

Cont. Beam Example 1-Floor Beam B-1

Digital Canal
 Project: Examples
 Job: Example Problems
 Client: Digital Canal Corporation

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 Designed by: auderer
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Input Data

<i>Span</i>	<i>Horizontal Span Length</i> <i>ft</i>	<i>Actual Length</i> <i>ft</i>	<i>Left Support Width</i> <i>in</i>	<i>Right Support Width</i> <i>in</i>
Member 1				
Span 1	25	25.7694	8	8
Overall Length	25	25.7694		

Notes:

- Lengths are to center line of bearing.
- Slope is 3 in 12.
- Eave Height is 0 ft.
- Spacing or tributary width is 4 ft.

Area Loads					
<i>Dead</i> <i>ksf</i>	<i>Construction</i> <i>ksf</i>	<i>Floor Live</i> <i>ksf</i>	<i>Roof Live</i> <i>ksf</i>	<i>Wind</i> <i>ksf</i>	<i>Snow</i> <i>ksf</i>
0.02	0.01	0.04	0	Varies	0.02

User Defined Loads

<i>Load Case</i>	<i>Load Type</i>	<i>Distance(s) to Start</i> <i>ft</i>	<i>Load Length</i> <i>ft</i>	<i>Load at Start</i> <i>K</i> <i>klf</i>	<i>Load at End</i> <i>K</i> <i>klf</i>	<i>Offset</i> <i>ft</i>
Description: Floor Live	Conc. Load @ mid-span Concentrated	5		0.5		0
Description: Floor Live	Linear Load Linear	12	6	0.05	0.15	0

Code Parameters - IBC 2006

IBC											
<i>Wind</i>					<i>Snow</i>					<i>Floor</i>	
<i>Wind Speed</i> <i>mph</i>	<i>I</i>	<i>Exposure Category</i>	<i>Open to Wind?</i>	<i>Edge Beam?</i>	<i>Ground Snow</i> <i>ksf</i>	<i>C_e</i>	<i>C_t</i>	<i>L_u</i> <i>ft</i>	<i>I</i>	<i>Garage?</i>	<i>Conc. Load</i> <i>K</i>
90	1	B	Partial	No	0.02	0.7	1	300	1	No	1

Notes:

- Positive loads act down.
- Distances are measured along horizontal axis.

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- Live loads are patterned to 100%.
- Live load reduction will be calculated based upon tributary area.
- Weight of members is included in the calculations.

Summary of Member Forces - Load Combinations

<i>Member</i>	<i>Span</i>	<i>Shear Max</i> <i>K</i>	<i>Bending Max.</i> <i>ft-lb</i>	<i>Torsion</i> <i>ft-lb</i>	<i>Deflection</i> <i>in</i>
1	1	3.97	25601.33		-1.637

Reactions

<i>Support</i>	<i>Load</i> <i>Comb.</i>	<i>Horizontal</i> <i>K</i>	<i>Vertical</i> <i>K</i>	<i>Moment</i> <i>ft-lb</i>
1	Dead+0.75*Wind in Pos X+0.75*Floor Live+0.75*Snow Condition 2 w/Pattern Loads	0.24	4.06	0.00
2	Dead+0.75*Wind in Pos X+0.75*Floor Live+0.75*Snow Condition 2 w/Pattern Loads	0.24	3.95	0.00

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Timber Design 1 - Option 1 - Design of Member 1 - 3 1/8"x16 1/2"



Design Data

Design of Member 1 - 3 1/8"x16 1/2" ✓		
Material type is 20F-V3 -Un-Balanced Layup -Glulam - Western		
Check for repetitive use? Yes	Top flange bracing is Fully Braced	E _{bx} : 1600 ksi
Moist use? No	Bottom flange bracing is Braced At Supports	E _{by} : 1500 ksi
I _x = 1169.8 in ⁴ S _x = 141.8 in ³	I _y = 42 in ⁴ S _y = 26.9 in ³	G assumed as .06E
Snow C _d = 1.15	This is not a spaced column	F _b : 2 ksi
Side loaded? No	K _x = 1	F _t : 0.975 ksi
Overstress factor = 1	L _x =	F _c : 1.55 ksi
Allowable Roof live load deflection = L/240	K _y = 1	F _{cL} : 0.56 ksi
Allowable Roof total load deflection = L/180	L _y =	F _v : 0.265 ksi
Member weight used in analysis = 0.01 klf	Area = 51.56 in ²	Actual density: 31.2 pcf

Critical Design Checks

	Critical Reaction K	Axial ksi	Bending - X ksi	Bending - Y ksi	Shear ksi	LL Defl. in	TL Defl. in
Span 1	3.968	0.018	2.03	0	0.094	-1.168	-1.637
Value	6.791	1.121	2.293	1.929	0.305	1.2885	1.718
Allowable	58 ✓	2 ✓	89 ✓	0 ✓	31 ✓	90 ✓	95 ✓
% of Allow.	0	13.5446	12.8847	12.8847	1.69838	12.8848	12.8848
Location	14	8	8	8	8	14	14
Comb.							

	C _D	C _t	C _L	C _V	C _{fu}	C _T	C _T	C _{Px}	C _{Pv}	C _T	C _b
Span 1	1.150	1.000	1.000	0.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000

	C _{Fb}	C _{Ft}	C _{Fc}	C _{Mb}	C _{Mt}	C _{Mv}	C _{McL}	C _{Mc}	C _{ME}	R _b
Span 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.00

	L/d Limit	L _x /d	L _y /d	F _{CE x} ksi	F _{CE y} ksi	F _{bE} ksi	K _{CE}	c	F _c ksi
Span 1	50	0	0	N.A.	N.A.	9.95e+006	0.426135	0.9	1.7825

Notes:

- Member has an actual/allowable ratio in span 1 of 95 ✓ %.
- Design is governed by total deflection.
- Governing load combination is Dead+0.75*Wind in Pos X+0.75*Floor Live+0.75*Snow Condition 2 w/Pattern Loads.
- Axial capacity of member is 6.64 K.
- Maximum hanger forces: 3.968 K (Left) and 3.855 K (Right).

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Minimum Bearing

<i>Span</i>	<i>Actual Length ft</i>	<i>Left Support Min. Bearing in</i>	<i>Right Support Min. Bearing in</i>
Span 1	25.7694	2.29	2.225

Notes:

- Locations of maximum stress, moment, etc. are measured from the left end of the member.
- Bearing across full width of beam is required.
- Structural adequacy of supporting members must be confirmed.
- Bearing lengths required may be limited by bearing stress on supporting members.
- A negative reaction indicates that the beam must be fastened to the support to resist uplift.
- See manufacturer's literature for side loaded connection requirements.
- Cantilever deflection allowables are based on twice the span length.
- Timber design is governed by NDS 2005.