steamboat.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

DESCRIPTION: King Studs 6' Openings

Maximum Reactions

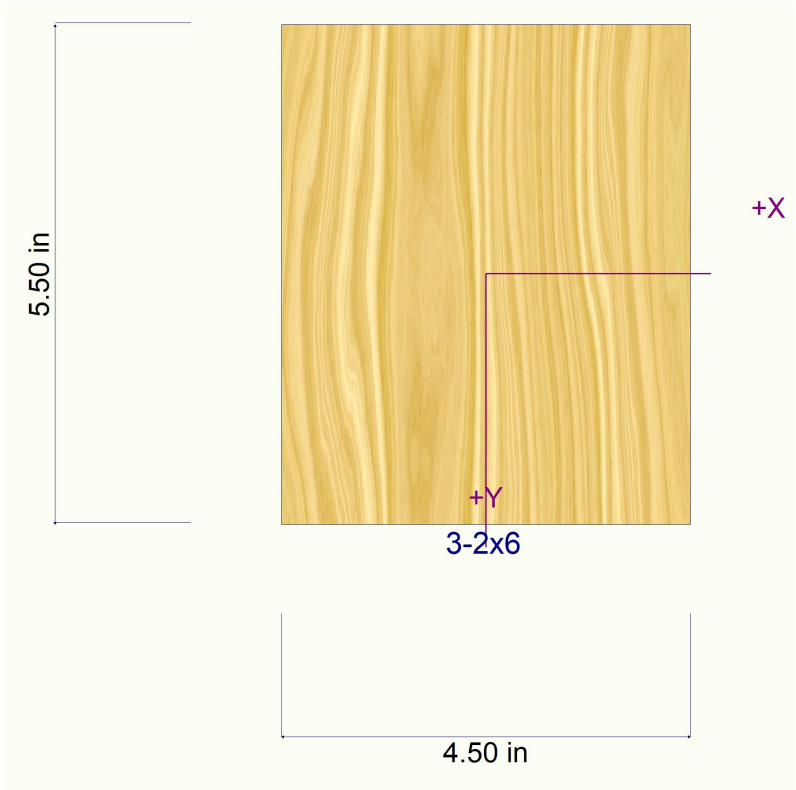
Note: Only non-zero reactions are listed.

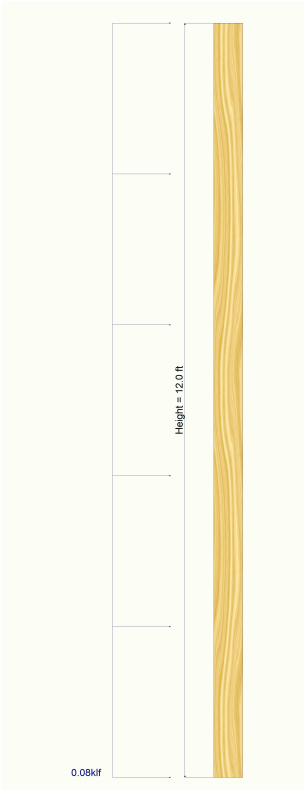
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+0.450W				0.203	0.203	0.054					
+0.60D+0.60W				0.270	0.270	0.032					
+0.60D						0.032					
W Only				0.450	0.450						

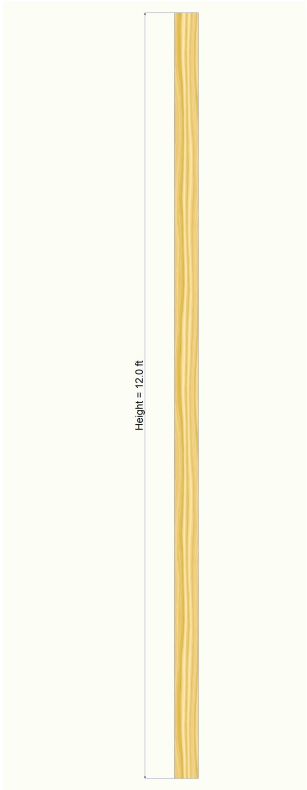
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.243 in	6.040 ft
+D+0.450W	0.0000 in	0.000ft	0.182 in	6.040 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.243 in	6.040 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.405 in	6.040 ft

Sketches







Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Roof Beam Bents 14/15

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

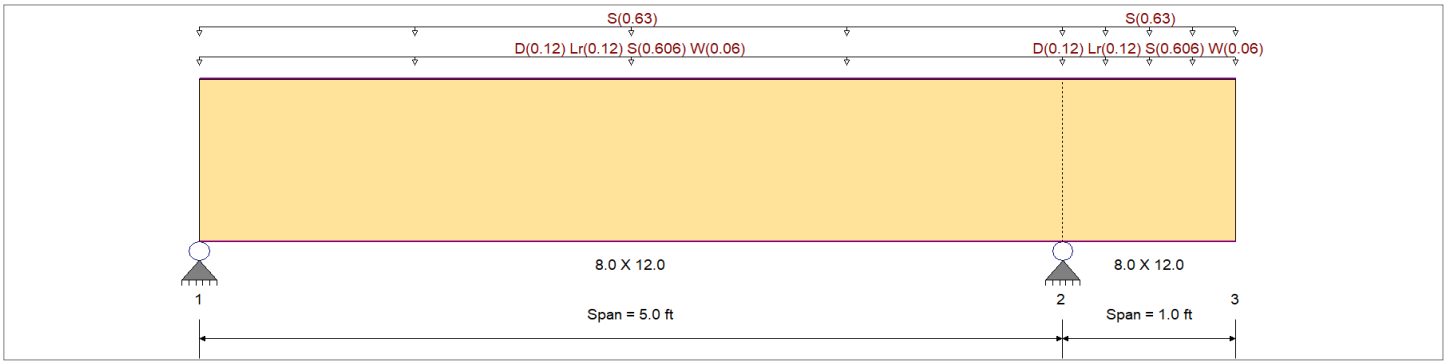
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 6.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 6.0 ft, (Drift)
Load for Span Number 2
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 6.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 6.0 ft, (Drift)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.160 : 1	Maximum Shear Stress Ratio	=	0.179 : 1
Section used for this span		8.0 X 12.0	Section used for this span		8.0 X 12.0
fb: Actual	=	247.82 psi	fv: Actual	=	34.90 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	2.402 ft	Location of maximum on span	=	4.022 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.009 in	Ratio =	6973 >=360	Span: 1 : S Only
Max Upward Transient Deflection	-0.005 in	Ratio =	4872 >=360	Span: 2 : S Only
Max Downward Total Deflection	0.010 in	Ratio =	6259 >=180	Span: 1 : +D+S
Max Upward Total Deflection	-0.005 in	Ratio =	4374 >=180	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.021	0.023	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.41	25.3	1,215.0	0.23	3.6	153.0
Length = 1.0 ft	2	0.004	0.023	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.07	4.4	1,215.0	0.14	3.6	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.028	0.031	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.75	46.9	1,687.5	0.42	6.6	212.5

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Roof Beam Bents 14/15

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 1.0 ft	**2**	0.005	0.031	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.13	8.2	1,687.5	0.26	6.6	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.160	0.179	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.97	247.8	1,552.5	2.23	34.9	195.5
Length = 1.0 ft	**2**	0.028	0.179	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.69	43.0	1,552.5	1.38	34.9	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.025	0.028	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.66	41.5	1,687.5	0.37	5.9	212.5
Length = 1.0 ft	**2**	0.004	0.028	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.12	7.2	1,687.5	0.23	5.9	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.124	0.138	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.08	192.2	1,552.5	1.73	27.1	195.5
Length = 1.0 ft	**2**	0.021	0.138	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.53	33.4	1,552.5	1.07	27.1	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.015	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.51	31.8	2,160.0	0.29	4.5	272.0
Length = 1.0 ft	**2**	0.003	0.016	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.09	5.5	2,160.0	0.18	4.5	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.021	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.74	46.4	2,160.0	0.42	6.5	272.0
Length = 1.0 ft	**2**	0.004	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.13	8.1	2,160.0	0.26	6.5	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.091	0.102	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.15	197.1	2,160.0	1.78	27.8	272.0
Length = 1.0 ft	**2**	0.016	0.102	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.55	34.2	2,160.0	1.09	27.8	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.010	0.011	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.35	21.7	2,160.0	0.20	3.1	272.0
Length = 1.0 ft	**2**	0.002	0.011	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.06	3.8	2,160.0	0.12	3.1	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	**1**	0.007	0.008	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.24	15.2	2,160.0	0.14	2.1	272.0
Length = 1.0 ft	**2**	0.001	0.008	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.04	2.6	2,160.0	0.08	2.1	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0096	2.486		0.0000	0.000
	2	0.0000	2.486	+D+S	-0.0055	1.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	3.304	4.957	
Max Upward from Load Combinations	3.304	4.957	
Max Upward from Load Cases	2.966	4.450	
D Only	0.338	0.507	
+D+Lr	0.626	0.939	
+D+S	3.304	4.957	
+D+0.750Lr	0.554	0.831	
+D+0.750S	2.563	3.844	
+D+0.60W	0.424	0.637	
+D+0.750Lr+0.450W	0.619	0.928	
+D+0.750S+0.450W	2.628	3.941	
+0.60D+0.60W	0.289	0.434	
+0.60D	0.203	0.304	
Lr Only	0.288	0.432	
S Only	2.966	4.450	
W Only	0.144	0.216	

Wood Column

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Columns Bent 14/15

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	9.25 ft		
(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	

Wood Section Name	**8x8**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**8.0** in	Allow Stress Modification Factors	
Exact Depth	**8.0** in	Cf or Cv for Bending	1.0
Area	64.0 in^2	Cf or Cv for Compressior	1.0
Ix	341.333 in^4	Cf or Cv for Tension	1.0
Iy	341.333 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 9.25 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 9.25 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 128.308 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.250 ft, D = 0.480, Lr = 0.480, S = 4.326, W = 0.240 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.07629 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	4.934 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,010.64 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	9.250 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 Only	0.900	0.910	0.01161	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+Lr	1.250	0.866	0.01572	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+S	1.150	0.879	0.07629	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.750Lr	1.250	0.866	0.01398	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.750S	1.150	0.879	0.05957	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.60W	1.600	0.817	0.008990	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.750Lr+0.450W	1.600	0.817	0.01286	PASS	0.0 ft	0.0	PASS	9.250 ft
+D+0.750S+0.450W	1.600	0.817	0.04733	PASS	0.0 ft	0.0	PASS	9.250 ft
+0.60D+0.60W	1.600	0.817	0.006082	PASS	0.0 ft	0.0	PASS	9.250 ft
+0.60D	1.600	0.817	0.004362	PASS	0.0 ft	0.0	PASS	9.250 ft

Wood Column

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Columns Bent 14/15

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						0.608					
+D+Lr						1.088					
+D+S						4.934					
+D+0.750Lr						0.968					
+D+0.750S						3.853					
+D+0.60W						0.752					
+D+0.750Lr+0.450W						1.076					
+D+0.750S+0.450W						3.961					
+0.60D+0.60W						0.509					
+0.60D						0.365					
Lr Only						0.480					
S Only						4.326					
W Only						0.240					

Maximum Deflections for Load Combinations

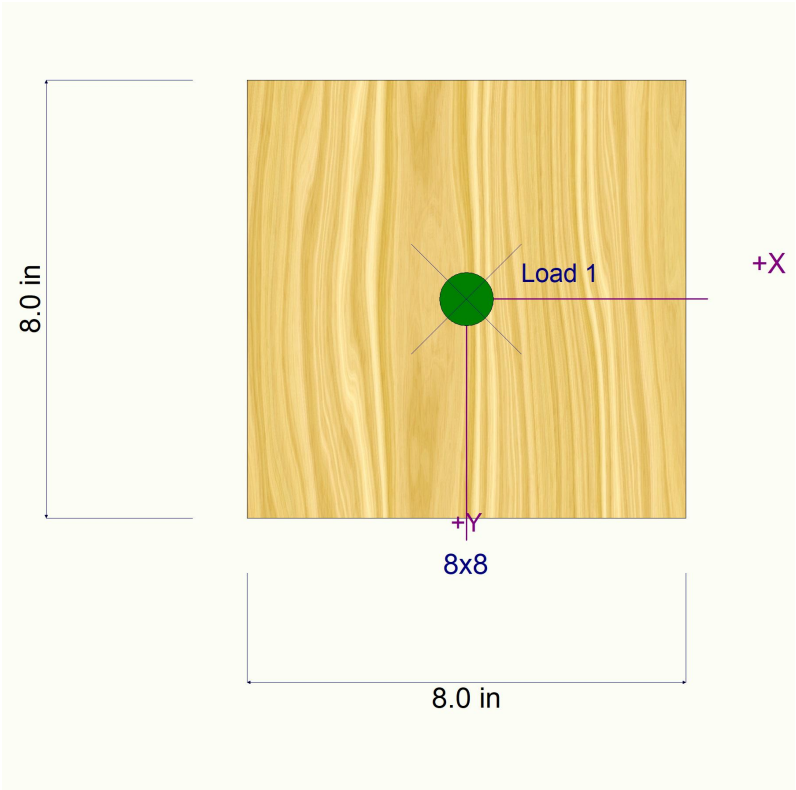
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W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

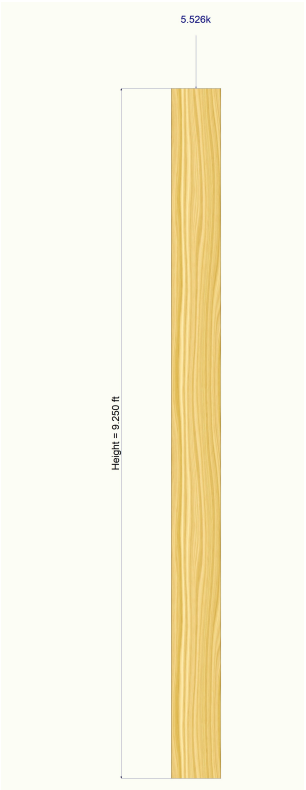
Wood Column

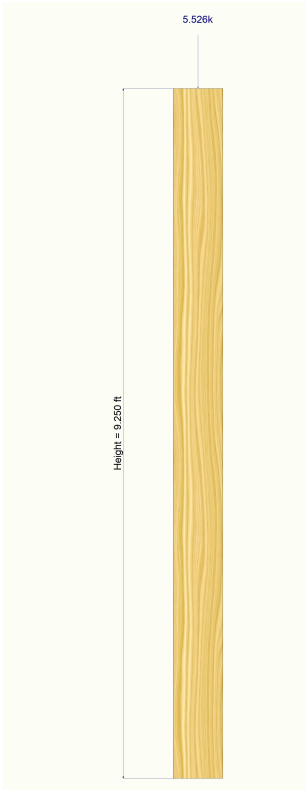
Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Columns Bent 14/15

Sketches







Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Header A

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

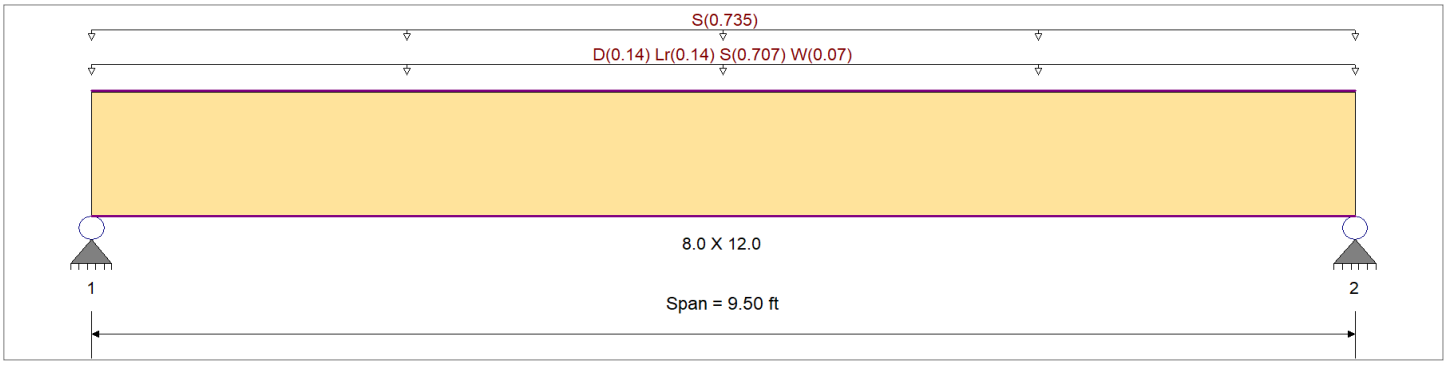
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 7.0 ft
Uniform Load : S = 0.1050 ksf, Tributary Width = 7.0 ft, (Drift)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.728 : 1	Maximum Shear Stress Ratio	=	0.484 : 1
Section used for this span		8.0 X 12.0	Section used for this span		8.0 X 12.0
fb: Actual	=	1,130.10 psi	fv: Actual	=	94.65 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.750 ft	Location of maximum on span	=	8.529 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.144 in	Ratio =	790 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.160 in	Ratio =	711 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 9.50 ft	1	0.093	0.062	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.81	113.4	1,215.0	0.61	9.5	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	1	0.126	0.084	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.39	212.1	1,687.5	1.14	17.8	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	1	0.728	0.484	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	18.08	1,130.1	1,552.5	6.06	94.6	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	1	0.111	0.074	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.00	187.4	1,687.5	1.00	15.7	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Header A

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 9.50 ft	**1**	0.564	0.375	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	14.01	875.9	1,552.5	4.69	73.4	195.5
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	**1**	0.066	0.044	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.29	143.0	2,160.0	0.77	12.0	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	**1**	0.097	0.065	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.35	209.6	2,160.0	1.12	17.6	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	**1**	0.416	0.277	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	14.37	898.1	2,160.0	4.81	75.2	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	**1**	0.045	0.030	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.56	97.6	2,160.0	0.52	8.2	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.50 ft	**1**	0.031	0.021	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.09	68.0	2,160.0	0.36	5.7	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1603	4.785		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	7.613	7.613
Max Upward from Load Combinations	7.613	7.613
Max Upward from Load Cases	6.850	6.850
D Only	0.764	0.764
+D+Lr	1.429	1.429
+D+S	7.613	7.613
+D+0.750Lr	1.263	1.263
+D+0.750S	5.901	5.901
+D+0.60W	0.963	0.963
+D+0.750Lr+0.450W	1.412	1.412
+D+0.750S+0.450W	6.051	6.051
+0.60D+0.60W	0.658	0.658
+0.60D	0.458	0.458
Lr Only	0.665	0.665
S Only	6.850	6.850
W Only	0.333	0.333

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Deck Beam Bent 13

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

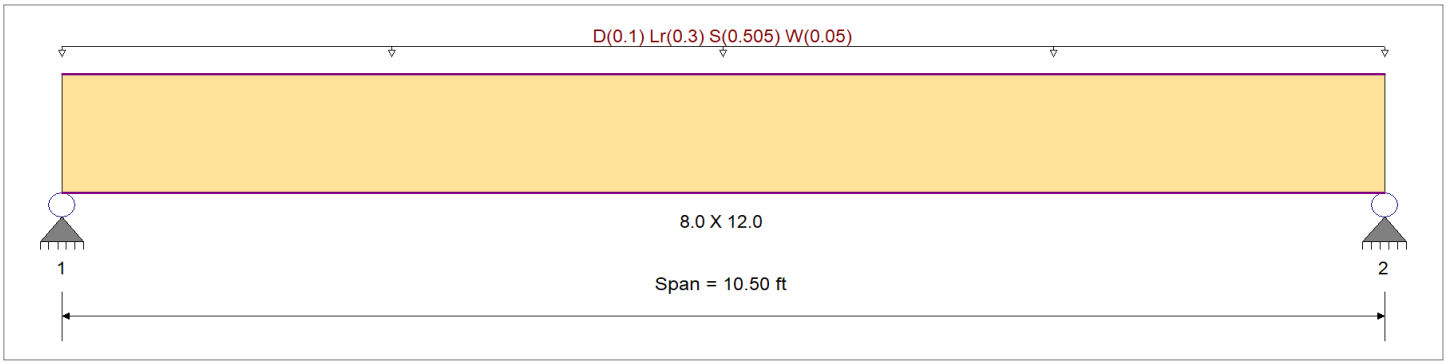
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.060, S = 0.1010, W = 0.010 ksf, Tributary Width = 5.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.347 : 1	Maximum Shear Stress Ratio	=	0.213 : 1
Section used for this span		8.0 X 12.0	Section used for this span		8.0 X 12.0
fb: Actual	=	539.02 psi	fv: Actual	=	41.59 psi
F'b	=	1,552.50 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.250 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	0.075 in	Ratio =	1671 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.093 in	Ratio =	1349 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 10.50 ft	1	0.086	0.052	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.66	104.1	1,215.0	0.51	8.0	153.0
+D+Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	1	0.215	0.132	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.80	362.5	1,687.5	1.79	28.0	212.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	1	0.347	0.213	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.62	539.0	1,552.5	2.66	41.6	195.5
+D+0.750Lr					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	1	0.177	0.108	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.77	297.9	1,687.5	1.47	23.0	212.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	1	0.277	0.170	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.88	430.3	1,552.5	2.12	33.2	195.5

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Deck Beam Bent 13

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	**1**	0.060	0.037	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.08	129.9	2,160.0	0.64	10.0	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	**1**	0.147	0.090	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.08	317.2	2,160.0	1.57	24.5	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	**1**	0.208	0.128	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.19	449.7	2,160.0	2.22	34.7	272.0
+0.60D+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	**1**	0.041	0.025	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.41	88.3	2,160.0	0.44	6.8	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.50 ft	**1**	0.029	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.00	62.4	2,160.0	0.31	4.8	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0934	5.288		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.285	3.285
Max Upward from Load Combinations	3.285	3.285
Max Upward from Load Cases	2.651	2.651
D Only	0.634	0.634
+D+Lr	2.209	2.209
+D+S	3.285	3.285
+D+0.750Lr	1.815	1.815
+D+0.750S	2.623	2.623
+D+0.60W	0.792	0.792
+D+0.750Lr+0.450W	1.934	1.934
+D+0.750S+0.450W	2.741	2.741
+0.60D+0.60W	0.538	0.538
+0.60D	0.381	0.381
Lr Only	1.575	1.575
S Only	2.651	2.651
W Only	0.263	0.263

Wood Column

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Bent #13 Columns

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	20 ft		
(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	

Wood Section Name	**8x8**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**8.0** in	Allow Stress Modification Factors	
Exact Depth	**8.0** in	Cf or Cv for Bending	1.0
Area	64.0 in^2	Cf or Cv for Compressior	1.0
Ix	341.333 in^4	Cf or Cv for Tension	1.0
Iy	341.333 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 20 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 12.0 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 277.422 lbs * Dead Load Factor
AXIAL LOADS . . .
Deck: Axial Load at 20.0 ft, D = 0.60, Lr = 1.80, S = 3.030, W = 0.30 k
Roof: Axial Load at 20.0 ft, D = 0.70, Lr = 0.70, S = 7.210, W = 0.350 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3961 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	11.817 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	466.174 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	20.0 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 Only	0.900	0.493	0.05557	PASS	0.0 ft	0.0	PASS	20.0 ft
+D+Lr	1.250	0.378	0.1349	PASS	0.0 ft	0.0	PASS	20.0 ft
+D+S	1.150	0.405	0.3961	PASS	0.0 ft	0.0	PASS	20.0 ft
+D+0.750Lr	1.250	0.378	0.1142	PASS	0.0 ft	0.0	PASS	20.0 ft
+D+0.750S	1.150	0.405	0.3103	PASS	0.0 ft	0.0	PASS	20.0 ft
+D+0.60W	1.600	0.304	0.06311	PASS	0.0 ft	0.0	PASS	20.0 ft
+D+0.750Lr+0.450W	1.600	0.304	0.1201	PASS	0.0 ft	0.0	PASS	20.0 ft
+D+0.750S+0.450W	1.600	0.304	0.3063	PASS	0.0 ft	0.0	PASS	20.0 ft
+0.60D+0.60W	1.600	0.304	0.04287	PASS	0.0 ft	0.0	PASS	20.0 ft
+0.60D	1.600	0.304	0.03036	PASS	0.0 ft	0.0	PASS	20.0 ft

Wood Column

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Bent #13 Columns

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						1.577					
+D+Lr						4.077					
+D+S						11.817					
+D+0.750Lr						3.452					
+D+0.750S						9.257					
+D+0.60W						1.967					
+D+0.750Lr+0.450W						3.745					
+D+0.750S+0.450W						9.550					
+0.60D+0.60W						1.336					
+0.60D						0.946					
Lr Only						2.500					
S Only						10.240					
W Only						0.650					

Maximum Deflections for Load Combinations

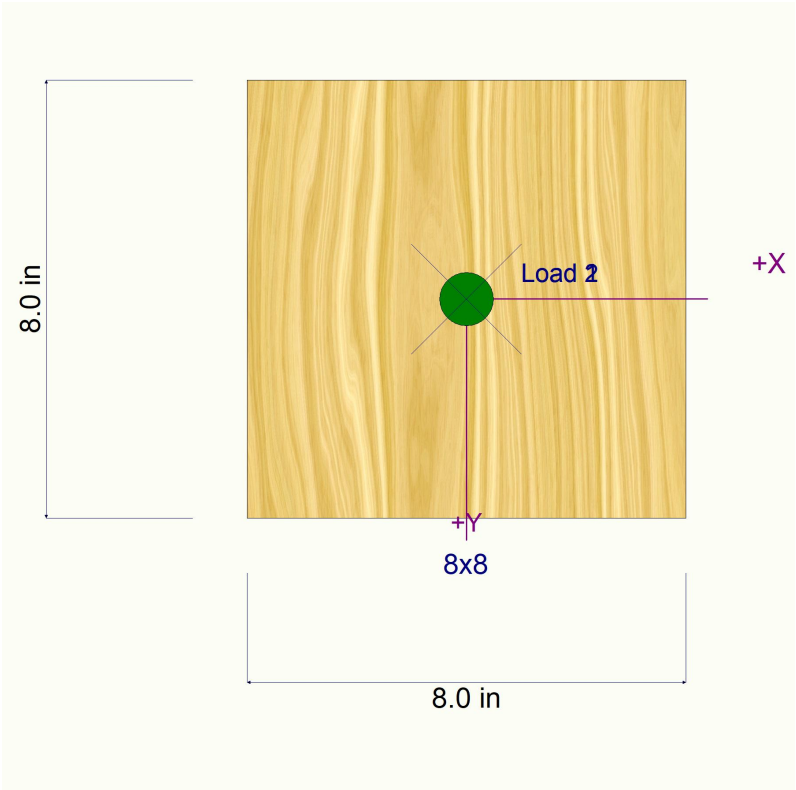
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W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

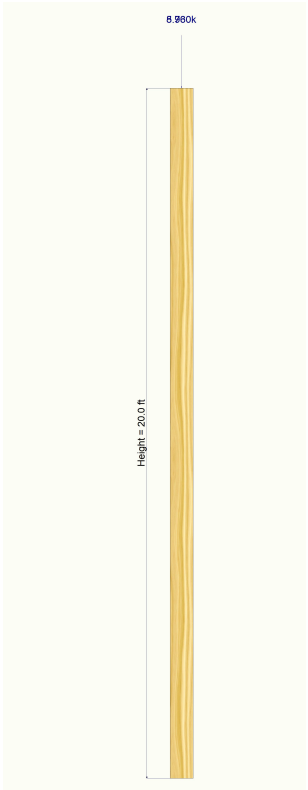
Wood Column

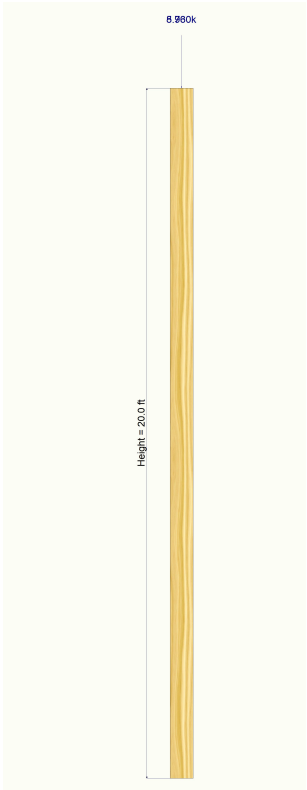
Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Bent #13 Columns

Sketches







Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Roof Beams Bents 10/11

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

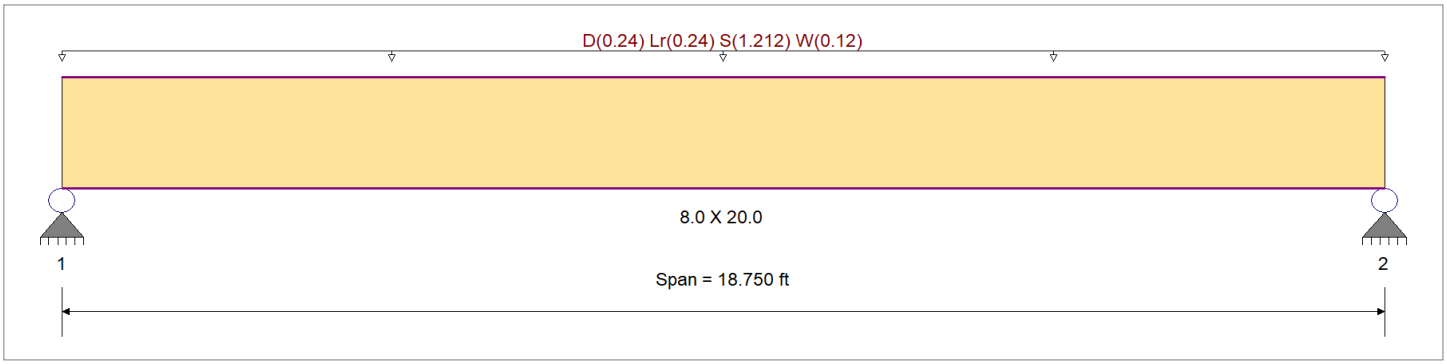
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 12.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.974 : 1	Maximum Shear Stress Ratio	=	0.551 : 1
Section used for this span		8.0 X 20.0	Section used for this span		8.0 X 20.0
fb: Actual	=	1,469.98 psi	fv: Actual	=	107.77 psi
F'b	=	1,508.97 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	9.375 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	0.397 in	Ratio =	566 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.487 in	Ratio =	461 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.230	0.130	0.90	1.00	1.00	1.00	0.972	1.00	1.00	1.00	12.07	271.6	1,180.9	2.12	19.9	153.0
+D+Lr					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.310	0.176	1.25	1.00	1.00	1.00	0.972	1.00	1.00	1.00	22.62	508.9	1,640.2	3.98	37.3	212.5
+D+S					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.974	0.551	1.15	1.00	1.00	1.00	0.972	1.00	1.00	1.00	65.33	1,470.0	1,509.0	11.50	107.8	195.5
+D+0.750Lr					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.274	0.155	1.25	1.00	1.00	1.00	0.972	1.00	1.00	1.00	19.98	449.6	1,640.2	3.52	33.0	212.5
+D+0.750S					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.776	0.439	1.15	1.00	1.00	1.00	0.972	1.00	1.00	1.00	52.02	1,170.4	1,509.0	9.15	85.8	195.5

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Roof Beams Bents 10/11

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.60W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.163	0.092	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	15.23	342.8	2,099.4	2.68	25.1	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.240	0.136	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	22.35	503.0	2,099.4	3.93	36.9	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.583	0.330	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	54.39	1,223.8	2,099.4	9.57	89.7	272.0
+0.60D+0.60W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.112	0.063	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	10.41	234.1	2,099.4	1.83	17.2	272.0
+0.60D					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.078	0.044	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	7.24	163.0	2,099.4	1.27	11.9	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4873	9.443		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	13.938	13.938
Max Upward from Load Combinations	13.938	13.938
Max Upward from Load Cases	11.363	11.363
D Only	2.575	2.575
+D+Lr	4.825	4.825
+D+S	13.938	13.938
+D+0.750Lr	4.263	4.263
+D+0.750S	11.097	11.097
+D+0.60W	3.250	3.250
+D+0.750Lr+0.450W	4.769	4.769
+D+0.750S+0.450W	11.603	11.603
+0.60D+0.60W	2.220	2.220
+0.60D	1.545	1.545
Lr Only	2.250	2.250
S Only	11.363	11.363
W Only	1.125	1.125

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Roof Beams Bents 9/12

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

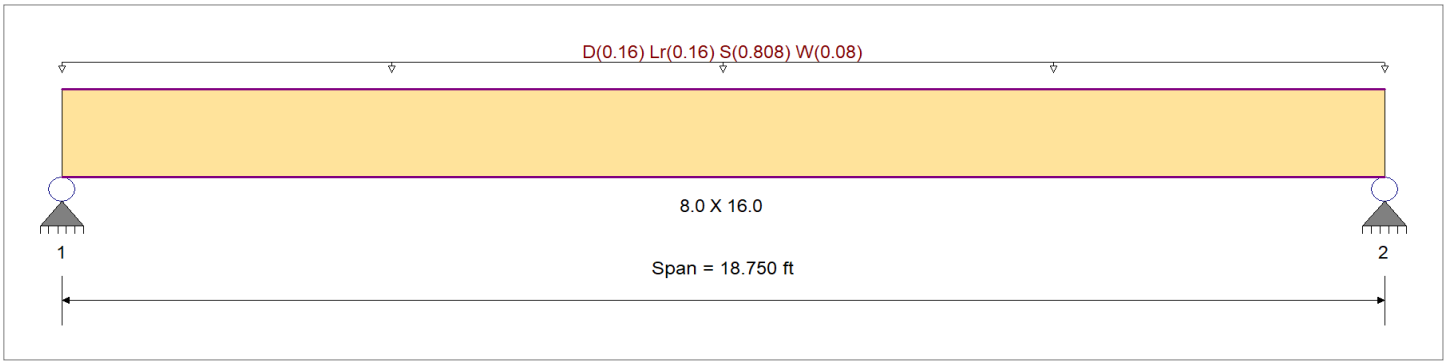
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, Lr = 0.020, S = 0.1010, W = 0.010 ksf, Tributary Width = 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.991 : 1	Maximum Shear Stress Ratio	=	0.469 : 1
Section used for this span		8.0 X 16.0	Section used for this span		8.0 X 16.0
fb: Actual	=	1,495.51 psi	fv: Actual	=	91.60 psi
F'b	=	1,508.97 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	9.375 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	0.517 in	Ratio =	434 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.620 in	Ratio =	363 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.209	0.099	0.90	1.00	1.00	1.00	0.972	1.00	1.00	1.00	7.03	247.2	1,180.9	1.29	15.1	153.0
+D+Lr					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.301	0.142	1.25	1.00	1.00	1.00	0.972	1.00	1.00	1.00	14.06	494.4	1,640.2	2.58	30.3	212.5
+D+S					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.991	0.469	1.15	1.00	1.00	1.00	0.972	1.00	1.00	1.00	42.54	1,495.5	1,509.0	7.82	91.6	195.5
+D+0.750Lr					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.264	0.125	1.25	1.00	1.00	1.00	0.972	1.00	1.00	1.00	12.30	432.6	1,640.2	2.26	26.5	212.5
+D+0.750S					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.784	0.371	1.15	1.00	1.00	1.00	0.972	1.00	1.00	1.00	33.66	1,183.4	1,509.0	6.19	72.5	195.5

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Roof Beams Bents 9/12

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.60W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.153	0.072	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	9.14	321.4	2,099.4	1.68	19.7	272.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.233	0.110	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	13.89	488.2	2,099.4	2.55	29.9	272.0
+D+0.750S+0.450W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.590	0.279	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	35.24	1,239.1	2,099.4	6.48	75.9	272.0
+0.60D+0.60W					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.106	0.050	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	6.33	222.5	2,099.4	1.16	13.6	272.0
+0.60D					1.00	1.00	1.00	0.972	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.071	0.033	1.60	1.00	1.00	1.00	0.972	1.00	1.00	1.00	4.22	148.3	2,099.4	0.78	9.1	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.6197	9.443		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	9.075	9.075
Max Upward from Load Combinations	9.075	9.075
Max Upward from Load Cases	7.575	7.575
D Only	1.500	1.500
+D+Lr	3.000	3.000
+D+S	9.075	9.075
+D+0.750Lr	2.625	2.625
+D+0.750S	7.181	7.181
+D+0.60W	1.950	1.950
+D+0.750Lr+0.450W	2.963	2.963
+D+0.750S+0.450W	7.519	7.519
+0.60D+0.60W	1.350	1.350
+0.60D	0.900	0.900
Lr Only	1.500	1.500
S Only	7.575	7.575
W Only	0.750	0.750

Wood Column

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Bents #9-12 Columns

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	**8x8**
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber
Overall Column Height	18.5 ft			Wood Member Type	Sawn
(Used for non-slender calculations)				Exact Width	**8.0** in
Wood Species	Douglas Fir-Larch			Exact Depth	**8.0** in
Wood Grade	No.1			Area	64.0 in^2
Fb +	1,200.0 psi	Fv	170.0 psi	Ix	341.333 in^4
Fb -	1,200.0 psi	Ft	825.0 psi	Iy	341.333 in^4
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	

Allow Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compressior	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 18.5 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 18.5 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 256.616 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 18.50 ft, D = 3.960, Lr = 3.960, S = 19.998, W = 1.980 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7152 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	24.215 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	529.0 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	18.50 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 Only	0.900	0.552	0.1326	PASS	0.0 ft	0.0	PASS	18.50 ft
+D+Lr	1.250	0.430	0.2375	PASS	0.0 ft	0.0	PASS	18.50 ft
+D+S	1.150	0.460	0.7152	PASS	0.0 ft	0.0	PASS	18.50 ft
+D+0.750Lr	1.250	0.430	0.2088	PASS	0.0 ft	0.0	PASS	18.50 ft
+D+0.750S	1.150	0.460	0.5676	PASS	0.0 ft	0.0	PASS	18.50 ft
+D+0.60W	1.600	0.349	0.1511	PASS	0.0 ft	0.0	PASS	18.50 ft
+D+0.750Lr+0.450W	1.600	0.349	0.2258	PASS	0.0 ft	0.0	PASS	18.50 ft
+D+0.750S+0.450W	1.600	0.349	0.5619	PASS	0.0 ft	0.0	PASS	18.50 ft
+0.60D+0.60W	1.600	0.349	0.1039	PASS	0.0 ft	0.0	PASS	18.50 ft
+0.60D	1.600	0.349	0.07071	PASS	0.0 ft	0.0	PASS	18.50 ft

Wood Column

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Bents #9-12 Columns

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						4.217					
+D+Lr						8.177					
+D+S						24.215					
+D+0.750Lr						7.187					
+D+0.750S						19.215					
+D+0.60W						5.405					
+D+0.750Lr+0.450W						8.078					
+D+0.750S+0.450W						20.106					
+0.60D+0.60W						3.718					
+0.60D						2.530					
Lr Only						3.960					
S Only						19.998					
W Only						1.980					

Maximum Deflections for Load Combinations

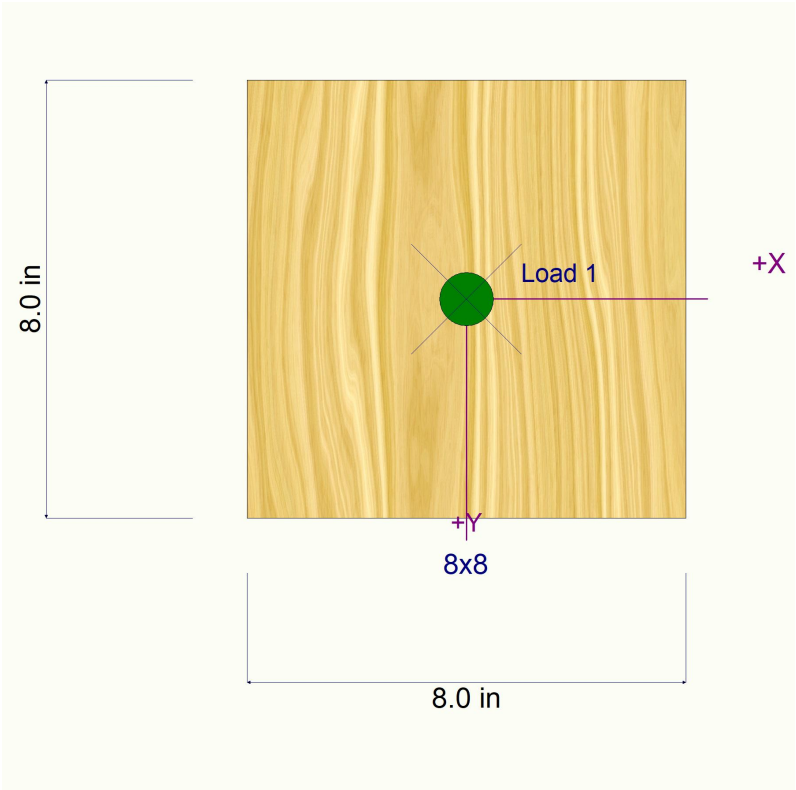
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W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

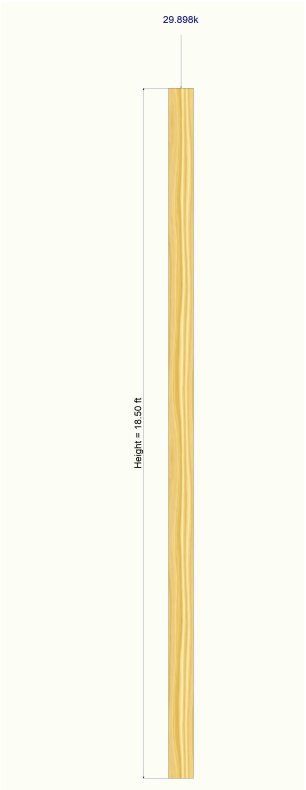
Wood Column

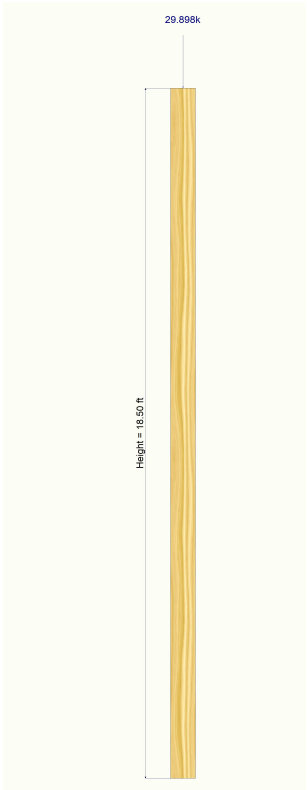
Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Bents #9-12 Columns

Sketches







Wood Beam

Project File: Dan McEntee.ec6

LIC# : KW-06016950, Build:20.24.08.01 Frame Engineering (c) ENERCALC INC 1983-2023

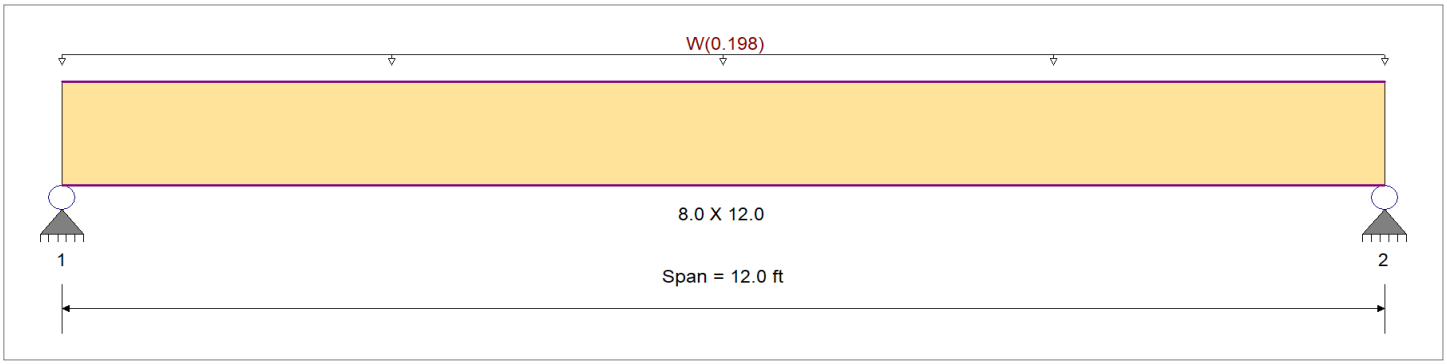
DESCRIPTION: Bent Spacer

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 +	1350 psi	*E : Modulus of Elasticity*	
Load Combination :	ASCE 7-16	Fb -	1350 psi	Ebend- xx	1600 ksi
		Fc - Prll	925 psi	Eminbend - xx	580 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade :	No.1	Fv	170 psi		
		Ft	675 psi	Density	31.21 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : W = 0.0180 ksf, Tributary Width = 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.093 : 1	Maximum Shear Stress Ratio	=	0.034 : 1
Section used for this span		**8.0 X 12.0** *(weak orientation)*	Section used for this span		**8.0 X 12.0** *(weak orientation)*
fb: Actual	=	200.48 psi	fv: Actual	=	9.35 psi
F'b	=	2,160.00 psi	F'v	=	272.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	6.000 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	0.113 in	Ratio =	1269 >=360	Span: 1 : W Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.068 in	Ratio =	2115 >=180	Span: 1 : +0.60W
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 12.0 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			1,215.0	0.00	0.0	153.0
+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.093	0.034	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.14	200.5	2,160.0	0.60	9.3	272.0
+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.070	0.026	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.60	150.4	2,160.0	0.45	7.0	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.1134	6.044		0.0000	0.000

Wood Beam

DESCRIPTION: Bent Spacer

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.188	1.188
Max Upward from Load Combinations	0.713	0.713
Max Upward from Load Cases	1.188	1.188
+0.60W	0.713	0.713
+0.450W	0.535	0.535
W Only	1.188	1.188

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Bent #12 Front Beam

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

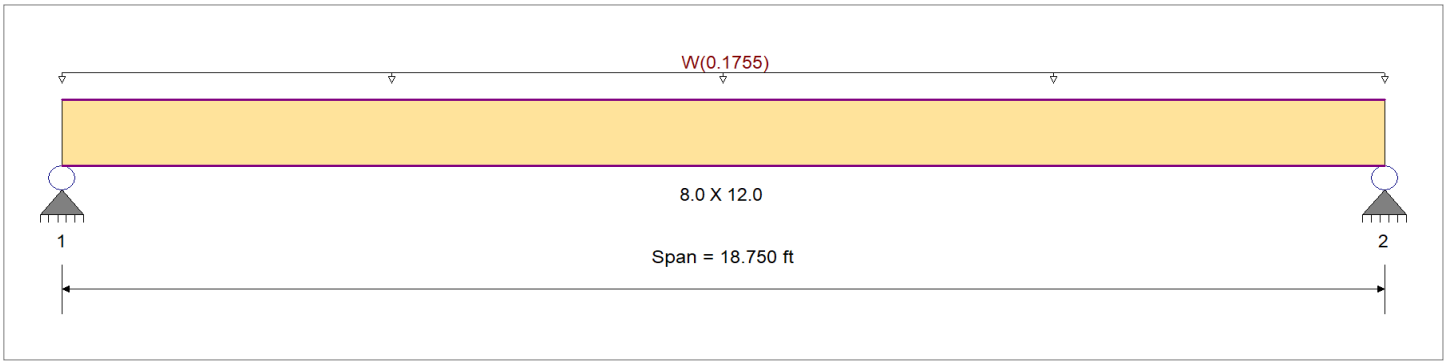
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : W = 0.0180 ksf, Tributary Width = 9.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.201 : 1	Maximum Shear Stress Ratio	=	0.051 : 1
Section used for this span		8.0 X 12.0 (weak orientation)	Section used for this span		8.0 X 12.0 (weak orientation)
fb: Actual	=	433.82 psi	fv: Actual	=	13.85 psi
F'b	=	2,160.00 psi	F'v	=	272.00 psi
Load Combination		+0.60W	Load Combination		+0.60W
Location of maximum on span	=	9.375 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	0.599 in	Ratio =	375 >=360	Span: 1 : W Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.360 in	Ratio =	625 >=180	Span: 1 : +0.60W
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
														0.0	0.00	0.0	0.0
Length = 18.750 ft	1			0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00			1,215.0	0.00	0.0	153.0
+0.60W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.201	0.051	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.63	433.8	2,160.0	0.89	13.8	272.0
+0.450W					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.750 ft	1	0.151	0.038	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.47	325.4	2,160.0	0.66	10.4	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.5992	9.443		0.0000	0.000

Wood Beam

DESCRIPTION: Bent #12 Front Beam

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.645	1.645
Max Upward from Load Combinations	0.987	0.987
Max Upward from Load Cases	1.645	1.645
+0.60W	0.987	0.987
+0.450W	0.740	0.740
W Only	1.645	1.645

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Girder #4/5 Center Beams

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

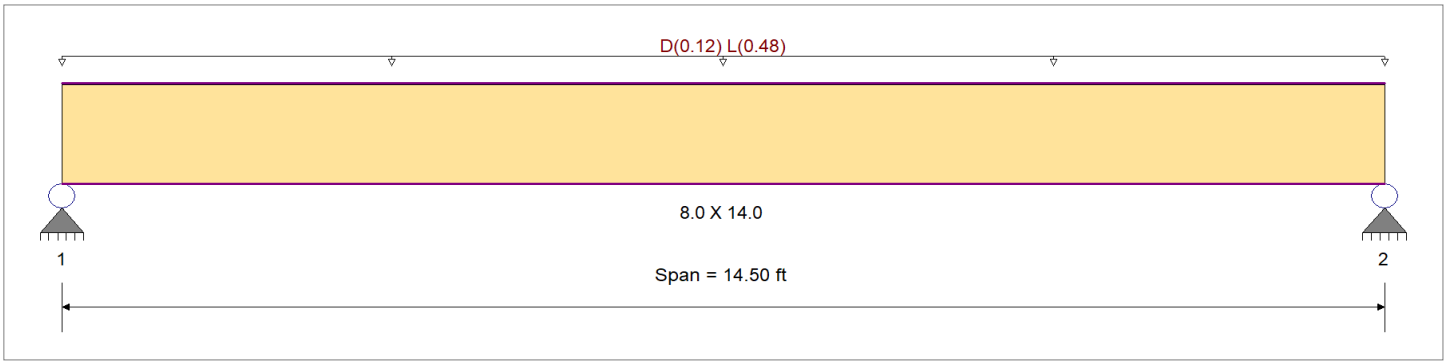
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 12.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.565 : 1	Maximum Shear Stress Ratio	=	0.299 : 1
Section used for this span		**8.0 X 14.0**	Section used for this span		**8.0 X 14.0**
fb: Actual	=	753.37 psi	fv: Actual	=	50.88 psi
F'b	=	1,332.45 psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	7.250 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	0.164 in	Ratio =	1060 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.213 in	Ratio =	815 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 14.50 ft	1	0.145	0.077	0.90	1.00	1.00	1.00	0.987	1.00	1.00	1.00	3.79	174.1	1,199.2	0.88	11.8	153.0
+D+L					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.50 ft	1	0.565	0.299	1.00	1.00	1.00	1.00	0.987	1.00	1.00	1.00	16.41	753.4	1,332.4	3.80	50.9	170.0
+D+0.750L					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.50 ft	1	0.365	0.193	1.25	1.00	1.00	1.00	0.987	1.00	1.00	1.00	13.25	608.6	1,665.6	3.07	41.1	212.5
+0.60D					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.50 ft	1	0.049	0.026	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	2.28	104.5	2,131.9	0.53	7.1	272.0

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Girder #4/5 Center Beams

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2134	7.303		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.526	4.526
Max Upward from Load Combinations	4.526	4.526
Max Upward from Load Cases	3.480	3.480
D Only	1.046	1.046
+D+L	4.526	4.526
+D+0.750L	3.656	3.656
+0.60D	0.628	0.628
L Only	3.480	3.480

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Girder #4/5 Side Beams

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

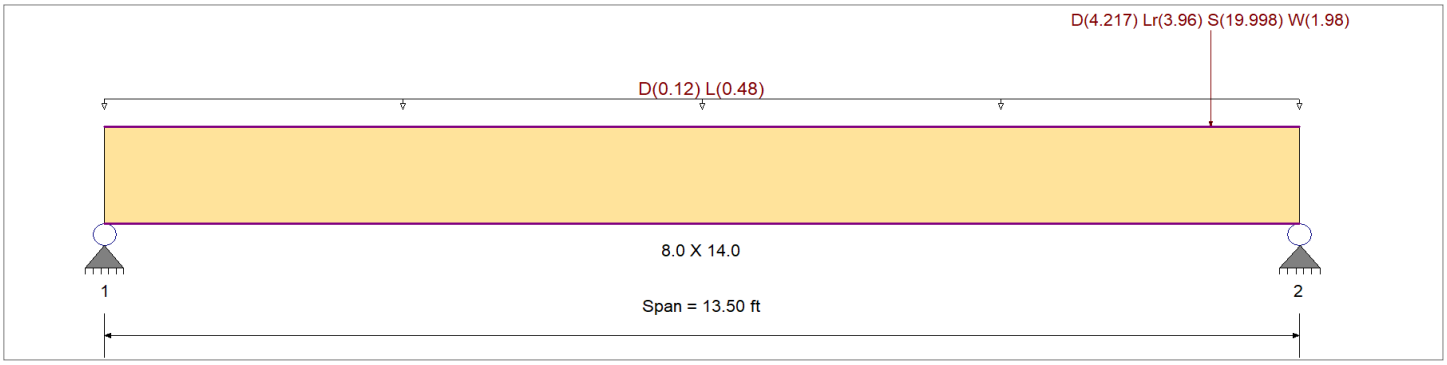
Wood Species : Douglas Fir-Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 12.0 ft
Point Load : D = 4.217, Lr = 3.960, S = 19.998, W = 1.980 k @ 12.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.698 : 1	Maximum Shear Stress Ratio	=	0.301 : 1
Section used for this span		8.0 X 14.0	Section used for this span		8.0 X 14.0
fb: Actual	=	1,069.42 psi	fv: Actual	=	51.14 psi
F'b	=	1,532.31 psi	F'v	=	170.00 psi
Load Combination		+D+S	Load Combination		+D+L
Location of maximum on span	=	12.465 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	0.138 in	Ratio =	1177 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.266 in	Ratio =	608 >=180	Span: 1 : +D+0.750L+0.750S+0.450W
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.220	0.098	0.90	1.00	1.00	1.00	0.987	1.00	1.00	1.00	5.73	263.3	1,199.2	1.12	15.0	153.0
Length = 0.04927 ft	1	0.009	0.098	0.90	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.24	11.0	1,199.2	0.50	15.0	153.0
+D+L					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.565	0.301	1.00	1.00	1.00	1.00	0.987	1.00	1.00	1.00	16.41	753.4	1,332.4	3.82	51.1	170.0
Length = 0.04927 ft	1	0.014	0.301	1.00	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.40	18.3	1,332.4	3.19	51.1	170.0
+D+Lr					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.238	0.089	1.25	1.00	1.00	1.00	0.987	1.00	1.00	1.00	8.65	397.0	1,665.6	1.42	19.0	212.5
Length = 0.04927 ft	1	0.012	0.089	1.25	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.42	19.3	1,665.6	0.20	19.0	212.5

Wood Beam

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Girder #4/5 Side Beams

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+S					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.698	0.178	1.15	1.00	1.00	1.00	0.987	1.00	1.00	1.00	23.29	1,069.4	1,532.3	2.60	34.9	195.5
Length = 0.04927 ft	1	0.035	0.178	1.15	1.00	1.00	1.00	0.987	1.00	1.00	1.00	1.15	52.9	1,532.3	0.97	34.9	195.5
+D+0.750Lr+0.750L					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.424	0.212	1.25	1.00	1.00	1.00	0.987	1.00	1.00	1.00	15.36	705.4	1,665.6	3.36	45.1	212.5
Length = 0.04927 ft	1	0.014	0.212	1.25	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.49	22.7	1,665.6	2.30	45.1	212.5
+D+0.750L+0.750S					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.692	0.292	1.15	1.00	1.00	1.00	0.987	1.00	1.00	1.00	23.10	1,060.9	1,532.3	4.26	57.0	195.5
Length = 0.04927 ft	1	0.031	0.292	1.15	1.00	1.00	1.00	0.987	1.00	1.00	1.00	1.04	47.9	1,532.3	1.41	57.0	195.5
+D+0.60W					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.141	0.060	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	6.54	300.5	2,131.9	1.21	16.2	272.0
Length = 0.04927 ft	1	0.006	0.060	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.29	13.5	2,131.9	0.41	16.2	272.0
+D+0.750Lr+0.750L+0.450W					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.342	0.169	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	15.88	729.3	2,131.9	3.43	45.9	272.0
Length = 0.04927 ft	1	0.012	0.169	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.54	24.6	2,131.9	2.23	45.9	272.0
+D+0.750L+0.750S+0.450W					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.511	0.213	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	23.74	1,090.1	2,131.9	4.32	57.9	272.0
Length = 0.04927 ft	1	0.023	0.213	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	1.08	49.8	2,131.9	1.34	57.9	272.0
+0.60D+0.60W					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.092	0.038	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	4.27	196.0	2,131.9	0.76	10.2	272.0
Length = 0.04927 ft	1	0.004	0.038	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.20	9.1	2,131.9	0.21	10.2	272.0
+0.60D					1.00	1.00	1.00	0.987	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.451 ft	1	0.074	0.033	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	3.44	158.0	2,131.9	0.67	9.0	272.0
Length = 0.04927 ft	1	0.003	0.033	1.60	1.00	1.00	1.00	0.987	1.00	1.00	1.00	0.14	6.6	2,131.9	0.30	9.0	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.450W	1	0.2660	7.292		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.893	23.395
Max Upward from Load Combinations	4.893	23.395
Max Upward from Load Cases	3.240	18.517
D Only	1.286	4.878
+D+L	4.526	8.118
+D+Lr	1.580	8.545
+D+S	2.768	23.395
+D+0.750Lr+0.750L	3.936	10.058
+D+0.750L+0.750S	4.827	21.196
+D+0.60W	1.374	5.978
+D+0.750Lr+0.750L+0.450W	4.002	10.883
+D+0.750L+0.750S+0.450W	4.893	22.021
+0.60D+0.60W	0.860	4.027
+0.60D	0.772	2.927
Lr Only	0.293	3.667
L Only	3.240	3.240
S Only	1.481	18.517
W Only	0.147	1.833

Wood Column

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Girder #4/5 Columns

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	**8x8**
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber
Overall Column Height	9 ft			Wood Member Type	Sawn
(Used for non-slender calculations)					
Wood Species	Douglas Fir-Larch			Exact Width	**8.0** in
Wood Grade	No.1			Exact Depth	**8.0** in
Fb +	1,200.0 psi	Fv	170.0 psi	Area	64.0 in^2
Fb -	1,200.0 psi	Ft	825.0 psi	Ix	341.333 in^4
Fc - Prll	1,000.0 psi	Density	31.210 pcf	Iy	341.333 in^4
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	

Allow Stress Modification Factors	
Cf or Cv for Bending	1.0
Cf or Cv for Compressior	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 9 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 9 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 124.840 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.0 ft, D = 5.960, Lr = 3.667, L = 6.840, S = 18.517, W = 1.833 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3846 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	25.103 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,019.72 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	9.0 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 Only	0.900	0.916	0.1154	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+L	1.000	0.904	0.2233	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+Lr	1.250	0.874	0.1394	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+S	1.150	0.887	0.3770	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750Lr+0.750L	1.250	0.874	0.1996	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L+0.750S	1.150	0.887	0.3846	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.60W	1.600	0.829	0.08461	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750Lr+0.750L+0.450W	1.600	0.829	0.1742	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L+0.750S+0.450W	1.600	0.829	0.3053	PASS	0.0 ft	0.0	PASS	9.0 ft
+0.60D+0.60W	1.600	0.829	0.05594	PASS	0.0 ft	0.0	PASS	9.0 ft
+0.60D	1.600	0.829	0.04299	PASS	0.0 ft	0.0	PASS	9.0 ft

Wood Column

Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Girder #4/5 Columns

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					6.085				
+D+L					12.925				
+D+Lr					9.752				
+D+S					24.602				
+D+0.750Lr+0.750L					13.965				
+D+0.750L+0.750S					25.103				
+D+0.60W					7.185				
+D+0.750Lr+0.750L+0.450W					14.790				
+D+0.750L+0.750S+0.450W					25.927				
+0.60D+0.60W					4.751				
+0.60D					3.651				
Lr Only					3.667				
L Only					6.840				
S Only					18.517				
W Only					1.833				

Maximum Deflections for Load Combinations

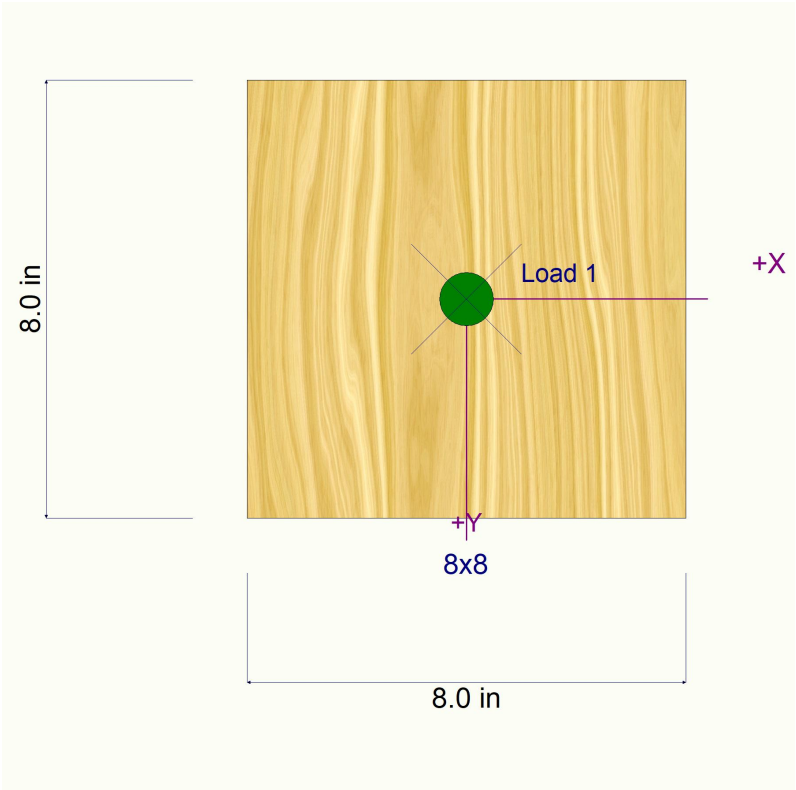
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L+0.750S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

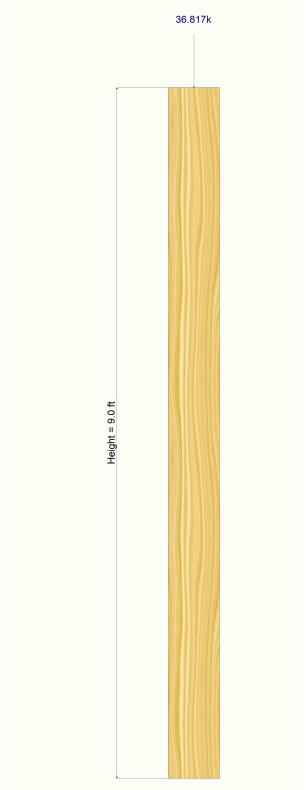
Wood Column

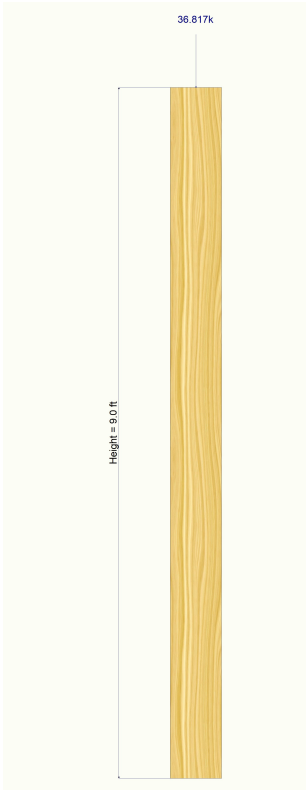
Project File: Dan McEntee - Steamboat.ec6

DESCRIPTION: Girder #4/5 Columns

Sketches







FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Garage	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Building Code:	2021	International Residential Code	
Roof Dead Load:	20	PSF	
Ground Snow Load:	130	PSF	
Roof Snow/Live Load:	101	PSF	= 130 psf x 0.7 x 1.1
Wind Speed (Basic):	115	MPH	
Building Enclosure:	Fully Enclosed		
Exposure:	C		
Seismic Design Category:	C		
Importance Category:	II		
Frost Depth:	48	Inches	

FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Garage	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Drifting on Lower Roofs:

Drift Weight:

$$\gamma = 0.13p_g + 14\ (Not\ to\ exceed\ 30\ psf)$$
$$\gamma = 0.13 * 130 + 14$$
$$\gamma = 30psf$$

Drift Height (Lower Roof):

$$h_d = \left(0.43\sqrt[3]{l_u}\sqrt[4]{p_g + 10}\right) - 1.5$$
$$h_d = \left(0.43\sqrt[3]{33}\sqrt[4]{130 + 10}\right) - 1.5$$
$$h_d = 3.3\ ft$$

Drift Load (Lower Roof):

$$p_d = h_d * \gamma$$
$$p_d = 3.3ft * 30psf$$
$$p_d = 99psf$$

Drift Width (Lower Roof):

$$w = 4 * h_d$$
$$w = 4 * 3.3ft$$
$$w = 13.2\ ft$$

Sliding Snow:

$$S = 0.4p_f W/15'$$
$$S = 0.4 * 101psf\ *39'/15'$$
$$S = 105\ \text{psf}$$

MecaWind v2478

Calculations Prepared by:
Date: Aug 20, 2024
File Location: Current Project Not Saved

General:

Wind Load Standard	=	ASCE 7-16	Basic Wind Speed	=	115.0 mph
Exposure Classification	=	C	Risk Category	=	II
Structure Type	=	Building	Design Basis for Wind Pressures	=	ASD
MWFRS Analysis Method	=	Ch 27 Pt 1	C&C Analysis Method	=	Ch 30 Pt 1
Dynamic Type of Structure	=	Rigid	Show Advanced Options	=	True
Reset Advanced Options to Default Values	=	Defaults	Simple Diaphragm Building	=	False
Show Base Reactions in Output	=	None	Altitude above Sea Level	=	0.000 ft
Base Elevation Of Structure	=	0.000 ft	MWFRS Pressure Elevations	=	Mean Ht
Topographic Effects	=	None	Override Directionality Factor K_d	=	False
Override the Gust Factor G	=	False	Override Minimum Pressure	=	False

Building:

Roof	=	Roof Type	=	Gabled	Encl	=	Enclosure Classification	=	Enclosed
Help	=	Help on Building Roof Type	=	Help	Pitch	=	Pitch of Roof	=	3.0 :12
θ	=	Slope of Roof	=	14.04 Deg	R_{Ht}	=	Ridge Height	=	26.750 ft
E_{Ht}	=	Eave Height	=	20.000 ft	W	=	Building Width	=	54.000 ft
L	=	Building Length	=	40.000 ft	OH	=	Type of Overhang	=	All Overhang
Par	=	Parapet	=	None	HT_{over}	=	Override Mean Roof Height	=	False
Ht_{man}	=	Mean Roof Height	=	23.375 ft	RA_{over}	=	Override Roof Area	=	False
GC_{pi_o}	=	Override GC_{pi} value	=	False		=			

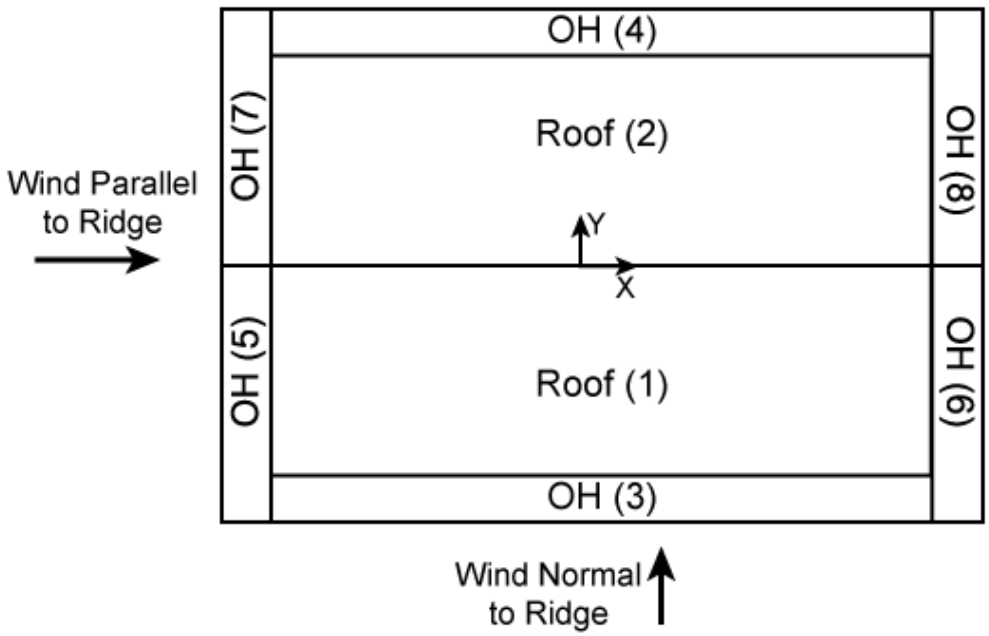
Exposure Constants [Tbl 26.11-1]:

α = 3-s Gust-speed exponent	=	9.500	Z_g = Nominal Ht of Boundary Layer	=	900.000 ft
â = Reciprocal of α	=	0.105	b = 3 sec gust speed factor	=	1.000
α_m = Mean hourly Wind-Speed Exponent	=	0.154	b_m = Mean hourly Windspeed Exponent	=	0.650
c = Turbulence Intensity Factor	=	0.200	ε = Integral Length Scale Exponent	=	0.2000

Overhang Inputs:

Std	=	Overhangs on all sides are the same	=	True
OHType	=	Type of Roof Wall Intersections	=	Overhang
OH	=	Overhang of Roof Beyond Wall	=	2.000 ft

Main Wind Force Resisting System (MWFRS) Wind Calculations per Ch 27 Pt1



h	=	Mean structure height	=	23.375 ft
h_{grade}	=	Elevation from Grade to Top of Structure	=	23.375 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	=	0.932
K_{zt}	=	No Topographic feature specified	=	1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	=	0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	=	+0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	=	-0.18
LF	=	Load Factor based upon ASD Design	=	0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	=	1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	16.09 psf
RA	=	Roof Area	=	2630.54 ft^2
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	16.09 psf
q_{in}	=	Negative Internal Pressure: $q_h \cdot LF$	=	16.09 psf
q_{ip}	=	Positive Internal Pressure: $q_h \cdot LF$	=	16.09 psf

MWFRS Wind Loads [Normal to Ridge]

h	=	Mean Roof Height Of Building	=	23.375 ft
RHt	=	Ridge Height Of Roof	=	26.750 ft
B	=	Horizontal Dimension Of Building Normal To Wind Direction	=	40.000 ft
L	=	Horizontal Dimension Of building Parallel To Wind Direction	=	54.000 ft
L/B	=	Ratio Of L/B used For Cp determination	=	1.350
h/L	=	Ratio Of h/L used For Cp determination	=	0.433
Slope	=	Slope Of Roof	=	14.04 Deg

Gust Factor Calculation for Wind: [Normal to Ridge]

Gust Factor Category I Rigid Structures - Simplified Method

G_1	=	Simplified: For Rigid Structures can use 0.85	=	0.85

Gust Factor Category II Rigid Structures - Complete Analysis

Z_m	=	Equiv Struc Height: Max(0.6•h, Z_{min})	=	15.000 ft
I_{zm}	=	Turbulence Intensity: $c \cdot (33/Z_m)^{1/6}$ [Eq 26.11-1]	=	0.228
L_{zm}	=	Turbulence Integral Length Scale: $\ell \cdot (Z_m/33)^{\varepsilon}$ [Eq 26.11-9]	=	427.057 ft
B	=	Building Width Width Normal to Wind Direction	=	40.000 ft
Q	=	$[1/(1+0.63 \cdot [(B+h)/L_{zm}]^{0.63})]^{0.5}$ [Eq 26.11-8]	=	0.917
G_2	=	Detailed: $0.925 \cdot [(1+1.7 \cdot g_q \cdot I_{zm} \cdot Q)/(1+1.7 \cdot g_v \cdot I_{zm})]$ [Eq 26.11-6]	=	0.881

Gust Factor Used in Analysis

G	=	Gust Factor: Min(G_1, G_2)	=	0.850

Cp_{WW}	=	Windward Wall Coefficient (All L/B Values)	=	0.800
Cp_{LW}	=	Leeward Wall Coefficient using L/B	=	-0.430
Cp_{SW}	=	Side Wall Coefficient (All L/B values)	=	-0.700

Wind Pressures [Normal to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Elev ft	GC_{pi}	q_i psf	K_z	K_{zt}	q_z psf	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
20.000	+0.18	16.09	0.902	1.000	15.57	7.69	-8.78	-12.47	16.47	9.60
20.000	-0.18	16.09	0.902	1.000	15.57	13.49	-2.99	-6.68	16.47	9.60

K_z = $2.01 \cdot (z_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]
GC_{pi} = Enclosed Internal Pressure Tbl 26.13-1
q_{ip} = Positive Internal Pressure: $q_h \cdot LF$
Side = $q_h \cdot G \cdot Cp_{SW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Windward = $q_z \cdot G \cdot Cp_{WW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
K_{zt} = No Topographic feature specified
q_z = $0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]
q_{in} = Negative Internal Pressure: $q_h \cdot LF$
Leeward = $q_h \cdot G \cdot Cp_{LW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Total = Windward - Leeward

- *Minimum Pressure: § 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Roof Wind Pressures [Normal to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Component	Description	Location	Start ft	End ft	GC_{pi}	C_{pMin}	C_{pMax}	$P_{C_{pMin}}$ psf	$P_{C_{pMax}}$ psf	P_{min} psf
OH	Overhang Top	3,5,6	All	All	0	-0.141	-0.685	-1.93	-9.37	4.80
OH	Overhang Leeward	2,7,8	All	All	0	-0.490	-0.490	-6.70	-6.70	4.80
OH_Bot	Overhang Bottom	3	All	All	0	0.800	0.800	10.94	10.94	4.80
Roof	Roof Windward	1	All	All	+0.18	-0.141	-0.685	-4.83	-12.26	4.80
Roof	Roof Leeward	2	All	All	+0.18	-0.490	-0.490	-9.59	-9.59	4.80
OH	Overhang Top	3,5,6	All	All	0	-0.141	-0.685	-1.93	-9.37	4.80
OH	Overhang Leeward	2,7,8	All	All	0	-0.490	-0.490	-6.70	-6.70	4.80
OH_Bot	Overhang Bottom	3	All	All	0	0.800	0.800	10.94	10.94	4.80
Roof	Roof Windward	1	All	All	-0.18	-0.141	-0.685	0.97	-6.47	4.80

Roof	Roof Leeward	2	All	All	-0.18	-0.490	-0.490	-3.80	-3.80	4.80

Roof Pressures based upon Ch 27 Pt1:

Component = The building component for pressures
Start = Start Dist from Windward Edge
C_{pMin} = Smallest Coefficient Magnitude
P_{CpMin} = $q_h \cdot G \cdot C_{pMin} - q_{ip} \cdot GC_{pi}$ [Eq 27.3-1]

Location = Reference Graphic in Output for Values
End = End Dist from Windward Edge
C_{pMax} = Largest Coefficient Magnitude
P_{CpMax} = $q_h \cdot G \cdot C_{pMax} - q_{in} \cdot GC_{pi}$ [Eq 27.3-1]

P_{min} = Min Press projected on vertical plane [§ 27.1.5]

- *No reduction factor was applicable*
- *The smaller uplift pressures due to C_{pMin} can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

MWFRS Wind Loads [Parallel to Ridge]

h	=	Mean Roof Height Of Building	= 23.375 ft
RHt	=	Ridge Height Of Roof	= 26.750 ft
B	=	Horizontal Dimension Of Building Normal To Wind Direction	= 54.000 ft
L	=	Horizontal Dimension Of building Parallel To Wind Direction	= 40.000 ft
L/B	=	Ratio Of L/B used For Cp determination	= 0.741
h/L	=	Ratio Of h/L used For Cp determination	= 0.584
Slope	=	Slope Of Roof	= 14.04 Deg

Gust Factor Calculation for Wind: [Parallel to Ridge]

Gust Factor Category I Rigid Structures - Simplified Method

G_1	=	Simplified: For Rigid Structures can use 0.85	= 0.85

Gust Factor Category II Rigid Structures - Complete Analysis

Z_m	=	Equiv Struc Height: Max(0.6•h, Z_{min})	= 15.000 ft
I_{zm}	=	Turbulence Intensity: $c \cdot (33/Z_m)^{1/6}$ [Eq 26.11-1]	= 0.228
L_{zm}	=	Turbulence Integral Length Scale: $\ell \cdot (Z_m/33)^{\varepsilon}$ [Eq 26.11-9]	= 427.057 ft
B	=	Building Width Width Normal to Wind Direction	= 54.000 ft
Q	=	$[1/(1+0.63 \cdot [(B+h)/L_{zm}]^{0.63})]^{0.5}$ [Eq 26.11-8]	= 0.907
G_2	=	Detailed: $0.925 \cdot [(1+1.7 \cdot g_q \cdot I_{zm} \cdot Q)/(1+1.7 \cdot g_v \cdot I_{zm})]$ [Eq 26.11-6]	= 0.876

Gust Factor Used in Analysis

G	=	Gust Factor: Min(G_1, G_2)	= 0.850

Cp_{WW}	=	Windward Wall Coefficient (All L/B Values)	= 0.800
Cp_{LW}	=	Leeward Wall Coefficient using L/B	= -0.500
Cp_{SW}	=	Side Wall Coefficient (All L/B values)	= -0.700

Wind Pressures [Parallel to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Elev ft	GC_{pi}	q_i psf	K_z	K_{zt}	q_z psf	Windward Press psf	Leeward Press psf	Side Press psf	Total Press psf	Minimum Pressure* psf
26.750	+0.18	16.09	0.959	1.000	16.56	8.36	-9.74	-12.47	18.10	9.60
23.375	+0.18	16.09	0.932	1.000	16.09	8.05	-9.74	-12.47	17.78	9.60
20.000	+0.18	16.09	0.902	1.000	15.57	7.69	-9.74	-12.47	17.43	9.60
26.750	-0.18	16.09	0.959	1.000	16.56	14.15	-3.94	-6.68	18.10	9.60
23.375	-0.18	16.09	0.932	1.000	16.09	13.84	-3.94	-6.68	17.78	9.60
20.000	-0.18	16.09	0.902	1.000	15.57	13.49	-3.94	-6.68	17.43	9.60

K_z = $2.01 \cdot (z_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]
GC_{pi} = Enclosed Internal Pressure Tbl 26.13-1
q_{ip} = Positive Internal Pressure: $q_h \cdot LF$
Side = $q_h \cdot G \cdot Cp_{SW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Windward = $q_z \cdot G \cdot Cp_{WW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]

K_{zt} = No Topographic feature specified
q_z = $0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 \cdot LF$ [Eq 26.10-1]
q_{in} = Negative Internal Pressure: $q_h \cdot LF$
Leeward = $q_h \cdot G \cdot Cp_{LW} - q_{ip} \cdot (+GC_{pi})$ [Eq 27.3-1]
Total = Windward - Leeward

- *Minimum Pressure: § 27.1.5 no less than 9.60 psf (Incl LF) applied to Walls*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Roof Wind Pressures [Parallel to Ridge]
All wind pressures include a Load Factor (LF) of 0.6

Component	Description	Location	Start ft	End ft	GC_{pi}	C_{pMin}	C_{pMax}	P_{CpMin} psf	P_{CpMax} psf	P_{min} psf
OH_Bot	Overhang Bottom	5,7	All	All	0	0.800	0.800	10.94	10.94	4.80
OH_Top	Overhang Top (0 to h/2)	3,4,5,7	0.000	11.688	0	-0.924	-0.180	-12.63	-2.46	4.80
OH_Top	Overhang Top (h/2 to h)	3,4	11.688	23.375	0	-0.866	-0.180	-11.85	-2.46	4.80
OH_Top	Overhang Top (h to 2*h)	3,4,6,8	23.375	44.000	0	-0.534	-0.180	-7.30	-2.46	4.80
Roof	Roof (0 to h/2)	1,2	2.000	11.688	+0.18	-0.924	-0.180	-15.53	-5.36	4.80
Roof	Roof (h/2 to h)	1,2	11.688	23.375	+0.18	-0.866	-0.180	-14.75	-5.36	4.80
Roof	Roof (h to 2*h)	1,2	23.375	42.000	+0.18	-0.534	-0.180	-10.20	-5.36	4.80

OH_Bot	Overhang Bottom	5,7	All	All	0	0.800	0.800	10.94	10.94	4.80
OH_Top	Overhang Top (0 to h/2)	3,4,5,7	0.000	11.688	0	-0.924	-0.180	-12.63	-2.46	4.80
OH_Top	Overhang Top (h/2 to h)	3,4	11.688	23.375	0	-0.866	-0.180	-11.85	-2.46	4.80
OH_Top	Overhang Top (h to 2*h)	3,4,6,8	23.375	44.000	0	-0.534	-0.180	-7.30	-2.46	4.80
Roof	Roof (0 to h/2)	1,2	2.000	11.688	-0.18	-0.924	-0.180	-9.74	0.43	4.80
Roof	Roof (h/2 to h)	1,2	11.688	23.375	-0.18	-0.866	-0.180	-8.95	0.43	4.80
Roof	Roof (h to 2*h)	1,2	23.375	42.000	-0.18	-0.534	-0.180	-4.40	0.43	4.80

Roof Pressures based upon Ch 27 Pt1:

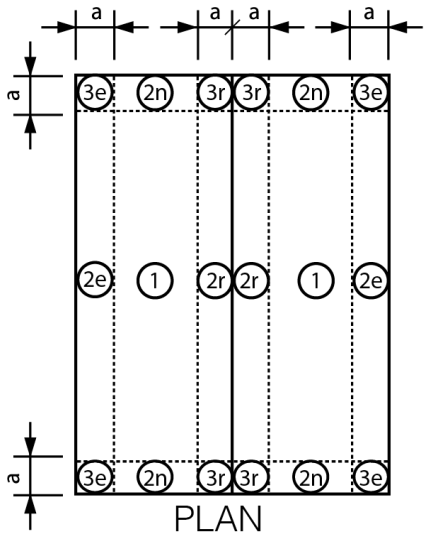
Component = The building component for pressures
Start = Start Dist from Windward Edge
C_{pMin} = Smallest Coefficient Magnitude
$P_{C_{pMin}}$ = $q_h \cdot G \cdot C_{pMin} - q_{ip} \cdot GC_{pi}$ [Eq 27.3-1]

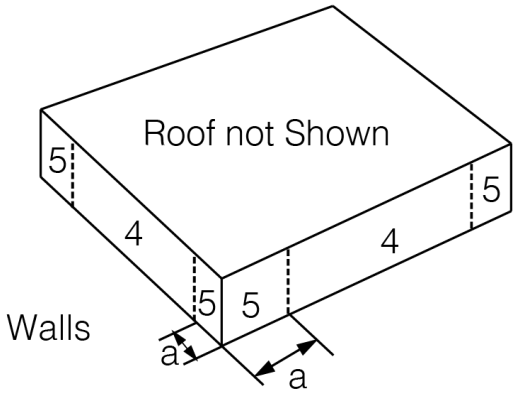
Location = Reference Graphic in Output for Values
End = End Dist from Windward Edge
C_{pMax} = Largest Coefficient Magnitude
$P_{C_{pMax}}$ = $q_h \cdot G \cdot C_{pMax} - q_{in} \cdot GC_{pi}$ [Eq 27.3-1]

P_{min} = Min Press projected on vertical plane [§ 27.1.5]

- *0.800 Reduction Factor applied for h/L>=1 & (0 to h/2)*
- *The smaller uplift pressures due to C_{pMin} can become critical when wind is combined with roof live load or snow load; load combinations are given in ASCE 7*
- *Positive Pressures Act TOWARD Surface and Negative Pressures Act AWAY from Surface*

Components and Cladding (C&C) Wind Loads per Ch 30 Part 1 Roof & Wall





h/W	=	Ratio of mean roof height to building width	= 0.433
h/L	=	Ratio of mean roof height to building length	= 0.584
h	=	Mean structure height	= 23.375 ft
h_{grade}	=	Elevation from Grade to Top of Structure	= 23.375 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	= 0.932
K_{zt}	=	No Topographic feature specified	= 1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	= 0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	= +0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	= -0.18
LF	=	Load Factor based upon ASD Design	= 0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	= 1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	= 16.09 psf
LHD	=	Least Horizontal Dimension: Min(B, L)	= 40.000 ft
a_1	=	Min(0.1•LHD, 0.4•h)	= 4.000 ft
a	=	Max(a_1, 0.04•LHD, 3 ft [0.9 m])	= 4.000 ft
h/B	=	Ratio of mean roof height to least horizontal dim: h/B	= 0.584

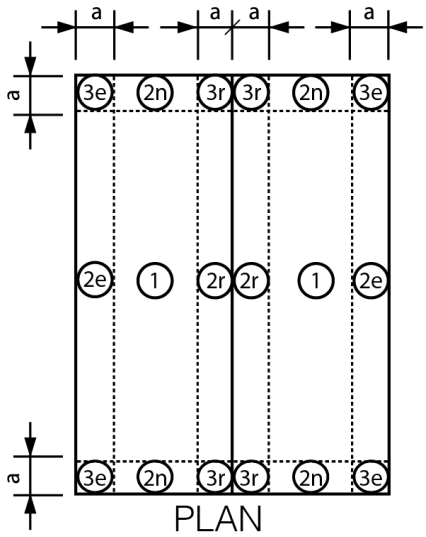
Wind Pressures for C&C Ch 30 Pt 1 Roof & Wall
All wind pressures include a Load Factor (LF) of 0.6

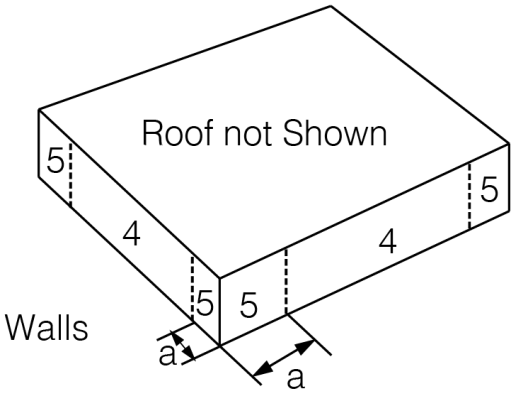
Description	Zone	Width ft	Span ft	Area ft^2	1/3 Rule	Figure	GCp Max	GCp Min	p Max psf	p Min psf
Truss	2e	2.000	24.000	192.00	Yes	30.3-2B	0.300	-0.500	9.60	-10.94
Studs	4	1.333	10.000	33.33	Yes	30.3-1	0.908	-1.008	17.50	-19.11
Columns	4	4.000	10.000	40.00	No	30.3-1	0.894	-0.994	17.28	-18.89

Area = Span Length x Effective Width
1/3 Rule = Effective width need not be less than 1/3 of the span length
GCp = External Pressure Coefficients taken from Figures 30.3-1 through 30.3-7
p = Wind Pressure: $q_h \cdot [GC_p - GC_{pi}]$ [[Eq 30.3-1]]
** Per § 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}*

Components and Cladding (C&C) Zone Summary per Ch 30 Pt 1:

h/W	=	Ratio of mean roof height to building width	=	0.433
h/L	=	Ratio of mean roof height to building length	=	0.584
h	=	Mean structure height	=	23.375 ft
h_{grade}	=	Elevation from Grade to Top of Structure	=	23.375 ft
K_h	=	$2.01 \cdot (h_{grade}/Z_g)^{2/\alpha}$ [Tbl 26.10-1]	=	0.932
K_{zt}	=	No Topographic feature specified	=	1.000
K_d	=	Wind Directionality Factor per Tbl 26.6-1	=	0.85
$+GC_{pi}$	=	Enclosed Positive Internal Pressure Tbl 26.13-1	=	+0.18
$-GC_{pi}$	=	Enclosed Negative Internal Pressure Tbl 26.13-1	=	-0.18
LF	=	Load Factor based upon ASD Design	=	0.60
K_e	=	Ground Elev Factor [Tbl 26.9-1]	=	1.000
q_h	=	$0.00256 \cdot K_h \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 * LF$ [Eq 26.10-1]	=	16.09 psf
LHD	=	Least Horizontal Dimension: Min(B, L)	=	40.000 ft
a_1	=	Min(0.1•LHD, 0.4•h)	=	4.000 ft
a	=	Max(a_1, 0.04•LHD, 3 ft [0.9 m])	=	4.000 ft
h/B	=	Ratio of mean roof height to least horizontal dim: h/B	=	0.584





Wind Pressure Summary for C&C Zones based Upon Areas Ch 30 Pt 1 (Table 1 of 2)
All wind pressures include a Load Factor (LF) of 0.6

Zone	Figure	Pos A ≤ 02 ft² psf	Neg A ≤ 02 ft² psf	Pos A = 10 ft² psf	Neg A = 10 ft² psf	Pos A = 20 ft² psf	Neg A = 20 ft² psf	Pos A = 50 ft² psf	Neg A = 50 ft² psf
1	30.3-2B	14.16	-35.08	11.51	-35.08	10.37	-35.08	9.60	-21.34
2e	30.3-2B	14.16	-35.08	11.51	-35.08	10.37	-35.08	9.60	-21.34
2n	30.3-2B	14.16	-51.17	11.51	-51.17	10.37	-44.24	9.60	-35.08
2r	30.3-2B	14.16	-51.17	11.51	-51.17	10.37	-44.24	9.60	-35.08
3e	30.3-2B	14.16	-51.17	11.51	-51.17	10.37	-44.24	9.60	-35.08
3r	30.3-2B	14.16	-60.83	11.51	-60.83	10.37	-52.11	9.60	-40.58
4	30.3-1	18.99	-20.60	18.99	-20.60	18.13	-19.74	17.00	-18.61
5	30.3-1	18.99	-25.43	18.99	-25.43	18.13	-23.71	17.00	-21.45
1_OH	30.3-2B	9.60	-40.23	9.60	-40.23	9.60	-40.23	9.60	-31.07
2e_OH	30.3-2B	9.60	-40.23	9.60	-40.23	9.60	-40.23	9.60	-31.07
2'_OH	30.3-2B	9.60	-40.23	9.60	-40.23	9.60	-40.23	9.60	-31.07
2n_OH	30.3-2B	9.60	-56.32	9.60	-56.32	9.60	-51.12	9.60	-44.25
2r_OH	30.3-2B	9.60	-56.32	9.60	-56.32	9.60	-51.12	9.60	-44.25
3e_OH	30.3-2B	9.60	-65.98	9.60	-65.98	9.60	-56.97	9.60	-45.06
3'_OH	30.3-2B	9.60	-65.98	9.60	-65.98	9.60	-56.97	9.60	-45.06
3r_OH	30.3-2B	9.60	-75.63	9.60	-75.63	9.60	-64.01	9.60	-48.64

Wind Pressure Summary for C&C Zones based Upon Areas Ch 30 Pt 1 (Table 2 of 2)
All wind pressures include a Load Factor (LF) of 0.6

Zone	Figure	Pos A = 100 ft² psf	Neg A = 100 ft² psf	Pos A = 200 ft² psf	Neg A = 200 ft² psf	Pos A = 250 ft² psf	Neg A = 250 ft² psf	Pos A > 500 ft² psf	Neg A > 500 ft² psf
1	30.3-2B	9.60	-10.94	9.60	-10.94	9.60	-10.94	9.60	-10.94

2e	30.3-2B	9.60	-10.94	9.60	-10.94	9.60	-10.94	9.60	-10.94
2n	30.3-2B	9.60	-28.15	9.60	-21.22	9.60	-18.99	9.60	-18.99
2r	30.3-2B	9.60	-28.15	9.60	-21.22	9.60	-18.99	9.60	-18.99
3e	30.3-2B	9.60	-28.15	9.60	-21.22	9.60	-18.99	9.60	-18.99
3r	30.3-2B	9.60	-31.86	9.60	-31.86	9.60	-31.86	9.60	-31.86
4	30.3-1	16.15	-17.76	15.29	-16.90	15.02	-16.63	14.16	-15.77
5	30.3-1	16.15	-19.74	15.29	-18.03	15.02	-17.48	14.16	-15.77
1_OH	30.3-2B	9.60	-24.14	9.60	-24.14	9.60	-24.14	9.60	-24.14
2e_OH	30.3-2B	9.60	-24.14	9.60	-24.14	9.60	-24.14	9.60	-24.14
2'_OH	30.3-2B	9.60	-24.14	9.60	-24.14	9.60	-24.14	9.60	-24.14
2n_OH	30.3-2B	9.60	-39.06	9.60	-33.86	9.60	-32.18	9.60	-32.18
2r_OH	30.3-2B	9.60	-39.06	9.60	-33.86	9.60	-32.18	9.60	-32.18
3e_OH	30.3-2B	9.60	-36.05	9.60	-27.04	9.60	-24.14	9.60	-24.14
3'_OH	30.3-2B	9.60	-36.05	9.60	-27.04	9.60	-24.14	9.60	-24.14
3r_OH	30.3-2B	9.60	-37.01	9.60	-37.01	9.60	-37.01	9.60	-37.01

** A is effective wind area for C&C: Span Length * Effective Width*
** Effective width need not be less than 1/3 of the span length*
** Maximum and minimum values of pressure shown.*
** + Pressures acting toward surface, - Pressures acting away from surface*
** Per § 30.2.2 the Minimum Pressure for C&C is 9.60 psf [0.460 kPa] {Includes LF}*
** Interpolation can be used for values of A that are between those values shown.*

FRAME ENGINEERING	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Garage	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Trusses

Dead Load:	20	PSF
Snow/Live Load:	101	PSF
$Wind_1$:	9.6	PSF
$Wind_2$:	-10.94	PSF

Load Combinations

D + L:	121	PSF
D + 0.6W_1:	25.8	PSF
D + 0.6W_2:	13.4	PSF
D+0.75(0.6W_1)+0.75L:	100.1	PSF
D+0.75(0.6W_2)+0.75L:	90.8	PSF
0.6D + 0.6W_1:	17.8	PSF
0.6D + 0.6W_2:	5.4	PSF

Studs

Dead Load:	N/A	PSF
Snow/Live Load:	N/A	PSF
$Wind_1$:	17.5	PSF
$Wind_2$:	-19.11	PSF

Load Combinations

W_1:	17.5	PSF
W_2:	-19.11	PSF

Columns

Dead Load:	N/A	PSF
Snow/Live Load:	N/A	PSF
$Wind_1$:	17.28	PSF
$Wind_2$:	-18.89	PSF

Load Combinations

W_1:	17.28	PSF
W_2:	-18.89	PSF

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Garage	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Analysis Transverse

Roof Height: 3.75 ft End Zone: 8 ft

Walls not to be less than 16 psf and roofs less than 8 psf.

Main Level: Roof Height: 3.75 ft

8.00	psf	x	3.8	' x	8.0	'	=	240	# (End Zone Roof)
8.00	psf	x	3.8	' x	16.0	'	=	480	# (Int. Zone Roof)
16.47	psf	x	9.0	' x	8.0	'	=	1186	# (End Zone Wall)
16.47	psf	x	9.0	' x	16.0	'	=	2372	# (Int. Zone Wall)

Total Shear = 4278 #

Total Shear (Upper + Main) = 4278 #

Seismic Shear > Wind Shear -> Use Seismic Shear 4409 #

Wall Height: 10 ft

North Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 10 ft

Openings In wall: 34.5 ft Total Wall Length: 54 ft

Shear = 4409 lb / 19.5 ft = 226 PLF

Shear capacity of 1/2" OSB with 8D nails @ 6" O.C. edge = 258 plf

257.6 plf > 226 plf -> OKAY

Overturning = 4409 # - 7 psf x 19.5 ft x 10.0 ft = 3044 #

= 3044 # x 10.0 ft / 19.5 ft = 1561 # @ Openings

Overturning Corners Only: 1561 # / 0.44 = 3561 #

Tension Capacity of Simpson HDU5-SDS2.5 into 3.5" wood w/ 0.625" x 12" A.B. 4340# > 3561# -> Okay

Wall Height: 10 ft

South Wall Shear Capacity: Wall Weight: 7 psf Opening Height: 7 ft

Openings In wall: 6 ft Total Wall Length: 54 ft

Shear = 4409 lb / 48 ft = 92 PLF

Shear capacity of 7/16" OSB with 8D nails @ 4" O.C. edge = 363 plf

363 plf > 92 plf -> OKAY

Overturning = 4409 # - 7 psf x 48 ft x 10.0 ft = 1049 #

= 1049 # x 10.0 ft / 48 ft = 219 # @ Openings

Overturning Corners Only: 219 # / 0.86 = 255 #

Tension Capacity of Simpson HDU5-SDS2.5 into 3.5" wood w/ 0.625" x 12" A.B. 4340# > 255# -> Okay

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Garage	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Analysis Longitudinal

End Zone: 4 ft

Main Level:

18.1	psf	x	5.0	' x	4.0	' =	362	#	(End Zone Wall)
18.1	psf	x	1.3	' x	4.0	' x 0.5 =	48	#	(End Zone Wall)
18.1	psf	x	6.3	' x	0.0	' =	0	#	(Int. Zone Wall)
18.1	psf	x	6.3	' x	20.0	' =	2293	#	(Int. Zone Wall)
18.1	psf	x	6.7	' x	20.0	' x 0.5 =	1207	PSF	(Int. Zone Wall)

Total Shear = 3910 #

Total Shear (Upper + Main) = 3910 #

Seismic Shear > Wind Shear -> Use Seismic Shear 4409 PSF

West Wall Shear Capacity: Wall Weight: 7 psf Wall Height: 10 ft Opening Height: 7 ft

Openings In wall: 3 ft Total Wall Length: 40 ft

Shear = 4409 lb / 37 ft = 119 PLF

Shear capacity of 1/2" OSB with 8D nails @ 6" O.C. edge = 258 plf

257.6 plf > 119 plf -> OKAY

Overturning = 4409 # - 7 psf x 37 ft x 10.0 ft = 1819 #

= 1819 # x 10.0 ft / 37 ft = 492 # @ Openings

Overturning Corners Only: 492 # / 0.90 = 545 #

East Wall Shear Capacity: Wall Weight: 7 psf Wall Height: 10 ft Opening Height: 7 ft

Openings In wall: 3 ft Total Wall Length: 40 ft

Shear = 4409 lb / 37 ft = 119 PLF

Shear capacity of 1/2" OSB with 8D nails @ 6" O.C. edge = 258 plf

257.6 plf > 119 plf -> OKAY

Overturning = 4409 # - 7 psf x 37 ft x 10.0 ft = 1819 #

= 1819 # x 10.0 ft / 37 ft = 492 # @ Openings

Overturning Corners Only: 492 # / 0.90 = 545 #

FRAME ENGINEERING				
	COMPANY:	Timberlyne	DATE:	8/27/2024
	PROJECT:	Dan McEntee - Garage	DESIGNER:	AS
	LOCATION:	Steamboat Springs, CO	PROJECT #:	MGR0524

Lateral Seismic Loading

R = Timber Frame w/ Stick Framing w/ sheathing(Table 12.2-1 B 22)

Shear = 1 x SDS x Weight / R SDS = 0.521 R = 7.0

20	psf	x	58.5	ft	x	41.5	ft			=	48555	# Roof
101	psf	x	58.5	ft	x	41.5	ft	x	0.2	=	49041	# Snow
105	psf	x	41.5	ft	x	15	ft	x	0.2	=	13073	# Snow
7	psf	x	40	ft	x	5	ft	x	2	=	2800	# Side Wall
7	psf	x	30	ft	x	5	ft	x	1	=	1050	# End Wall
7	psf	x	30	ft	x	10	ft	x	1	=	2100	# End Wall
7	psf	x	24	ft	x	5	ft	x	1	=	840	# End Wall
7	psf	x	24	ft	x	6	ft	x	1	=	1008	# End Wall
									Total Seismic Weight:		118466	#

1 x 0.521 x 118466 / 7.0 = 8817 # / Direction

8817 # / Direction / 2 = 4409 # / Wall

Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: Studs

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	**2-2x6**
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber
Overall Column Height	10 ft			Wood Member Type	Sawn
(Used for non-slender calculations)					
Wood Species	Spruce-Pine-Fir			Exact Width	**3.0** in
Wood Grade	No. 1/No. 2			Exact Depth	**5.50** in
Fb +	875 psi	Fv	135 psi	Area	16.50 in^2
Fb -	875 psi	Ft	450 psi	Ix	41.594 in^4
Fc - Prll	1150 psi	Density	26.22 pcf	Iy	12.375 in^4
Fc - Perp	425 psi				

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1400	1400	1400 ksi
Minimum	510	510	

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compressior	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 30.044 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 0.330, Lr = 0.330, S = 3.399, W = 0.1650 k
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.020 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1566 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	3.759 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,454.75 psi

PASS Maximum Shear Stress Ratio = **0.02525 : 1**

Load Combination	+D+0.60W
Location of max.above base	10.0 ft
Applied Design Shear	8.182 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.10 k	Bottom along Y-Y	0.10 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.07811 in at 5.034 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.01917	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr	1.250	1.000	0.02645	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	1.000	0.1566	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr	1.250	1.000	0.02329	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S	1.150	1.000	0.1212	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	1.000	0.06766	PASS	4.966 ft	0.02525	PASS	10.0 ft
+D+0.750Lr+0.450W	1.600	1.000	0.05102	PASS	4.966 ft	0.01894	PASS	10.0 ft
+D+0.750S+0.450W	1.600	1.000	0.08973	PASS	4.966 ft	0.01894	PASS	10.0 ft
+0.60D+0.60W	1.600	1.000	0.06756	PASS	4.966 ft	0.02525	PASS	10.0 ft

Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: Studs

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	1.600	1.000	0.006469	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	k-ft @ Top	Mx - End Moments @ Base	@ Top
D Only						0.360				
+D+Lr						0.690				
+D+S						3.759				
+D+0.750Lr						0.608				
+D+0.750S						2.909				
+D+0.60W				0.060	0.060	0.459				
+D+0.750Lr+0.450W				0.045	0.045	0.682				
+D+0.750S+0.450W				0.045	0.045	2.984				
+0.60D+0.60W				0.060	0.060	0.315				
+0.60D						0.216				
Lr Only						0.330				
S Only						3.399				
W Only				0.100	0.100	0.165				

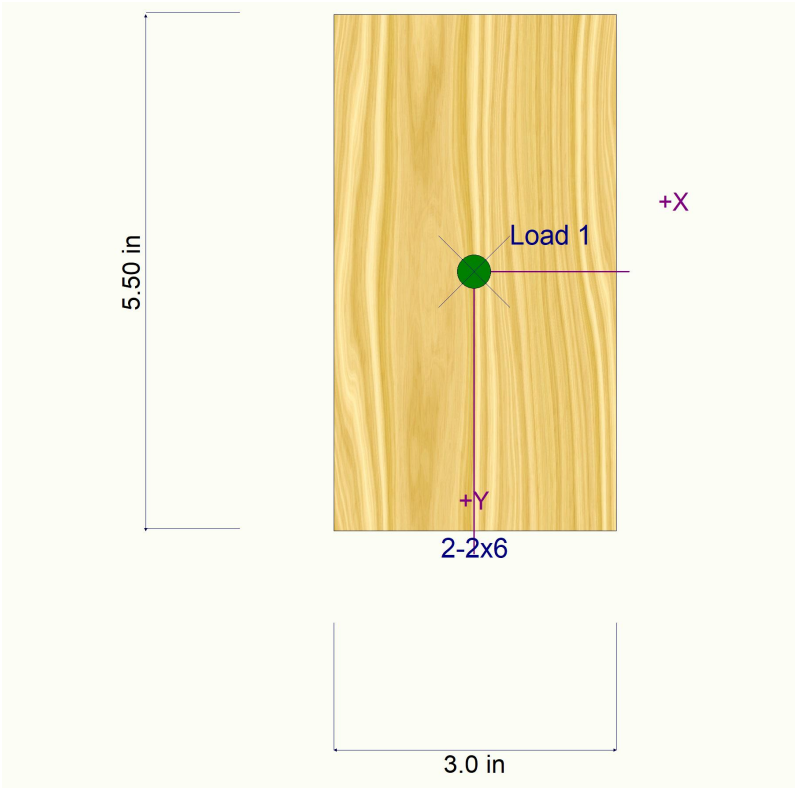
Maximum Deflections for Load Combinations

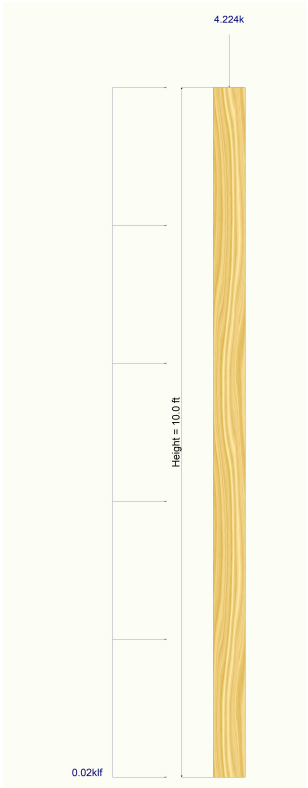
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.047 in	5.034 ft
+D+0.750Lr+0.450W	0.0000 in	0.000ft	0.035 in	5.034 ft
+D+0.750S+0.450W	0.0000 in	0.000ft	0.035 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.047 in	5.034 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.078 in	5.034 ft

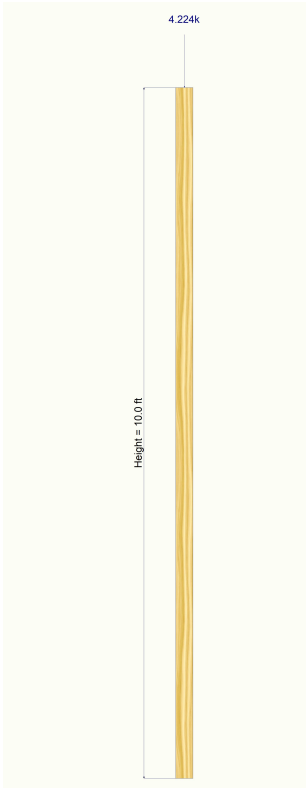
Wood Column

DESCRIPTION: Studs

Sketches







Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: Interior Studs

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	10 ft		
(Used for non-slender calculations)			
Wood Species	Spruce-Pine-Fir		
Wood Grade	No. 1/No. 2		
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Wood Section Name	**3-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**4.50** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	24.750 in^2	Cf or Cv for Compressior	1.10
Ix	62.391 in^4	Cf or Cv for Tension	1.30
Iy	41.766 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 45.066 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 0.580, Lr = 0.580, S = 5.974, W = 0.290 k
Drift: Axial Load at 10.0 ft, S = 0.6540 k
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.020 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2014 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	7.253 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,454.75 psi

PASS Maximum Shear Stress Ratio = **0.01684 : 1**

Load Combination	+D+0.60W
Location of max.above base	10.0 ft
Applied Design Shear	5.455 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.10 k	Bottom along Y-Y	0.10 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.05207 in at 5.034 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.02218	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr	1.250	1.000	0.03079	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	1.000	0.2014	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr	1.250	1.000	0.02709	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S	1.150	1.000	0.1554	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	1.000	0.04431	PASS	4.966 ft	0.01684	PASS	10.0 ft
+D+0.750Lr+0.450W	1.600	1.000	0.03361	PASS	4.966 ft	0.01263	PASS	10.0 ft
+D+0.750S+0.450W	1.600	1.000	0.1144	PASS	4.966 ft	0.01263	PASS	10.0 ft

Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: Interior Studs

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+0.60W	1.600	1.000	0.04418	PASS	4.966 ft	0.01684	PASS	10.0 ft
+0.60D	1.600	1.000	0.007487	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						0.625					
+D+Lr						1.205					
+D+S						7.253					
+D+0.750Lr						1.060					
+D+0.750S						5.596					
+D+0.60W				0.060	0.060	0.799					
+D+0.750Lr+0.450W				0.045	0.045	1.191					
+D+0.750S+0.450W				0.045	0.045	5.727					
+0.60D+0.60W				0.060	0.060	0.549					
+0.60D						0.375					
Lr Only						0.580					
S Only						6.628					
W Only				0.100	0.100	0.290					

Maximum Deflections for Load Combinations

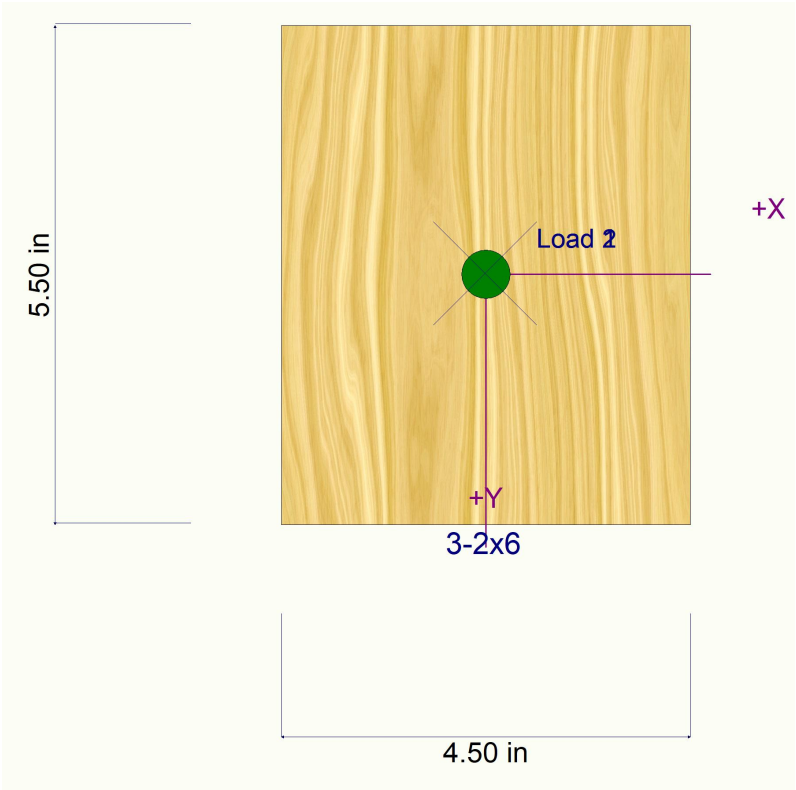
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.031 in	5.034 ft
+D+0.750Lr+0.450W	0.0000 in	0.000ft	0.023 in	5.034 ft
+D+0.750S+0.450W	0.0000 in	0.000ft	0.023 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.031 in	5.034 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.052 in	5.034 ft

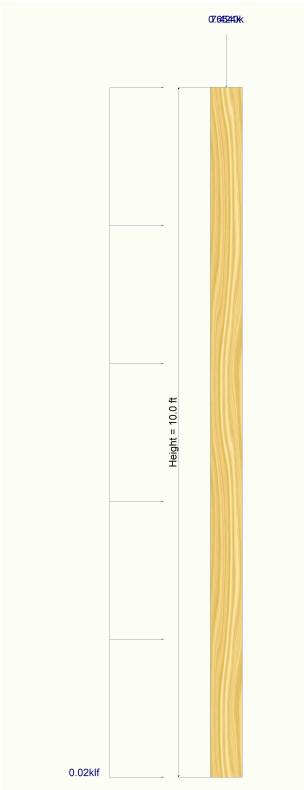
Wood Column

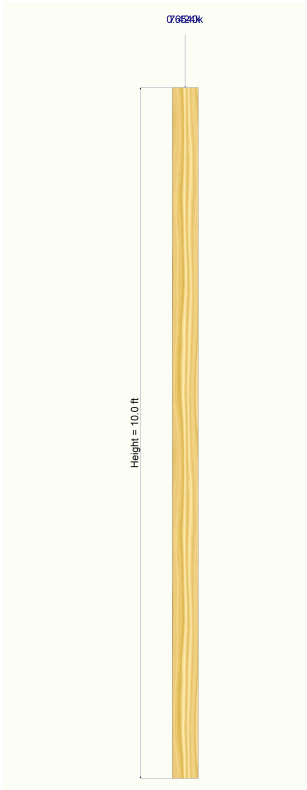
Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: Interior Studs

Sketches







Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: King Studs

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		
End Fixities	Top & Bottom Pinned		
Overall Column Height	10 ft		
(Used for non-slender calculations)			
Wood Species	Spruce-Pine-Fir		
Wood Grade	No. 1/No. 2		
Fb +	875.0 psi	Fv	135.0 psi
Fb -	875.0 psi	Ft	450.0 psi
Fc - Prll	1,150.0 psi	Density	26.220 pcf
Fc - Perp	425.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Wood Section Name	**2-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**3.0** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	16.50 in^2	Cf or Cv for Compressior	1.10
Ix	41.594 in^4	Cf or Cv for Tension	1.30
Iy	12.375 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 30.044 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 0.330, Lr = 0.330, S = 3.399, W = 0.1650 k
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0940 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3173 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	4.966 ft
At maximum location values are . .	
Applied Axial	0.4590 k
Applied Mx	0.7050 k-ft
Applied My	0.0 k-ft
Fc : Allowable	2,024.0 psi

PASS Maximum Shear Stress Ratio = **0.1187 : 1**

Load Combination	+D+0.60W
Location of max.above base	10.0 ft
Applied Design Shear	38.455 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.470 k	Bottom along Y-Y	0.470 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.3671 in at 5.034 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.01917	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr	1.250	1.000	0.02645	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	1.000	0.1566	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr	1.250	1.000	0.02329	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S	1.150	1.000	0.1212	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	1.000	0.3173	PASS	4.966 ft	0.1187	PASS	10.0 ft
+D+0.750Lr+0.450W	1.600	1.000	0.2382	PASS	5.034 ft	0.08902	PASS	10.0 ft
+D+0.750S+0.450W	1.600	1.000	0.2458	PASS	5.034 ft	0.08902	PASS	10.0 ft
+0.60D+0.60W	1.600	1.000	0.3172	PASS	4.966 ft	0.1187	PASS	10.0 ft

Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: King Studs

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	1.600	1.000	0.006469	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	k-ft @ Top	Mx - End Moments @ Base	@ Top
D Only						0.360				
+D+Lr						0.690				
+D+S						3.759				
+D+0.750Lr						0.608				
+D+0.750S						2.909				
+D+0.60W				0.282	0.282	0.459				
+D+0.750Lr+0.450W				0.212	0.212	0.682				
+D+0.750S+0.450W				0.212	0.212	2.984				
+0.60D+0.60W				0.282	0.282	0.315				
+0.60D						0.216				
Lr Only						0.330				
S Only						3.399				
W Only				0.470	0.470	0.165				

Maximum Deflections for Load Combinations

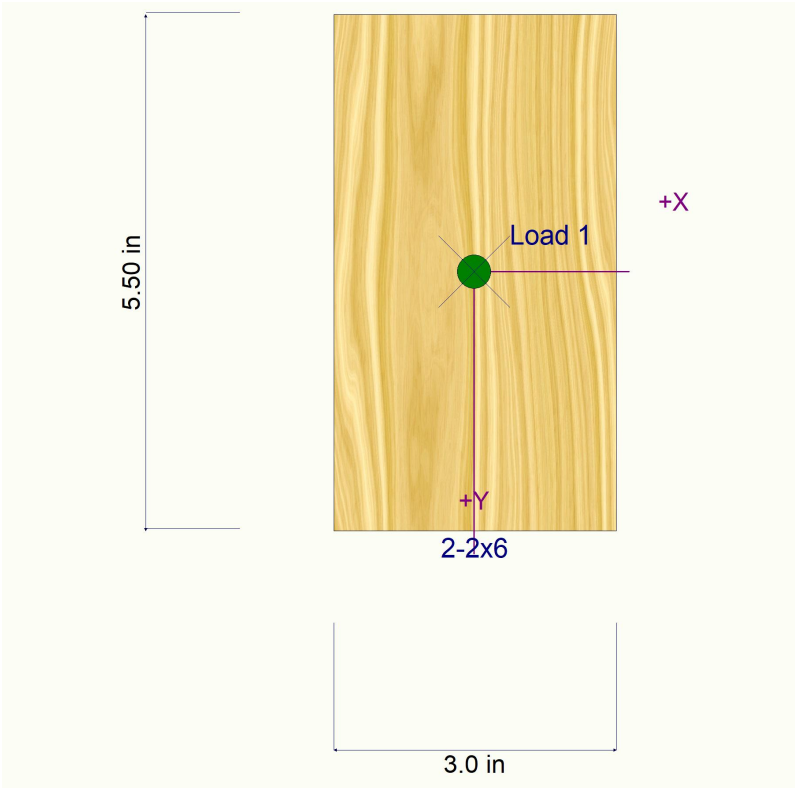
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.220 in	5.034 ft
+D+0.750Lr+0.450W	0.0000 in	0.000ft	0.165 in	5.034 ft
+D+0.750S+0.450W	0.0000 in	0.000ft	0.165 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.220 in	5.034 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.367 in	5.034 ft

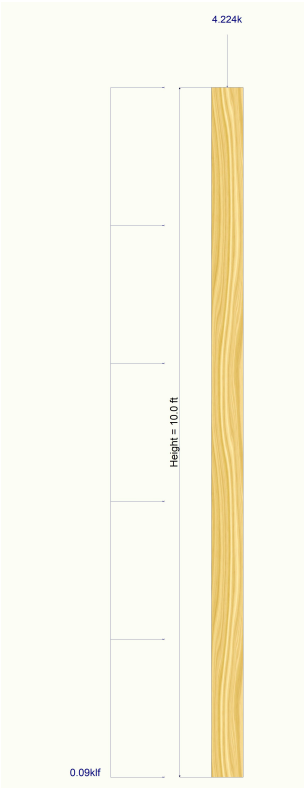
Wood Column

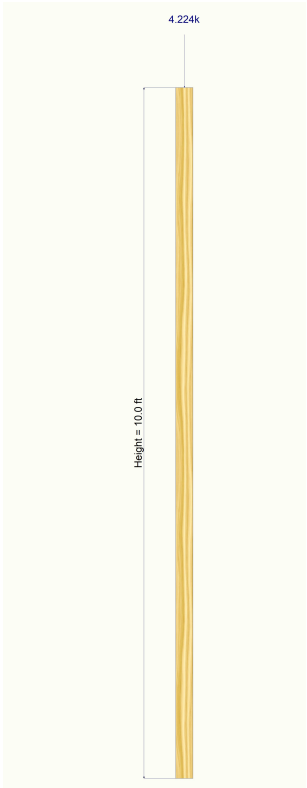
Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: King Studs

Sketches







Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: King Studs @ 16' Garage Door

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				
End Fixities	Top & Bottom Pinned				
Overall Column Height	10 ft				
(Used for non-slender calculations)					
Wood Species	Spruce-Pine-Fir				
Wood Grade	No. 1/No. 2				
Fb +	875.0 psi	Fv	135.0 psi		
Fb -	875.0 psi	Ft	450.0 psi		
Fc - Prll	1,150.0 psi	Density	26.220 pcf		
Fc - Perp	425.0 psi				

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Wood Section Name	**4-2x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**6.0** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.30
Area	33.0 in^2	Cf or Cv for Compressior	1.10
Ix	83.188 in^4	Cf or Cv for Tension	1.30
Iy	99.0 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
Fully braced against buckling ABOUT X-X Axis
Fully braced against buckling ABOUT Y-Y Axis

Applied Loads

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

Column self weight included : 60.088 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 0.330, Lr = 0.330, S = 3.399, W = 0.1650 k
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.1650 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2698 : 1**

Load Combination	+D+0.60W
Governing NDS Forumla	Comp + Mxx, NDS Eq. 3.9-3
Location of max.above base	4.966 ft
At maximum location values are . .	
Applied Axial	0.4891 k
Applied Mx	1.237 k-ft
Applied My	0.0 k-ft
Fc : Allowable	2,024.0 psi

PASS Maximum Shear Stress Ratio = **0.1042 : 1**

Load Combination	+D+0.60W
Location of max.above base	10.0 ft
Applied Design Shear	33.750 psi
Allowable Shear	216.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.8250 k	Bottom along Y-Y	0.8250 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.3222 in at 5.034 ft above base
for load combination : W Only

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 Only	0.900	1.000	0.01038	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr	1.250	1.000	0.01380	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S	1.150	1.000	0.07893	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr	1.250	1.000	0.01222	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750S	1.150	1.000	0.06123	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	1.000	0.2698	PASS	4.966 ft	0.1042	PASS	10.0 ft
+D+0.750Lr+0.450W	1.600	1.000	0.2024	PASS	4.966 ft	0.07813	PASS	10.0 ft
+D+0.750S+0.450W	1.600	1.000	0.2043	PASS	4.966 ft	0.07813	PASS	10.0 ft
+0.60D+0.60W	1.600	1.000	0.2697	PASS	4.966 ft	0.1042	PASS	10.0 ft

Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: King Studs @ 16' Garage Door

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	1.600	1.000	0.003504	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						0.390					
+D+Lr						0.720					
+D+S						3.789					
+D+0.750Lr						0.638					
+D+0.750S						2.939					
+D+0.60W				0.495	0.495	0.489					
+D+0.750Lr+0.450W				0.371	0.371	0.712					
+D+0.750S+0.450W				0.371	0.371	3.014					
+0.60D+0.60W				0.495	0.495	0.333					
+0.60D						0.234					
Lr Only						0.330					
S Only						3.399					
W Only				0.825	0.825	0.165					

Maximum Deflections for Load Combinations

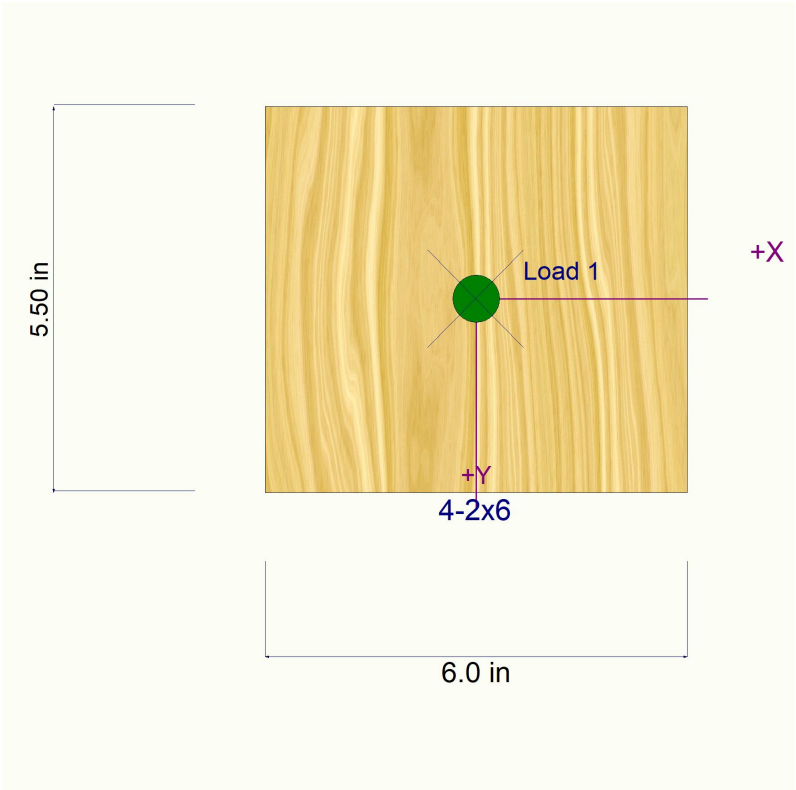
Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.193 in	5.034 ft
+D+0.750Lr+0.450W	0.0000 in	0.000ft	0.145 in	5.034 ft
+D+0.750S+0.450W	0.0000 in	0.000ft	0.145 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.193 in	5.034 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.322 in	5.034 ft

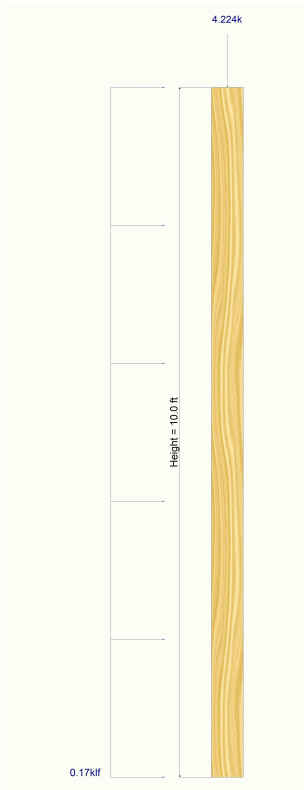
Wood Column

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: King Studs @ 16' Garage Door

Sketches





Wood Beam

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: Walk Doors

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

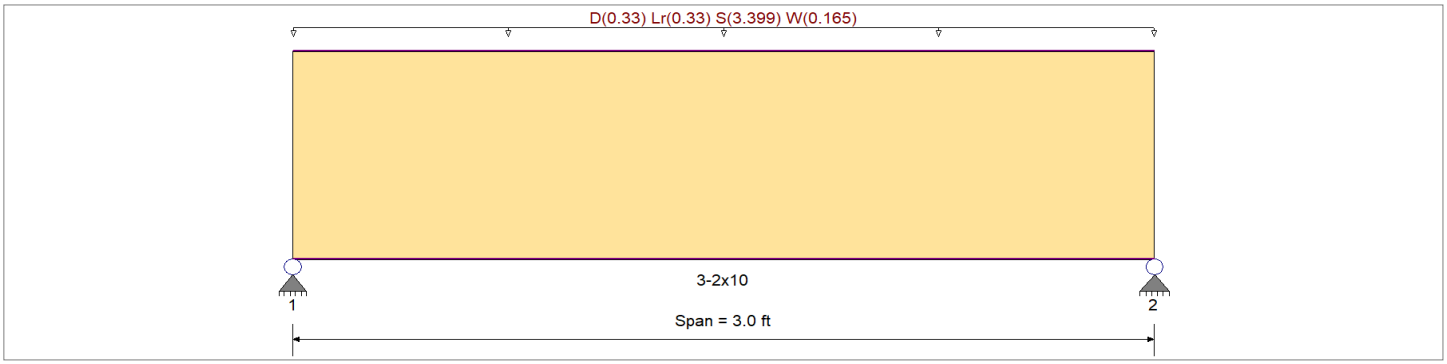
Wood Species : Spruce-Pine-Fir
Wood Grade : No. 1/No. 2

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

Fb +	875 psi
Fb -	875 psi
Fc - Prll	1150 psi
Fc - Perp	425 psi
Fv	135 psi
Ft	450 psi

E : Modulus of Elasticity

Ebend- xx	1400 ksi
Eminbend - xx	510 ksi
Density	26.22 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, Lr = 0.020, S = 0.2060, W = 0.010 ksf, Tributary Width = 16.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.710 : 1	Maximum Shear Stress Ratio	=	0.636 : 1
Section used for this span		3-2x10	Section used for this span		3-2x10
fb: Actual	=	786.07 psi	fv: Actual	=	98.78 psi
F'b	=	1,106.88 psi	F'v	=	155.25 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	1.500 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	0.015 in	Ratio =	2400 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.016 in	Ratio =	2183 >=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.082	0.073	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.38	71.0	866.3	0.25	8.9	121.5
+D+Lr					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.117	0.105	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.75	140.4	1,203.1	0.49	17.6	168.8
+D+S					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.710	0.636	1.15	1.00	1.00	1.00	1.100	1.00	1.00	1.00	4.20	786.1	1,106.9	2.74	98.8	155.3
+D+0.750Lr					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.102	0.092	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.66	123.1	1,203.1	0.43	15.5	168.8
+D+0.750S					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	1	0.549	0.492	1.15	1.00	1.00	1.00	1.100	1.00	1.00	1.00	3.25	607.3	1,106.9	2.12	76.3	155.3

Wood Beam

Project File: Dan McEntee - MGR0524 - Garge.ec6

DESCRIPTION: Walk Doors

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.60W					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.060	0.053	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.49	91.8	1,540.0	0.32	11.5	216.0
+D+0.750Lr+0.450W					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.090	0.081	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.74	138.7	1,540.0	0.48	17.4	216.0
+D+0.750S+0.450W					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.404	0.362	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	3.33	622.9	1,540.0	2.17	78.3	216.0
+0.60D+0.60W					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.041	0.037	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.34	63.4	1,540.0	0.22	8.0	216.0
+0.60D					1.00	1.00	1.00	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.0 ft	**1**	0.028	0.025	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.00	0.23	42.6	1,540.0	0.15	5.4	216.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0165	1.511		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.605	5.605
Max Upward from Load Combinations	5.605	5.605
Max Upward from Load Cases	5.099	5.099
D Only	0.506	0.506
+D+Lr	1.001	1.001
+D+S	5.605	5.605
+D+0.750Lr	0.878	0.878
+D+0.750S	4.330	4.330
+D+0.60W	0.655	0.655
+D+0.750Lr+0.450W	0.989	0.989
+D+0.750S+0.450W	4.442	4.442
+0.60D+0.60W	0.452	0.452
+0.60D	0.304	0.304
Lr Only	0.495	0.495
S Only	5.099	5.099
W Only	0.248	0.248

Table 12.2A Lag Screw Reference Withdrawal Values, W[1]

Tabulated withdrawal design values (W) are in pounds per inch of thread penetration into side grain of wood member. Length of thread penetration in main member shall not include the length of the tapered tip (see 12.2.1.1).

Specific Gravity, G^2	Lag Screw Diameter, D										
	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"	1-1/4"
0.73	397	469	538	604	668	789	905	1016	1123	1226	1327
0.71	381	450	516	579	640	757	868	974	1077	1176	1273
0.68	357	422	484	543	600	709	813	913	1009	1103	1193
0.67	349	413	473	531	587	694	796	893	987	1078	1167
0.58	281	332	381	428	473	559	641	719	795	869	940
0.55	260	307	352	395	437	516	592	664	734	802	868
0.51	232	274	314	353	390	461	528	593	656	716	775
0.50	225	266	305	342	378	447	513	576	636	695	752
0.49	218	258	296	332	367	434	498	559	617	674	730
0.47	205	242	278	312	345	408	467	525	580	634	686
0.46	199	235	269	302	334	395	453	508	562	613	664
0.44	186	220	252	283	312	369	423	475	525	574	621
0.43	179	212	243	273	302	357	409	459	508	554	600
0.42	173	205	235	264	291	344	395	443	490	535	579
0.41	167	198	226	254	281	332	381	428	473	516	559
0.40	161	190	218	245	271	320	367	412	455	497	538
0.39	155	183	210	236	261	308	353	397	438	479	518
0.38	149	176	202	227	251	296	340	381	422	461	498
0.37	143	169	194	218	241	285	326	367	405	443	479
0.36	137	163	186	209	231	273	313	352	389	425	460
0.35	132	156	179	200	222	262	300	337	373	407	441
0.31	110	130	149	167	185	218	250	281	311	339	367

1. Tabulated withdrawal design values, W, for lag screw connections shall be multiplied by all applicable adjustment factors (see Table 11.3.1).
2. Specific gravity, G, shall be determined in accordance with Table 12.3.3A.

adjustment factors (see Table 11.3.1) to obtain adjusted withdrawal design values, W'.

$$W = 1380\ G^{5/2}\ D \qquad (12.2\text{-}3)$$

(b) The nail or spike reference withdrawal design value, W, in lbs/in. of penetration, for a smooth shank stainless steel nail or spike driven into the side grain of a wood member, with the nail or spike axis perpendicular to the wood fibers, shall be determined from Table 12.2D or Equation 12.2-4, within the range of specific gravities, G, and nail or spike diameters, D, given in Table 12.2D. Reference withdrawal design values, W, shall be multiplied by all applicable adjustment factors (see Table 11.3.1) to obtain adjusted withdrawal design values, W'.

$$W = 465\ G^{3/2}\ D \qquad (12.2\text{-}4)$$

(c) For calculation of the fastener reference withdrawal design value in pounds, the unit reference withdrawal design value in lbs/in. of fastener penetration from 12.2.3.1a or 12.2.3.1b shall be multiplied by the length of fastener penetration, p_t, into the wood member.

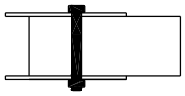
12.2.3.2 Deformed shank nails

(a) The reference withdrawal design value, in lbs/in. of ring shank penetration, for a Roof Sheathing Ring Shank nail or Post-Frame Ring Shank nail driven in the side grain of the main member, with the nail axis perpendicular to the wood fibers, shall be determined from Table 12.2E or Equation 12.2-5, within the range of specific gravities and nail diameters given in Table 12.2E. Reference withdrawal design values, W, shall be multiplied by all applicable adjustment factors (see Table 11.3.1) to obtain adjusted withdrawal design values, W'.

$$W = 1800\ G^2\ D \qquad (12.2\text{-}5)$$

Table 12G BOLTS: Reference Lateral Design Values, Z, for Double Shear (three member) Connections[1,2]

for sawn lumber or SCL main member with 1/4" ASTM A 36 steel side plates

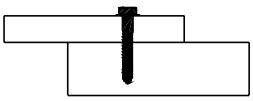


Thickness			G=0.67 Red Oak		G=0.55 Mixed Maple Southern Pine		G=0.50 Douglas Fir-Larch		G=0.49 Douglas Fir-Larch (N)		G=0.46 Douglas Fir(S) Hem-Fir(N)		G=0.43 Hem-Fir		G=0.42 Spruce-Pine-Fir		G=0.37 Redwood		G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods		G=0.35 Northern Species	
Main Member	Side Member	Bolt Diameter																				
t_m	t_s	D	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$
in.	in.	in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1-1/2	1/4	1/2	1410	730	1150	550	1050	470	1030	460	970	420	900	380	880	370	780	310	760	290	730	290
		5/8	1760	810	1440	610	1310	530	1290	520	1210	470	1130	420	1100	410	970	350	950	330	910	320
		3/4	2110	890	1730	660	1580	590	1550	560	1450	520	1350	460	1320	450	1170	370	1140	360	1100	350
		7/8	2460	960	2020	720	1840	630	1800	600	1690	550	1580	500	1540	490	1360	410	1330	390	1280	370
		1	2810	1020	2310	770	2100	680	2060	650	1930	600	1800	540	1760	530	1560	440	1520	420	1460	410
1-3/4	1/4	1/2	1640	850	1350	640	1230	550	1200	530	1130	490	1050	450	1030	430	910	360	890	340	850	330
		5/8	2050	940	1680	710	1530	610	1500	600	1410	550	1310	490	1290	480	1130	400	1110	380	1070	370
		3/4	2460	1040	2020	770	1840	680	1800	660	1690	600	1580	540	1540	530	1360	430	1330	420	1280	410
		7/8	2870	1120	2350	840	2140	740	2110	700	1970	640	1840	580	1800	570	1590	470	1550	460	1490	430
		1	3280	1190	2690	890	2450	790	2410	750	2250	700	2100	630	2060	610	1820	510	1770	490	1710	470
2-1/2	1/4	1/2	1870	1210	1720	910	1650	790	1640	760	1590	700	1500	640	1470	610	1300	510	1270	490	1220	480
		5/8	2740	1340	2400	1020	2190	880	2150	860	2010	780	1880	700	1840	690	1620	580	1580	550	1520	530
		3/4	3520	1480	2880	1110	2630	980	2580	940	2410	860	2250	770	2200	750	1950	620	1900	600	1830	580
		7/8	4100	1600	3360	1200	3060	1050	3010	1010	2820	920	2630	830	2570	810	2270	680	2210	660	2130	610
		1	4690	1700	3840	1280	3500	1130	3440	1080	3220	1000	3000	900	2940	880	2590	730	2530	700	2440	680
3-1/2	1/4	1/2	1870	1240	1720	1100	1650	1030	1640	1010	1590	970	1540	890	1530	860	1450	720	1430	680	1410	670
		5/8	2740	1720	2510	1420	2410	1230	2390	1200	2330	1090	2260	980	2230	960	2110	810	2090	770	2060	740
		3/4	3800	2070	3480	1550	3340	1370	3320	1310	3220	1210	3120	1080	3080	1050	2720	870	2660	840	2560	810
		7/8	5060	2240	4630	1680	4290	1470	4210	1410	3940	1290	3680	1160	3600	1130	3180	950	3100	920	2990	860
		1	6520	2380	5380	1790	4900	1580	4810	1510	4510	1400	4200	1260	4110	1230	3630	1020	3540	980	3410	950
5-1/4	1/4	5/8	2740	1720	2510	1510	2410	1420	2390	1400	2330	1340	2260	1280	2230	1270	2110	1170	2090	1140	2060	1120
		3/4	3800	2290	3480	2000	3340	1890	3320	1850	3220	1780	3120	1610	3090	1580	2920	1300	2890	1260	2840	1220
		7/8	5060	2930	4630	2530	4440	2210	4410	2110	4280	1930	4150	1750	4110	1700	3880	1420	3840	1380	3770	1290
		1	6520	3570	5960	2680	5720	2360	5670	2260	5510	2100	5330	1890	5280	1840	4990	1520	4930	1470	4850	1420
5-1/2	1/4	5/8	2740	1720	2510	1510	2410	1420	2390	1400	2330	1340	2260	1280	2230	1270	2110	1170	2090	1140	2060	1120
		3/4	3800	2290	3480	2000	3340	1890	3320	1850	3220	1780	3120	1690	3090	1650	2920	1360	2890	1320	2840	1280
		7/8	5060	2930	4630	2570	4440	2310	4410	2210	4280	2020	4150	1830	4110	1780	3880	1490	3840	1440	3770	1350
		1	6520	3640	5960	2810	5720	2480	5670	2370	5510	2200	5330	1980	5280	1930	4990	1600	4930	1540	4850	1490
7-1/2	1/4	5/8	2740	1720	2510	1510	2410	1420	2390	1400	2330	1340	2260	1280	2230	1270	2110	1170	2090	1140	2060	1120
		3/4	3800	2290	3480	2000	3340	1890	3320	1850	3220	1780	3120	1690	3090	1670	2920	1530	2890	1500	2840	1480
		7/8	5060	2930	4630	2570	4440	2410	4410	2360	4280	2260	4150	2160	4110	2130	3880	1960	3840	1930	3770	1840
		1	6520	3640	5960	3180	5720	3000	5670	2940	5510	2840	5330	2700	5280	2630	4990	2180	4930	2100	4850	2030
9-1/2	1/4	3/4	3800	2290	3480	2000	3340	1890	3320	1850	3220	1780	3120	1690	3090	1670	2920	1530	2890	1500	2840	1480
		7/8	5060	2930	4630	2570	4440	2410	4410	2360	4280	2260	4150	2160	4110	2130	3880	1960	3840	1930	3770	1870
		1	6520	3640	5960	3180	5720	3000	5670	2940	5510	2840	5330	2700	5280	2660	4990	2440	4930	2400	4850	2350
11-1/2	1/4	7/8	5060	2930	4630	2570	4440	2410	4410	2360	4280	2260	4150	2160	4110	2130	3880	1960	3840	1930	3770	1870
		1	6520	3640	5960	3180	5720	3000	5670	2940	5510	2840	5330	2700	5280	2660	4990	2440	4930	2400	4850	2350
13-1/2	1/4	1	6520	3640	5960	3180	5720	3000	5670	2940	5510	2840	5330	2700	5280	2660	4990	2440	4930	2400	4850	2350

1. Tabulated lateral design values, Z, for bolted connections shall be multiplied by all applicable adjustment factors (see Table 11.3.1).
2. Tabulated lateral design values, Z, are for "full-body diameter" bolts (see Appendix Table L1) with bolt bending yield strength, F_{yb}, of 45,000 psi and dowel bearing strength, F_e, of 87,000 psi for ASTM A36 steel.

Table 12J LAG SCREWS: Reference Lateral Design Values, Z, for Single Shear (two member) Connections[1,2,3,4]

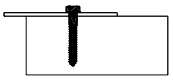
for sawn lumber or SCL with both members of identical specific gravity (tabulated lateral design values are calculated based on an assumed length of lag screw penetration, p, into the main member equal to 8D)



Side Member Thickness	Lag Screw Diameter	G=0.67 Red Oak				G=0.55 Mixed Maple Southern Pine				G=0.50 Douglas Fir-Larch				G=0.49 Douglas Fir-Larch(N)				G=0.46 Douglas Fir(S) Hem-Fir(N)			
t_s	D	$Z_{\parallel}$	$Z_{s\perp}$	$Z_{m\perp}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{s\perp}$	$Z_{m\perp}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{s\perp}$	$Z_{m\perp}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{s\perp}$	$Z_{m\perp}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{s\perp}$	$Z_{m\perp}$	$Z_{\perp}$
in.	in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1/2	1/4	150	110	110	110	130	90	100	90	120	90	90	80	120	90	90	80	110	80	90	80
	5/16	170	130	130	120	150	110	120	100	150	100	110	100	140	100	110	90	140	100	100	90
	3/8	180	130	130	120	160	110	110	100	150	100	110	90	150	90	110	90	140	90	100	90
5/8	1/4	160	120	130	120	140	100	110	100	130	90	100	90	130	90	100	90	120	90	90	80
	5/16	190	140	140	130	160	110	120	110	150	110	110	100	150	100	110	100	150	100	110	90
	3/8	190	130	140	120	170	110	120	100	160	100	110	100	160	100	110	90	150	100	110	90
3/4	1/4	180	140	140	130	150	110	120	110	140	100	110	100	140	100	110	90	130	90	100	90
	5/16	210	150	160	140	180	120	130	120	170	110	120	100	160	110	120	100	160	100	110	100
	3/8	210	140	160	130	180	120	130	110	170	110	120	100	170	110	120	100	160	100	110	90
1	1/4	180	140	140	140	160	120	120	120	150	120	120	110	150	110	110	110	150	110	110	100
	5/16	230	170	170	160	210	140	150	130	190	130	140	120	190	120	140	120	180	120	130	110
	3/8	230	160	170	160	210	130	150	120	200	120	140	110	190	120	140	110	180	110	130	100
1-1/4	1/4	180	140	140	140	160	120	120	120	150	120	120	110	150	110	110	110	150	110	110	100
	5/16	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	130	140	120
	3/8	230	170	170	160	210	150	150	140	200	140	140	130	200	130	140	120	190	120	140	120
1-1/2	1/4	180	140	140	140	160	120	120	120	150	120	120	110	150	110	110	110	150	110	110	100
	5/16	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	140	140	130
	3/8	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	140	140	120
	7/16	360	260	260	240	320	220	230	200	310	200	210	180	310	190	210	180	300	180	200	160
	1/2	460	310	320	280	410	250	290	230	390	220	270	200	390	220	260	200	370	210	250	190
	5/8	700	410	500	370	600	340	420	310	560	310	380	280	550	310	380	270	530	290	360	260
	3/4	950	550	660	490	830	470	560	410	770	440	510	380	760	430	510	370	730	400	480	360
	7/8	1240	720	830	630	1080	560	710	540	1020	490	660	490	1010	470	650	470	970	430	610	430
	1	1550	800	1010	780	1360	600	870	600	1290	530	810	530	1280	500	790	500	1230	470	760	470
1-3/4	1/4	180	140	140	140	160	120	120	120	150	120	120	110	150	110	110	110	150	110	110	100
	5/16	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	140	140	130
	3/8	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	140	140	120
	7/16	360	260	260	240	320	230	230	210	310	210	210	190	310	210	210	190	300	200	200	180
	1/2	460	320	320	290	410	270	290	250	390	240	270	220	390	240	260	220	380	220	250	200
	5/8	740	440	500	400	660	360	440	320	610	330	420	290	600	320	410	290	570	300	390	270
	3/4	1030	580	720	520	890	480	600	430	830	450	550	390	820	440	540	380	780	420	510	360
	7/8	1320	740	890	650	1150	630	750	550	1070	570	700	510	1060	550	680	490	1010	500	650	470
	1	1630	910	1070	790	1420	700	910	670	1340	610	850	610	1320	590	830	590	1270	550	790	550
2-1/2	1/4	180	140	140	140	160	120	120	120	150	120	120	110	150	110	110	110	150	110	110	100
	5/16	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	140	140	130
	3/8	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	140	140	120
	7/16	360	260	260	240	320	230	230	210	310	210	210	190	310	210	210	190	300	200	200	180
	1/2	460	320	320	290	410	290	290	250	390	270	270	240	390	260	260	230	380	250	250	220
	5/8	740	500	500	450	670	430	440	390	640	390	420	350	630	380	410	340	610	360	390	320
	3/4	1110	680	740	610	1010	550	650	490	960	500	610	450	950	490	600	430	920	460	580	410
	7/8	1550	830	1000	740	1370	690	880	600	1280	630	830	550	1260	620	810	530	1190	580	770	500
	1	1940	980	1270	860	1660	830	1080	720	1550	770	990	660	1520	750	970	640	1450	720	920	620
3-1/2	1/4	180	140	140	140	160	120	120	120	150	120	120	110	150	110	110	110	150	110	110	100
	5/16	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	140	140	130
	3/8	230	170	170	160	210	150	150	140	200	140	140	130	200	140	140	130	190	140	140	120
	7/16	360	260	260	240	320	230	230	210	310	210	210	190	310	210	210	190	300	200	200	180
	1/2	460	320	320	290	410	290	290	250	390	270	270	240	390	260	260	230	380	250	250	220
	5/8	740	500	500	450	670	440	440	390	640	420	420	360	630	410	410	360	610	390	390	340
	3/4	1110	740	740	650	1010	650	650	560	960	600	610	520	950	580	600	510	920	550	580	490
	7/8	1550	990	1000	860	1400	800	880	710	1340	720	830	640	1320	700	810	620	1280	660	780	570
	1	2020	1140	1270	1010	1830	930	1120	810	1740	850	1060	740	1730	830	1040	720	1670	790	1000	680

1. Tabulated lateral design values, Z, shall be multiplied by all applicable adjustment factors (see Table 11.3.1).
2. Tabulated lateral design values, Z, are for "reduced body diameter" lag screws (see Appendix Table L2) inserted in side grain with screw axis perpendicular to wood fibers; screw penetration, p, into the main member equal to 8D; screw bending yield strengths, F_{yb},of 70,000 psi for D = 1/4", 60,000 psi for D = 5/16", and 45,000 psi for D ≥3/8".
3. Where the lag screw penetration, p, is less than 8D but not less than 4D, tabulated lateral design values, Z, shall be multiplied by p/8D or lateral design values shall be calculated using the provisions of 12.3 for the reduced penetration.
4. The length of lag screw penetration, p, not including the length of the tapered tip, E (see Appendix Table L2), of the lag screw into the main member shall not be less than 4D. See 12.1.4.6 for minimum length of penetration, p_{min}.

Table 12K LAG SCREWS: Reference Lateral Design Values, Z, for Single Shear (two member) Connections[1,2,3,4]



for sawn lumber or SCL with ASTM A653, Grade 33 steel side plate (for t_s<1/4") or ASTM A 36 steel side plate (for t_s=1/4")
(tabulated lateral design values are calculated based on an assumed length of lag screw penetration, p, into the main member equal to 8D)

Side Member Thickness	Lag Screw Diameter	G=0.67 Red Oak		G=0.55 Mixed Maple Southern Pine		G=0.5 Douglas Fir-Larch		G=0.49 Douglas Fir-Larch (N)		G=0.46 Douglas Fir(S) Hem-Fir(N)		G=0.43 Hem-Fir		G=0.42 Spruce-Pine-Fir		G=0.37 Redwood		G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods		G=0.35 Northern Species	
t_s	D	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$
in.	in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
0.075	1/4	170	130	160	120	150	110	150	110	150	100	140	100	140	100	130	90	130	90	130	90
(14 gage)	5/16	220	160	200	140	190	130	190	130	190	130	180	120	180	120	170	110	170	110	160	100
	3/8	220	160	200	140	200	130	190	130	190	120	180	120	180	120	170	110	170	100	170	100
0.105	1/4	180	140	170	130	160	120	160	120	160	110	150	110	150	110	140	100	140	100	140	90
(12 gage)	5/16	230	170	210	150	200	140	200	140	190	130	190	130	190	120	180	110	170	110	170	110
	3/8	230	160	210	140	200	140	200	130	200	130	190	120	190	120	180	110	180	110	170	110
0.120	1/4	190	150	180	130	170	120	170	120	160	120	160	110	160	110	150	100	150	100	140	100
(11 gage)	5/16	230	170	210	150	210	140	200	140	200	140	190	130	190	130	180	120	180	120	180	110
	3/8	240	170	220	150	210	140	210	140	200	130	200	130	190	120	180	110	180	110	180	110
0.134	1/4	200	150	180	140	180	130	170	130	170	120	160	120	160	110	150	110	150	100	150	100
(10 gage)	5/16	240	180	220	160	210	150	210	140	200	140	200	130	200	130	190	120	180	120	180	120
	3/8	240	170	220	150	220	140	210	140	210	140	200	130	200	130	190	120	190	120	180	110
0.179	1/4	220	170	210	150	200	150	200	140	190	140	190	130	190	130	180	120	170	120	170	120
(7 gage)	5/16	260	190	240	170	230	160	230	160	230	150	220	150	220	150	210	130	200	130	200	130
	3/8	270	190	250	170	240	160	240	160	230	150	220	140	220	140	210	130	210	130	200	130
0.239	1/4	240	180	220	160	210	150	210	150	200	140	190	140	190	130	180	120	180	120	180	120
(3 gage)	5/16	300	220	280	190	270	180	260	180	260	170	250	160	250	160	230	150	230	150	230	140
	3/8	310	220	280	190	270	180	270	180	260	170	250	160	250	160	240	140	230	140	230	140
	7/16	420	290	390	260	380	240	370	240	360	230	350	220	350	220	330	200	330	200	320	190
	1/2	510	340	470	300	460	290	450	280	440	270	430	260	420	260	400	240	400	230	390	230
	5/8	770	490	710	430	680	400	680	400	660	380	640	370	630	360	600	330	590	330	580	320
	3/4	1110	670	1020	590	980	560	970	550	950	530	920	500	910	500	860	450	850	450	840	440
	7/8	1510	880	1390	780	1330	730	1320	710	1280	690	1250	650	1230	650	1170	590	1160	590	1140	570
	1	1940	1100	1780	960	1710	910	1700	890	1650	860	1600	820	1590	810	1500	740	1480	730	1460	710
1/4	1/4	240	180	220	160	210	150	210	150	200	140	200	140	190	130	180	120	180	120	180	120
	5/16	310	220	280	200	270	180	270	180	260	170	250	170	250	160	230	150	230	150	230	140
	3/8	320	220	290	190	280	180	270	180	270	170	260	160	250	160	240	150	240	140	230	140
	7/16	480	320	440	280	420	270	420	260	410	250	390	240	390	230	370	220	360	210	360	210
	1/2	580	390	540	340	520	320	510	320	500	310	480	290	480	290	460	270	450	260	440	260
	5/8	850	530	780	470	750	440	740	440	720	420	700	400	690	400	660	370	650	360	640	350
	3/4	1200	730	1100	640	1060	600	1050	590	1020	570	990	540	980	530	930	490	920	480	900	470
	7/8	1600	930	1470	820	1410	770	1400	750	1360	720	1320	690	1310	680	1240	630	1220	620	1200	600
	1	2040	1150	1870	1000	1800	950	1780	930	1730	900	1680	850	1660	840	1570	770	1550	760	1530	740

1. Tabulated lateral design values, Z, shall be multiplied by all applicable adjustment factors (see Table 11.3.1).
2. Tabulated lateral design values, Z, are for "reduced body diameter" lag screws (see Appendix Table L2) inserted in side grain with screw axis perpendicular to wood fibers; screw penetration, p, into the main member equal to 8D; dowel bearing strengths, F_e, of 61,850 psi for ASTM A653, Grade 33 steel and 87,000 psi for ASTM A36 steel and screw bending yield strengths, F_{yb}, of 70,000 psi for D = 1/4", 60,000 psi for D = 5/16", and 45,000 psi for D ≥3/8".
3. Where the lag screw penetration, p, is less than 8D but not less than 4D, tabulated lateral design values, Z, shall be multiplied by p/8D or lateral design values shall be calculated using the provisions of 12.3 for the reduced penetration.
4. The length of lag screw penetration, p, not including the length of the tapered tip, E (see Appendix Table L2), of the lag screw into the main member shall not be less than 4D. See 12.1.4.6 for minimum length of penetration, p_{min}.