

Design Check Calculation Sheet

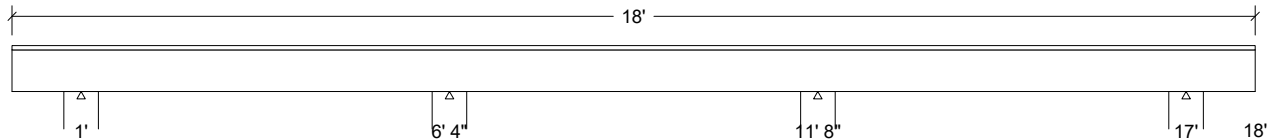
WoodWorks Sizer 2020 (Update 4)

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] StartEnd	Magnitude StartEnd	Unit
1	Dead	Full UDL	No		85.0	plf
2	Snow	Full UDL	Yes		386.0	plf
3	Dead	Full UDL	No		40.0	plf
4	Dead	Full Area	No		15.00(8.00')	psf
5	Live	Full Area	Yes		40.00(8.00')	psf
Self-weight	Dead	Full UDL	No		7.9	plf

Load magnitude does not include Normal Importance factor from NBC Tables 4.1.6.2, 4.1.7.3, 4.1.8.2 which is applied during analysis.

Maximum Reactions (lbs), Bearing Resistances (lbs) and Bearing Lengths (in) :



Unfactored:									
Dead		821		1455		1455		821	
Live		1126		2060		2060		1126	
Snow		1306		2353		2353		1306	
Factored:									
Total		3944		6992		6991		3944	
Bearing:									
Capacity									
Beam	22080		22080		22080		22080		
Support	47910		47910		47910		47910		
Des ratio									
Beam	0.18		0.32		0.32		0.18		
Support	0.08		0.15		0.15		0.08		
Load comb	#5		#5		#5		#5		
Length	6.00		6.00		6.00		6.00		
Min req'd	1.50*		1.90		1.90		1.50*		
KB	1.00		1.00		1.00		1.00		
KB min	1.25		1.00		1.00		1.25		
KD	1.00		1.00		1.00		1.00		
KB support	-		-		-		-		
fc sup	1668		1668		1668		1668		
Kzcp sup	-		-		-		-		

\*Minimum bearing length setting used: 1-1/2" for interior supports

**Built-up, S-P-F, No.1/No.2, 2x8, 4-ply (6"x7-1/4")**  
Supports: All - Built-up Column, S-P-F No.1/No.2  
Total length: 17' 12"; Clear span: 0' 9", 4' 10", 4' 10", 4' 10", 0' 9"; Volume = 5.4 cu.ft.  
Load sharing: Yes; Lateral support: top = continuous, bottom = at end supports;

**This section FAILS the design check**  
**WARNING: This section violates the following design criteria: Bending**

Force vs. Resistance and Deflection using CSA O86-19:

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	Vf @d = 2714	Vr = 7469	lbs	Vf/Vr = 0.36
Moment(+)	Mf = 2457	Mr = 8868	lbs-ft	Mf/Mr = 0.28
Moment(-)	Mf = 3335	Mr = 3143	lbs-ft	Mf/Mr = 1.06
Deflection:				
Interior Perm	0.01 = < L/999	0.18 = L/360	in	0.05
Live	0.02 = < L/999	0.18 = L/360	in	0.10
Total	0.03 = < L/999	0.36 = L/180	in	0.07
Cantil. Perm	-0.00 = < L/999	0.07 = L/180	in	0.07
Live	-0.01 = < L/999	0.07 = L/180	in	0.16
Total	-0.02 = L/774	0.13 = L/90	in	0.12

Additional Data:

FACTORS:	f/E(psi)	KD	KH	KZ	KL	KT	KS	KN	LC#
Fv	218	1.00	1.10	1.200	-	1.00	1.00	-	#5
Fb+	1711	1.00	1.10	1.200	1.000	1.00	1.00	-	#5
Fb-	1711	1.00	1.10	1.200	0.354	1.00	1.00	-	#5
Fcp	769	-	-	1.000	-	1.00	1.00	-	#-
Es	1.4 million	-	-	-	-	1.00	1.00	-	#19

CRITICAL LOAD COMBINATIONS:

Shear : LC #5 = 1.25D + (1.0)1.5S + 1.0L  
Moment(+) : LC #5 = 1.25D + (1.0)1.5S + 1.0L  
Moment(-) : LC #5 = 1.25D + (1.0)1.5S + 1.0L  
Deflection: LC #1 = 1.0D (permanent)  
LC #19 = 1.0D + 1.0L (pattern: \_L\_L\_) (live)  
LC #19 = 1.0D + 1.0L (pattern: \_L\_L\_) (total)  
Bearing : Support 1 - LC #5 = 1.25D + (1.0)1.5S + 1.0L  
Support 2 - LC #5 = 1.25D + (1.0)1.5S + 1.0L  
Support 3 - LC #5 = 1.25D + (1.0)1.5S + 1.0L  
Support 4 - LC #5 = 1.25D + (1.0)1.5S + 1.0L  
Load Types: D=dead S=snow L=live(use,occupancy)  
Load Patterns: s=S/2 L=L+Ls \_=no pattern load in this span  
All Load Combinations (LCs) are listed in the Analysis output

CALCULATIONS:

EI = 65.30e06 lb-in^2/ply  
"Live" deflection is due to all non-dead loads (live, wind, snow...)  
Lateral stability(-): Lu = 17'-12.00" Le = 34'-6.69" CB = 36.6  
Lu based on full span; b = single ply width

Design Notes:

- WoodWorks analysis and design are in accordance with the 2015 National Building Code of Canada (NBC), Division B, Part 4, and the CSA O86 - 19 Engineering Design in Wood standard.
- Please verify that the default deflection limits are appropriate for your application.
- KL calculated as per O86 7.5.6.4
- BEAMS require restraint against lateral displacement and rotation at points of bearing (O86 6.5.3.2.3).
- This beam is restrained at end supports only.
- BUILT-UP BEAMS: it is assumed that each ply is a single continuous member (that is, no butt joints are present) and that each ply is equally top-loaded. Where beams are side-loaded, special fastening details may be required.



Critical Results

