

Engineering

tecinstruct LLC 4111 164th St SW Unit 51 Lynnwood, WA 98087

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STRUCTURAL DESIGN

Owner:	Eric & Jodi Blohm
Project:	5642 E Mercer Way Mercer Island, WA

Description:	New Deck
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Building Codes:	IBC/IRC 2018
	ASCE 7-16

Structural Design/ EOR:	Roland Heimisch, P. E. Lic # 42479	
Date	03/30/2023	OLAND HEIA



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1. LATERAL DESIGN

1.1 Seismic Design

The front of the roof and decks are braced with custom made steel brackets for seismic forces. The rear grid of the decks is braced parallel to the exterior wall of the house with the ledger, and perpendicular with Simpson deck tension ties DTT1Z

For consistency of looks, steel a Section modulus Allowable stress for A36 steel			nd Ts 3/8x3" are .385 x 3 ²	e used at = =	all post/beam c 0.58 in ³ 21,600 psi	onnectio	ns.
Loads at front grid: With mapped accelerat	ion		61 and SD _s = 1. c Response Coe		Cs 1.14 / (6.5/1.0)	=	SDs / (R/I) 0.185
Roof	W	=	15 x 290 sqft		=	4,350	lbs
Base Shear	V_{Base}	=	$C_{s} \times W = 0.18$	x 4,350	=	800	lbs
Design Shear:	To con	vert fron	n strength level t	o ASD, I	Base Shear is m	ultiplied	by 0.7
	VDesign	=	0.7 x 800		=	560	lbs
Force at front grid	V		0.5 x 460		=	230	lbs
With (2) Posts, horizon	tal force	at botto	m per post is			80	lbs
	>>> be	ending m	oment at top	115 x 8	3 x 12 =	11,040	lb-in
Bending Stress		M / S =	= 11,040 / 0.58		=	19,034	< 21,600
Covered Deck	W	=	10 x 470 sqft		=	4,700	lbs
Base Shear	V_{Base}	=	$C_s \times W = 0.18$	x 4,700	=	850	lbs
Design Shear:	To con	vert fron	n strength level t	o ASD, I	Base Shear is m	ultiplied	by 0.7
	VDesign	=	0.7 x 850		=	600	lbs
Force at front grid	V		0.5 x 600		=	300	lbs
With (4) Posts, horizon	tal force	at botto	m per post is			75	lbs
	>>> be	ending m	oment at top	75 x 8	x 12 =	7,200	lb-in
Bending Stress		M / S =	= 7,200 / 0.58		=	12,413	3 < 21,600

Uncovered Deck	W	=	10 x 200 sqft		=	2,000 lbs
Base Shear	VBase	=	$C_s \times W = 0.18$	x 2,000	=	360 lbs
Design Shear:	To con	vert fron	rom strength level to ASD, Base Shear is multiplied by		Iltiplied by 0.7	
	V_{Design}	=	0.7 x 360		=	250 lbs
Force at front grid	V		0.5 x 250		=	125 lbs
With (3) Posts, horizontal force at bottom per post is 50 lbs						50 lbs
	>>> be	nding m	oment at top	50 x 8 x 12	=	4,800 lb-in
Bending Stress		M / S =	4,800 / 0.58		=	8,276 < 21,600

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2. GRAVITY DESIGN

2.1 Design Criteria

Dead Loads	Roof	Coating/Waterproofing Sheathing OSB/Plywood 15/32" Trusses / Framing Insulation R-38 Gypsum Board 5/8" Miscellaneous (Sprinkler, HVAC etc) Total	2.0 2.0 3.0 1.2 2.8 1.5 12.5, say 15 psf
	Floors Living	Finished Floor (carpet) Sheathing OSB/Plywood 3/4" Floor Joists / TJIs Insulation R-11 Gypsum Board 5/8" Miscellaneous (Sprinkler, HVAC etc) Non bearing partitions Total	1.0 2.5 2.5 1.0 2.8 1.5 8.0 19.3, say 20 psf
	Decks/Balconies	Decking Floor Joists / TJIs Miscellaneous (Railing/Waterproofing) Total	3.0 2.5 1.5 7.0 say 10 psf
	Ext. Walls	Siding Sheathing 15/32" OSB/Plywood 2x6" Studs @ 16" o.c. Insulation R-21 Gypsum Board 5/8" Total	3.0 2.0 1.5 0.6 2.8 9.9, say 10 ps f
	Int. Walls	2x4" Studs @ 16" o.c. Gypsum Board (2 sides) 5/8" Total	1.5 5.6 7.1, say 8 psf
Live Loads		Roof Living areas Decks/Balconies	20 psf 40 psf 60 psf
Snow Load		Snow Ground Load Snow Roof Load (no reduction applied)	25 psf 25 psf

2.2 Key List

Roof

Key No. 1.1	Rafters, HF No. 2, 2x8", @ 24" o.c.
Key No. 1.2	Overframing, HF No. 2, 2x6", @ 24" o.c.
Key No. 1.3	Ridge Beam, DF No. 2, 6x10"
Key No. 1.4	Beam, DF No. 2, 4x8"
Key No. 1.5	Glulam WS, 24F-1.8E, 5-1/2x10-1/2"
Key No. 1.6	Post, HF No. 2, 6x6", P.T.

Deck

- Key No. 2.1 Deck Joists, HF No. 2, 2x10", @ 12" o.c.
- Key No. 2.2 Deck Joists, HF No. 2, 2x10", @ 16" o.c.
- Key No. 2.3 Beam, HF No. 2, 6x12", P.T.
- Key No. 2.4 Beam, HF No. 2, 6x12", P.T.
- Key No. 2.5 Post, HF No. 2, 6x6", P.T.
- Key No. 2.6 Stair Stringers, HF No. 2, 2x12", @ 12" o.c., P.T.
- Key No. 2.7 Landing Joists, HF No. 2, 2x6", @ 16" o.c., P.T.
- Key No. 2.8 Exist. Header, verify min LSL, 1.55E, 2325Fb, 3-1/2x9-1/4"
- Key No. 2.9 Exist. Header, DF No. 2, verify min 4x8"
- Key No. 2.10 Exist. Header, DF No. 2, verify min 4x6"

Foundation

- Key No. 3.1 Spread Footing, fc = 2,500 psi, 30x30x8"
- Key No. 3.2 Spread Footing, fc = 2,500 psi, 24x24x8"

2.3 Roof

Key No. 1.1	Rafters, HF No. 2, 2x8", @ 24" o.c.		
Span:	L	=	10 ft
Load:	DL	=	15 psf
	SL	=	25 psf
For ca	culation see design sheets		
Key No. 1.2	Overframing, HF No. 2, 2x6", @ 24"	0.C.	
Per sp	an tables		
For ca	culation see design sheets		
Key No. 1.3	Ridge Beam, DF No. 2, 6x10"		
Span:	L cantilevered	=	11 + 2 ft
Load:	roof w/ trib 10 ft		
	DL 10 x 15	=	150 plf
	SL 10 x 25	=	250 plf
For ca	culation see design sheets		
Key No. 1.4	Beam, DF No. 2, 4x8"		
Span:	L cantilevered	_	11 + 2 ft
•		=	11 + 2 11
Load:	roof w/ trib 6 ft DL 6 x 15	_	90 plf
	SL 6 x 25	=	150 plf
For ca	culation see design sheets		
Key No. 1.5	Glulam WS, 24F-1.8E, 5-1/2x10-1/2"		
Span:	L	=	20 ft
Load:	point load from ridge beam 1.3		2011
LUau.	PDL at L/2	=	1,150 lbs
	PSL	=	1,920 lbs
For ca	culation see design sheets		
Key No. 1.6	Post, HF No. 2, 6x6", P.T.		
Height	н	=	8 ft
Loads:)	
	PDL 690 +		1,270 lbs
		+ 960 =	2,110 lbs
Per ins	pection		

Per inspection

2.4 Deck

Key No. 2.1	Deck Joists, HF No. 2	2, 2x10", @ 12" o.c., P.T.		
Span:	L	cantilevered	=	12 + 5 ft
Loads			=	10 psf
	LL		=	60 psf
For ca	lculation see design she	ets		
Key No. 2.2	Deck Joists, HF No. 2	2, 2x10", @ 16" o.c.		
Span:	L	cantilevered	=	4 + 1.5 ft
Loads	DL		=	10 psf
	LL		=	60 psf
	SL		=	25 psf
For ca	lculation see design she	ets. Depth to match 2.1		
Key No. 2.3	Beam, HF No. 2, 6x12	2", P.T.		
Span:	L	cantilevered	=	13 + 2 ft
Load:	reaction from i	oists 2.2 (factor 0.75 to adjust for spacing	1)	
	DL ,	0.75 x 50	=	40 plf
	LL	0.75 x 300	=	225 plf
	SL	0.75 x 125	=	95 plf
For ca	lculation see design she	ets. 2% excess in allowable stress is still	within th	e intent of the design.
Key No. 2.4	Beam, HF No. 2, 6x12	у, рт		
-				7.054
Span:	L	cantilevered	=	7 + 3.5 ft
Load:	reaction from j	oists 2.1		
	DL		=	120 plf
Галаа	LL LL	ata	=	725 plf
For ca	lculation see design she	els.		
Key No. 2.5	Post, HF No. 2, 6x6",	Р.Т.		
Height	: H		=	8 ft
Loads	reaction from t and reactions	beam 2.4, cantilevered end (governs over at beam 2.3)	r 2x inter	ior end
	PDL		=	945 lbs
	PLL		=	5,710 lbs
For ca	culation see design she	ets.		
Key No. 2.6	Stair Stringers, HF N	o. 2, 2x12", @ 12" o.c., P.T.		
Span:	L		=	12 ft
Loads			=	10 psf
	LL		=	40 psf
Per sp	an tables			F -

Key No. 2.7	Landing Joists, HF No. 2, 2x6", @ 16" o.c., P.T.		
Span:	L	=	3 ft
Loads:	DL	=	10 psf
	LL	=	40 psf
Per sp	an tables		
Key No. 2.8	Exist. Header, verify min LSL, 1.55E, 2325Fb, 3-1/2x9-1/4"		
•			0.4
Span:	L	=	8 ft
Load:	floor w/ trib 8 ft, deck w/ trib 6 ft		
	DL 8 x 20 + 6 x 10	=	220 plf
F	LL $8 \times 40 + 6 \times 60$	=	600 plf
For ca	culation see design sheets		
Key No. 2.9	Exist. Header, DF No. 2, verify min 4x8"		
Span:	L	=	4 ft
Load:	floor w/ trib 8 ft, deck w/ trib 6 ft		
	DL 8 x 20 + 6 x 10	=	220 plf
	LL 8 x 40 + 6 x 60	=	600 plf
For cal	culation see design sheets		
Key No. 2.10	Exist. Header, DF No. 2, verify min 4x6"		
Span:	L	=	4 ft
Load:	floor w/ trib 8 ft, deck w/ trib 2 ft		
	DL 8 x 20 + 2 x 10	=	180 plf
	LL 8 x 40 + 2 x 60	=	360 plf
For cal	culation see design sheets		

2.5 Foundation

Key No. 3.1 Spread Footing, fc = 2,500 psi, 30x30x8"

Load	from post 2.5		
	Р	=	6,655 lbs
Soil pressure	6,655 / 6.25	=	1,065 psf < 1,500
Rebars	# 4 @ 6" o.c. both directions		

Key No. 3.2 Spread Footing, fc = 2,500 psi, 24x24x8"

Load	reaction from (2x)	interior end of beam 2.3		
	Р	2 x 1812	=	3,624 lbs
Soil pressure		3,624 / 4	=	906 psf < 1,500
Rebars	# 4 @ 6"	o.c. both directions		

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		Mercer Island, WA 1_1 Rafter Mar. 27, 2023 11:14

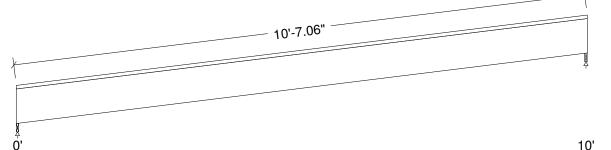
Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnituc	le	Unit
			tern	Start	End	Start	End	
DL	Dead	Full Area				10.00(24.	.0")	psf
SL	Snow	Full Area				25.00(24.	.0")	psf

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



Unfactored: 106 106 Dead Snow 251 251 Factored: 357 357 Total Bearing: F'theta 439 439 Capacity 357 357 Joist 636 636 Support Des ratio 1.00 Joist 1.00 0.56 0.56 Support Load comb #2 #2 0.54 0.54 Length Min req'd 0.54 0.54 1.00 1.00 Cb Cb min 1.00 1.00 1.25 1.25 Cb support 625 625 Fcp sup

Lumber-soft, Hem-Fir (N), No.1/No.2, 2x8 (1-1/2"x7-1/4")

Supports: All - Timber-soft Beam, D.Fir-L (N) No.2

Roof joist spaced at 24.0" c/c; Total length: 10'-9.5"; Clear span(horz): 9'-11.44"; Volume = 0.8 cu.ft.; Pitch: 4/12 Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help); This section PASSES the design code check.

SOFTWARE FOR WOOD DESIGN

1_1 Rafter

WoodWorks® Sizer 2019 (Update 4)

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riterion	Analysis Value	Design	Value	Uni	t	Analy	sis/Des	sign
hear	fv = 41	Fv' =	167	psi		fv	/Fv' =	0.25
ending(+)	fb = 811	Fb' =	1587	psi		fb	/Fb' =	0.51
ead Defl'n	0.07 = < L/999							
ive Defl'n	0.16 = L/771		, -	in				0.31
otal Defl'n	0.23 = L/542	0.70 =	L/180	in				0.33
ditional Data:								
TORS: F/E(ps	i) CD CM C	t CL	CF	Cfu	Cr	Cfrt	Ci	LC#
' 145		00 -	_	_	_	1.00		2
'+ 1000		00 1.000	1.200	_	1.15	1.00	1.00	2
p' 405	- 1.00 1.	00 –	-	-	-	1.00	1.00	-
1.6 m	illion 1.00 1.	00 –	_	-	_	1.00	1.00	2
in' 0.58 m	illion 1.00 1.	00 –	-	-	-	1.00	1.00	2
TICAL LOAD COI	MBINATIONS:							
	#2 = D + S							
nding(+): LC								
flection: LC		•						
	#2 = D + S (to	,						
	port 1 - LC #2 =							
1	port 2 - LC #2 =	D + S						
ead S=snow	stalls the Deal		L.					
	sted in the Anal ns: ASD Basic fr			/ TDC	2010 1	605 3	1	
CULATIONS:	INS: ASD BASIC II	ON ASCE /-	10 2.4	/ IBC	2010 1	.603.3.	T	
	design = 297 lbs	• M(+) = 0	00 lba	£+				
max = 337, v EIy = 76.21 l		M(+) = 0	og ibs-	LL				
	on is due to all	non-dood	loade (livo	wind	cnow)		
	n = 1.0 dead + "		IUaus (IIVe,	wind,	5110w)		
	ble bearing at a		theta	calcul	ated f	or eac	h suppo	ort
	NIC NEALINY AL A	n angre r	LIIELA	CUTCUT	uceu I	or eac	in suppo	ノエレ

Design N

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement. 2. Please verify that the default deflection limits are appropriate for your application.

3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

4. SLOPED BEAMS: level bearing is required for all sloped beams.

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WoodWorks® SOFTWARE FOR WOOD DESIGN	5642 E Mercer Way Mercer Island, WA 1_3 Ridge Beam Mar. 27, 2023 11:19	

Design Check Calculation Sheet WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitude		Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL	No			150.0		plf
SL	Snow	Full UDL	No			250.0		plf

Maximum Reactions (Ibs) Rearing Canacities (Ibs) and Rearing Lengths (in) -

	<u>/</u> 13'	-0.31"	
	ی 0'	11'	13'
Unfactored: Dead Snow	802 1336	1152 1920	
Factored: - Total Bearing: -	2138	3073	<u> </u>
Capacity Beam Support Des ratio	2138 2283	4166 3073	
Beam Support Load comb	1.00 0.94 #2	0.74 1.00 #2	
Length Min req'd Cb	0.62 0.62 1.00	0.84 0.84** 1.45	
Cb min Cb support Fcp sup	1.00 1.07 625	1.45 1.07 625	
	ng length governed by the required width of the su	pporting member.	
То	Timber-soft, D.Fir-L (N), No.2, Supports: All - Timber-soft Bear al length: 13'-0.31"; Clear span: 10'-11.25", 1'-11.5	m, D.Fir-L (N) No.2 56"; Volume = 4.7 cu.ft.; Beam or stringer	
10	Lateral support: top = continuous, This section PASSES the des	bottom = at supports;	

SOFTWARE FOR WOOD DESIGN

1_3 Ridge Beam

WoodWorks® Sizer 2019 (Update 4)

Page 2

Analysis vs. Allo	wable Stress and I	Deflection using	NDS 2018 :		
Criterion	Analysis Value	Design Value	Unit	Analysis/Des	ign
Shear	fv = 56	Fv' = 195	psi	fv/Fv' =	0.29
Bending(+)	fb = 821	Fb' = 1006	psi	fb/Fb' =	0.82
Bending(-)	fb = 116	Fb' = 1006	psi	fb/Fb' =	0.12
Deflection:			-		
Interior Dead	0.09 = < L/999				
Live	0.15 = L/889	0.37 = L/360	in		0.40
Total	0.24 = L/555	0.55 = L/240	in		0.43
Cantil. Dead	-0.05 = L/501				
Live	-0.08 = L/301	0.13 = L/180	in		0.60
Total	-0.13 = L/188	0.20 = L/120	in		0.64
Additional Data:					
FACTORS: F/E(ps	si) CD CM Ct	CL CF	Cfu Cr	Cfrt Ci	LC#
Fv' 170	1.15 1.00 1.0	- – C		1.00 1.00	2
Fb'+ 875	1.15 1.00 1.0	0 1.000 1.000	- 1.00	1.00 1.00	2
Fb'- 875	1.15 1.00 1.0	0 1.000 1.000	- 1.00	1.00 1.00	2
Fcp' 625	- 1.00 1.0	- – C		1.00 1.00	-
E' 1.3 m	illion 1.00 1.0	C		1.00 1.00	2
RITICAL LOAD CO	MBINATIONS:				
Shear : LC	#2 = D + S				
Bending(+): LC	#2 = D + S				
Bending(-): LC	#2 = D + S				
Deflection: LC	#2 = D + S (live	e)			
LC	#2 = D + S (tot)	al)			
	port 1 - LC #2 = 1				
Sup	port 2 - LC #2 = 1	D + S			
D=dead S=snow					
	sted in the Analy				
	ons: ASD Basic from	n ASCE 7-16 2.4	/ IBC 2018 1	1605.3.1	
CALCULATIONS:					
V max = 2273, V	7 design = 1942 lb	s; M(+) = 5657	lbs-ft; M(-)	= 800 lbs-ft	
EIy = 510.84					
	on is due to all :		(live, wind,	snow)	
Total deflection	n = 1.0 dead + "1	ive"			

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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Design Check Calculation Sheet

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Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitu	de	Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL	No			90.0		plf
SL	Snow	Full UDL	No			150.0		plf

Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) :

	/	13'-0.25" —	
	¢ 0'	11'	13'
Unfactored: Dead Snow Factored:	481 801	691 1152	
Total	1281	1844	
Bearing: Capacity Beam Support Des ratio Beam Support Load comb Length Min req'd Cb Cb min Cb support	1719 1836 0.75 0.70 #2 0.50* 0.50* 1.00 1.00 1.07	3015 1844 0.61 1.00 #2 0.50 0.50** 1.75 1.75 1.07	
Fcp sup	625	625	
**Minimum bear	ring length	<pre>setting used: 1/2" for end supports n governed by the required width of the supporting member. Timber-soft, D.Fir-L (N), No.2, 6x8 (5-1/2"x7-1/2") Supports: All - Timber-soft Beam, D.Fir-L (N) No.2 th: 13'-0.25"; Clear span: 10'-11.5", 1'-11.75"; Volume = 3.7 cu.ft.; Post or timber Lateral support: top = continuous, bottom = at supports;</pre>	

SOFTWARE FOR WOOD DESIGN

1_4 Beam

WoodWorks® Sizer 2019 (Update 4)

Page 2

Analysis vs. Allo	wable Stress and I	Deflection	n using N	DS 201	8 :			
Criterion	Analysis Value	Design	Value	Uni	t	Analv	sis/De	sian
Shear	fv = 44	Fv' =		psi	_		/Fv' =	
Bending(+)	fb = 790	Fb' =		psi			/Fb' =	
Bending (-)	fb = 112	Fb' =	834	psi	_	fb	/Fb' =	0.13
Deflection:				-				
Interior Dead	0.11 = < L/999							
Live	0.18 = L/729	0.37 =	L/360	in				0.49
Total	0.29 = L/455	0.55 =	L/240	in				0.53
Cantil. Dead	-0.06 = L/411							
Live	-0.10 = L/246	0.13 =	L/180	in				0.73
Total	-0.16 = L/154	0.20 =	L/120	in				0.78
Additional Data:								
FACTORS: F/E(ps	i) CD CM Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv' 170	1.15 1.00 1.0	0 –	_	_	-	1.00	1.00	2
Fb ' + 725	1.15 1.00 1.0	0 1.000	1.000	-	1.00	1.00	1.00	2
Fb'- 725	1.15 1.00 1.0	0 1.000	1.000	-	1.00	1.00	1.00	2
Fcp' 625	- 1.00 1.0	0 –	-	-	-	1.00	1.00	-
E' 1.3 m	illion 1.00 1.0	0 –	-	-	-	1.00	1.00	2
CRITICAL LOAD CON	MBINATIONS:							
Shear : LC								
Bending(+): LC								
Bending(-): LC								
Deflection: LC		,						
	#2 = D + S (tot	'						
	port 1 - LC #2 = 1							
	port 2 - LC #2 = 1	D + S						
D=dead S=snow								
	sted in the Analy			,			_	
	ns: ASD Basic from	m ASCE 7-	-16 2.4	/ IBC	2018 1	.605.3.	1	
CALCULATIONS:								
	design = 1209 lb	s; M(+) =	= 3394 1	bs-ft;	M(-)	= 480	lbs-ft	
EIy = 251.36								
	on is due to all :		loads (live,	wind,	snow)		
Total deflectio	n = 1.0 dead + "1	ive"						

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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Design Check Calculation Sheet WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	le	Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL	No			150.0		plf
SL	Snow	Full UDL	No			250.0		plf

Maximum Reactions (Ibs) Rearing Canacities (Ibs) and Rearing Lengths (in) -

	<u>∤</u> 13	'-0.31"	
	¢ O'	11'	13'
Unfactored: Dead Snow	802 1336	1152 1920	
Factored: Total	2138	3073	
Bearing: Capacity Beam Support Des ratio Beam Support Load comb Length Min req'd Cb Cb min Cb support Fcp sup	2138 2283 1.00 0.94 #2 0.62 0.62 1.00 1.00 1.00 1.07 625	4166 3073 0.74 1.00 #2 0.84 0.84** 1.45 1.45 1.45 1.45 1.07 625	
	Timber-soft, D.Fir-L (N), No.2, Supports: All - Timber-soft Bea al length: 13'-0.31"; Clear span: 10'-11.25", 1'-11. Lateral support: top = continuous, This section PASSES the de	6x10 (5-1/2''x9-1/2'') m, D.Fir-L (N) No.2 56"; Volume = 4.7 cu.ft.; Beam or stringer bottom = at supports;	

SOFTWARE FOR WOOD DESIGN

1_3 Ridge Beam

WoodWorks® Sizer 2019 (Update 4)

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Analysis vs. Allo	wable Stress and I	Deflection using	NDS 2018 :		
Criterion	Analysis Value	Design Value	Unit	Analysis/Des	ign
Shear	fv = 56	Fv' = 195	psi	fv/Fv' =	0.29
Bending(+)	fb = 821	Fb' = 1006	psi	fb/Fb' =	0.82
Bending(-)	fb = 116	Fb' = 1006	psi	fb/Fb' =	0.12
Deflection:			-		
Interior Dead	0.09 = < L/999				
Live	0.15 = L/889	0.37 = L/360	in		0.40
Total	0.24 = L/555	0.55 = L/240	in		0.43
Cantil. Dead	-0.05 = L/501				
Live	-0.08 = L/301	0.13 = L/180	in		0.60
Total	-0.13 = L/188	0.20 = L/120	in		0.64
Additional Data:					
FACTORS: F/E(ps	si) CD CM Ct	CL CF	Cfu Cr	Cfrt Ci	LC#
Fv' 170	1.15 1.00 1.0	- – C		1.00 1.00	2
Fb'+ 875	1.15 1.00 1.0	0 1.000 1.000	- 1.00	1.00 1.00	2
Fb'- 875	1.15 1.00 1.0	0 1.000 1.000	- 1.00	1.00 1.00	2
Fcp' 625	- 1.00 1.0	- – C		1.00 1.00	-
E' 1.3 m	illion 1.00 1.0	C		1.00 1.00	2
RITICAL LOAD CO	MBINATIONS:				
Shear : LC	#2 = D + S				
Bending(+): LC	#2 = D + S				
Bending(-): LC	#2 = D + S				
Deflection: LC	#2 = D + S (live	e)			
LC	#2 = D + S (tot)	al)			
	port 1 - LC #2 = 1				
Sup	port 2 - LC #2 = 1	D + S			
D=dead S=snow					
	sted in the Analy				
	ons: ASD Basic from	n ASCE 7-16 2.4	/ IBC 2018 1	1605.3.1	
CALCULATIONS:					
V max = 2273, V	7 design = 1942 lb	s; M(+) = 5657	lbs-ft; M(-)	= 800 lbs-ft	
EIy = 510.84					
	on is due to all :		(live, wind,	snow)	
Total deflection	n = 1.0 dead + "1	ive"			

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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WoodWorks® SOFTWARE FOR WOOD DESIGN	5642 E Mercer Way Mercer Island, WA 1_3 Ridge Beam Mar. 27, 2023 11:26	

Design Check Calculation Sheet WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	le	Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL	No			150.0		plf
SL	Snow	Full UDL	No			250.0		plf

Maximum Reactions (lbs) Rearing Capacities (lbs) and Rearing Lengths (in) :

	k	— 13'-0.31" —	
	0'	11'	13'
Unfactored: Dead Snow	802 1336	1152 1920	
Factored: - Total Bearing: -	2138	3073	
Capacity Beam Support Des ratio	2138 2283	4166 3073	
Beam Support Load comb	1.00 0.94 #2	0.74 1.00 #2	
Length Min req'd Cb	0.62 0.62 1.00	0.84 0.84** 1.45	
Cb min Cb support Fcp sup	1.00 1.07 625	1.45 1.07 625	
**Minimum bear	g length governed by the required width of	the supporting member.	
То	Supports: All - Timber-so I length: 13'-0.31"; Clear span: 10'-11.25",	No.2, 6x10 (5-1/2''x9-1/2'') oft Beam, D.Fir-L (N) No.2 1'-11.56"; Volume = 4.7 cu.ft.; Beam or stringer nuous, bottom = at supports;	

SOFTWARE FOR WOOD DESIGN

1_3 Ridge Beam

WoodWorks® Sizer 2019 (Update 4)

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Analysis vs. Allo	wable Stress and I	Deflection using	NDS 2018 :		
Criterion	Analysis Value	Design Value	Unit	Analysis/Des	ign
Shear	fv = 56	Fv' = 195	psi	fv/Fv' =	0.29
Bending(+)	fb = 821	Fb' = 1006	psi	fb/Fb' =	0.82
Bending(-)	fb = 116	Fb' = 1006	psi	fb/Fb' =	0.12
Deflection:			-		
Interior Dead	0.09 = < L/999				
Live	0.15 = L/889	0.37 = L/360	in		0.40
Total	0.24 = L/555	0.55 = L/240	in		0.43
Cantil. Dead	-0.05 = L/501				
Live	-0.08 = L/301	0.13 = L/180	in		0.60
Total	-0.13 = L/188	0.20 = L/120	in		0.64
Additional Data:					
FACTORS: F/E(ps	si) CD CM Ct	CL CF	Cfu Cr	Cfrt Ci	LC#
Fv' 170	1.15 1.00 1.0	- – C		1.00 1.00	2
Fb'+ 875	1.15 1.00 1.0	0 1.000 1.000	- 1.00	1.00 1.00	2
Fb'- 875	1.15 1.00 1.0	0 1.000 1.000	- 1.00	1.00 1.00	2
Fcp' 625	- 1.00 1.0	- – C		1.00 1.00	-
E' 1.3 m	illion 1.00 1.0	C		1.00 1.00	2
RITICAL LOAD CO	MBINATIONS:				
Shear : LC	#2 = D + S				
Bending(+): LC	#2 = D + S				
Bending(-): LC	#2 = D + S				
Deflection: LC	#2 = D + S (live	e)			
LC	#2 = D + S (tot)	al)			
	port 1 - LC #2 = 1				
Sup	port 2 - LC $#2 = 1$	D + S			
D=dead S=snow					
	sted in the Analy				
	ons: ASD Basic from	n ASCE 7-16 2.4	/ IBC 2018 1	1605.3.1	
CALCULATIONS:					
V max = 2273, V	7 design = 1942 lb	s; M(+) = 5657	lbs-ft; M(-)	= 800 lbs-ft	
EIy = 510.84					
	on is due to all :		(live, wind,	snow)	
Total deflection	n = 1.0 dead + "1	ive"			

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

Loads:

Loa	ad	Туре	Distribution	Pat-	Location	[ft]	Magnitud	e	Unit
				tern	Start	End	Start	End	
DL		Dead	Full UDL	No			90.0		plf
SL		Snow	Full UDL	No			150.0		plf

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

	Q'	11'	13'
nfactored:			
Dead	481	691	
Snow	801	1152	
actored:			
Total	1281	1844	
earing:			
Capacity			
Beam	1719	3015	
Support	1836	1844	
Des ratio			
Beam	0.75	0.61	
Support	0.70	1.00	
Load comb	#2	#2	
Length	0.50*	0.50	
Min req'd	0.50*	0.50**	
Cb	1.00	1.75	
Cb min	1.00	1.75	
Cb support			
Fcp sup	625	1/2" for end supports	
		the required width of the supporting member.	
winning bear			
		r-soft, D.Fir-L (N), No.2, 6x8 (5-1/2"x7-1/2") ports: All - Timber-soft Beam, D.Fir-L (N) No.2	

This section PASSES the design code check.

SOFTWARE FOR WOOD DESIGN

1_4 Beam

WoodWorks® Sizer 2019 (Update 4)

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Criterion	wable Stress and Analysis Value	Design		Uni		70011	sis/Des	
Shear	fv = 44	Fv' =		psi			$F_{\rm Fv} =$	
Bending(+)	fb = 790	FV =		psi psi			/FV =	
Bending (-)	fb = 790 fb = 112	FD =		-	I		/FD =	
Deflection:		- 41	034	psi		10	/ 20 -	0.13
Interior Dead	0.11 = < L/999							
Live	0.11 = (1/55) 0.18 = L/729	0.37 =	т/360	in				0.49
Total	0.29 = L/455	0.55 =		lin				0.53
Cantil. Dead	-0.06 = L/411	0.00	1/240					0.00
Live	-0.10 = L/246	0.13 =	T./180	in				0.73
Total	-0.16 = L/154	0.20 =		in				0.78
		0.20	17 120					0.70
Additional Data:								
	i) CD CM Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv' 170	1.15 1.00 1.0		_	-	-	1.00	1.00	2
Fb'+ 725	1.15 1.00 1.0		1.000	_	1.00	1.00	1.00	2
Fb'- 725	1.15 1.00 1.0		1.000	_	1.00	1.00	1.00	2
Fcp' 625	- 1.00 1.0		_	_	_	1.00	1.00	_
	illion 1.00 1.0		_	_	_	1.00	1.00	2
RITICAL LOAD CO								
	#2 = D + S							
Bending(+): LC								
Bending(-): LC								
Deflection: LC		∋)						
LC	#2 = D + S (tot	al)						
Bearing : Sup	port 1 - LC #2 =) + S						
Sup	port 2 - LC #2 =) + S						
D=dead S=snow								
All LC's are li	sted in the Analy	sis outpu	t					
	ns: ASD Basic fro			/ IBC	2018 1	605.3.	1	
ALCULATIONS:								
V max = 1364, V	design = 1209 lb	s; M(+) =	3394 1	bs-ft;	M(-)	= 480	lbs-ft	
EIy = 251.36	lb-in ²							
"Live" deflecti	on is due to all	non-dead	loads (live,	wind,	snow)		
	n = 1.0 dead + "1							

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	le	Unit
			tern	Start	End	Start	End	
DL	Dead	Point		10.00		1150		lbs
SL	Snow	Point		10.00		1920		lbs

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

	<u> </u>	20'-0.5"	
	^۸ 0'		⁴ 20'
Unfactored:			
Dead	576		574
Snow Factored:	962		958
Total	1538		1532
Bearing:	1000		
Capacity			
Beam	1787		1787
Support	1836		1836
Des ratio			
Beam	0.86		0.86
Support Load comb	0.84 #2		0.83 #2
Length	#2 0.50*		0.50*
Min req'd	0.50*		0.50*
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625
*Minimum beari	ng length	setting used: 1/2" for end supports	

Glulam-Unbalan., West Species, 24F-1.8E WS, 5-1/2"x10-1/2"

Supports: All - Timber-soft Beam, D.Fir-L (N) No.2

Total length: 20'-0.5"; Clear span: 19'-11.5"; Volume = 8.0 cu.ft.; 7 laminations, 5-1/2" maximum width,

Lateral support: top = at supports, bottom = at supports;

This section PASSES the design code check.

Analysis vs. All	lowable Stress and	d Deflection using NDS 2018	:
------------------	--------------------	-----------------------------	---

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 40	Fv' = 305	psi	fv/Fv' = 0.13
Bending(+)	fb = 1823	Fb' = 2670	psi	fb/Fb' = 0.68
Dead Defl'n	0.35 = L/692			
Live Defl'n	0.58 = L/414	0.67 = L/360	in	0.87
Total Defl'n	0.93 = L/259	1.00 = L/240	in	0.93

SOFTWARE FOR WOOD DESIGN

1_5 Beam

WoodWorks® Sizer 2019 (Update 4)

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<pre>FACTORS: F/E(psi) CD CM Ct CL CV Cfu Cr Cfrt Notes Cvr LC# Fv' 265 1.15 1.00 1.00 1.00 1.00 1.00 2 Fb'+ 2400 1.15 1.00 1.00 0.968 1.000 1.00 1.00 - 2 Fcp' 650 - 1.00 1.00 1.00 2 E' 1.8 million 1.00 1.00 1.00 2 Eminy' 0.85 million 1.00 1.00 1.00 2 CRITICAL LOAD COMBINATIONS: Shear : LC #2 = D + S Bending(+): LC #2 = D + S Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live" Lateral stability(+): Lu = 20' Le = 36'-9.63" RB = 12.4</pre>	Additiona	al Data:											
<pre>Fb'+ 2400 1.15 1.00 1.00 0.968 1.000 1.00 1.00 - 2 Fcp' 650 - 1.00 1.00 1.00 E' 1.8 million 1.00 1.00 1.00 2 Eminy' 0.85 million 1.00 1.00 1.00 2 CRITICAL LOAD COMBINATIONS: Shear : LC #2 = D + S Bending(+): LC #2 = D + S Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>	FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cvr	LC#
<pre>Fcp' 650 - 1.00 1.00 1.00 2 E' 1.8 million 1.00 1.00 1.00 2 Eminy' 0.85 million 1.00 1.00 1.00 2 CRITICAL LOAD COMBINATIONS: Shear : LC #2 = D + S Bending(+): LC #2 = D + S Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>	Fv'	265	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
<pre>E' 1.8 million 1.00 1.00 1.00 2 Eminy' 0.85 million 1.00 1.00 1.00 2 CRITICAL LOAD COMBINATIONS: Shear : LC #2 = D + S Bending(+): LC #2 = D + S Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>						0.968	1.000	-	-	1.00	1.00	-	2
<pre>Eminy' 0.85 million 1.00 1.00 1.00 2 CRITICAL LOAD COMBINATIONS: Shear : LC #2 = D + S Bending(+): LC #2 = D + S Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>	Fcp'	650	-	1.00	1.00								
<pre>CRITICAL LOAD COMBINATIONS: Shear : LC #2 = D + S Bending(+): LC #2 = D + S Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>	Ε'	1.8 mil	lion	1.00	1.00	-	-	-	-				
<pre>Shear : LC #2 = D + S Bending(+): LC #2 = D + S Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>					1.00	-	-	-	-	1.00	-	-	2
<pre>Bending(+): LC #2 = D + S Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>													
<pre>Deflection: LC #2 = D + S (live) LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>													
<pre>LC #2 = D + S (total) Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>													
<pre>Bearing : Support 1 - LC #2 = D + S Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>	Deflecti												
Support 2 - LC #2 = D + S D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"													
<pre>D=dead S=snow All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>	Bearing												
<pre>All LC's are listed in the Analysis output Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>			rt 2	– LC #	2 = D	+ S							
<pre>Load combinations: ASD Basic from ASCE 7-16 2.4 / IBC 2018 1605.3.1 CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>				_ la _ 7			. 上						
<pre>CALCULATIONS: V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>					-	1		/ TDC	2010 1		1		
<pre>V max = 1538, V design = 1538 lbs; M(+) = 15350 lbs-ft EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"</pre>			: ASD	Basic	T L'OIII	ASCE /-	-16 2.4	/ IBC	2018 1	.605.3.	T		
EIy = 955.03 lb-in^2 "Live" deflection is due to all non-dead loads (live, wind, snow) Total deflection = 1.0 dead + "live"			.	_ 150	0 lba.	M(1)	1 5 2 5 0	lba f	-				
"Live" deflection is due to all non-dead loads (live, wind, snow…) Total deflection = 1.0 dead + "live"					o ids;	M(+) =	- 10000	IDS-I	L				
Total deflection = 1.0 dead + "live"													
-12.4													
		Scapilly	(')•	ши —		e = 50	5.05	1/10 -	12.4				

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Glulam design values are for materials conforming to ANSI 117-2015 and manufactured in accordance with ANSI A190.1-2012

4. GLULAM: bxd = actual breadth x actual depth.

5. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.

6. GLULAM: bearing length based on smaller of Fcp(tension), Fcp(comp'n).

		25
WoodWorks [®]	5642 E Mercer Way Mercer Island, WA 2_1 Deck Joists Mar. 27, 2023 13:39	

Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	.e	Unit
			tern	Start	End	Start	End	
DL	Dead	Full Area	No			10.00(12.	0")	psf
LL	Live	Full Area	Yes			60.00(12.	0")	psf

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

	<u></u>	17'-0.34"	
	¢ O'	<u> </u> 12'	17'
Unfactored: Dead	50	120	
Live Factored:	362	723	
Uplift Total	-11 412	843	
Bearing: Capacity Joist Support Des ratio	412 794	843 1187	
Joist Support	1.00 0.52	1.00 0.71	
Load comb Length Min req'd	#3 0.68 0.68	#2 1.01 1.01	
Cb Cb min	1.00 1.00	1.37 1.37	
Cb support Fcp sup	1.25 625	1.25 625	

Lumber-soft, Hem-Fir (N), No.1/No.2, 2x10 (1-1/2"x9-1/4")

Supports: All - Timber-soft Beam, D.Fir-L (N) No.2

Floor joist spaced at 12.0" c/c; Total length: 17'-0.31"; Clear span: 11'-11.13", 4'-11.5"; Volume = 1.6 cu.ft.

Incised; Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online

help);

This section PASSES the design code check.

SOFTWARE FOR WOOD DESIGN

2_1 Deck Joists

WoodWorks® Sizer 2019 (Update 4)

Page 2

Criterion	Analysis Value	Design Value	Unit	Analysis/Des	ign
Shear	fv = 47	Fv' = 116	psi	fv/Fv' =	0.41
Bending(+)	fb = 672	Fb' = 1012	psi	fb/Fb' =	0.66
Bending(-)	fb = 491	Fb' = 544	psi	fb/Fb' =	0.90
Deflection:					
Interior Dead	0.02 = < L/999				
Live	0.19 = L/773	0.40 = L/360	in		0.47
Total	0.20 = L/704	0.60 = L/240	in		0.34
	-0.00 = < L/999				
Live	-0.25 = L/241	0.33 = L/180	in		0.74
Total	-0.25 = L/238	0.50 = L/120	in		0.50
dditional Data:					
ACTORS: F/E(ps:	i) CD CM Ct	CL CF	Cfu Cr	Cfrt Ci	LC#
Fv' 145	1.00 1.00 1.00			1.00 0.80	2
Fb'+ 1000	1.00 1.00 1.00		- 1.15	1.00 0.80	3
Fb'- 1000	1.00 1.00 1.00		- 1.15	1.00 0.80	2
Fcp' 405	- 1.00 1.00			1.00 1.00	-
E' 1.6 m				1.00 0.95	3
Emin' 0.58 m:) – –		1.00 0.95	3
RITICAL LOAD CON					
	#2 = D + L				
	#3 = D + L (patte	ern: L_)			
Bending(-): LC =					
	#3 = D + L (patternel)				
	#3 = D + L (patternel)				
	port 1 - LC #3 = I		L_)		
	port 2 - LC #2 = I		- \		
	port $1 - LC #4 = I$) + L (pattern:	_L)		
D=dead L=live					
	sted in the Analys				
	s=S/2, X=L+S or I				
	ns: ASD Basic from	ASCE /-16 2.4	V TRC ZUIX -	1003.3.1	
ALCULATIONS:	1	N(() 1100 J			
	design = 436 lbs;	M(+) = 1198 lbs	-IC; M(-) =	JI-201 C/8	
EIy = 158.29			14)	
	on is due to all r		iive, wind,	SHOW)	
	n = 0.5 dead + "12		DD _ 21 1	Tu board on f	
aterai staplil	ty(-): Lu = 12'	Te = 13 1.13.	KD = 31.1;	Lu pased on I	uii spa

Design Notes:

 Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
 Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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WoodWorks®	5642 E Mercer Way Mercer Island, WA 2_2 Deck Joists Mar. 27, 2023 13:58

Design Check Calculation Sheet WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	le	Unit
			tern	Start	End	Start	End	
DL LL	Dead	Full Area	No			10.00(16.	0")	psf
	Live	Full Area	Yes			60.00(16.	0")	psf
SL	Snow	Full Area	No			25.00(16.	0")	psf

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

	1	5'-6.25"	
	风 () ()	× 4'	5'-6"
Unfactored:			
Dead	23	50	
Live	162	303	
Snow	58	126	
Factored:	1.0.0		
Total	188	372	
Bearing:			
Capacity Joist	304	532	
Support	586	586	
Des ratio	500	500	
Joist	0.62	0.70	
Support	0.32	0.63	
Load comb	#8	#3	
Length	0.50*	0.50*	
Min req'd	0.50*	0.35	
Cb	1.00	1.75	
Cb min	1.00	1.75	
Cb support	1.25	1.25	
Fcp sup	625	625	
*Minimum beari	ng length se	tting used: 1/2" for end supports and 1/2" for interior supports	
	I	umber-soft, Hem-Fir (N), No.1/No.2, 2x10 (1-1/2''x9-1/4'')	

Supports: All - Timber-soft Beam, D.Fir-L (N) No.2

Floor joist spaced at 16.0" c/c; Total length: 5'-6.25"; Clear span: 3'-11.5", 1'-5.75"; Volume = 0.5 cu.ft. Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help); This section PASSES the design code check.

SOFTWARE FOR WOOD DESIGN

2_2 Deck Joists

WoodWorks® Sizer 2019 (Update 4)

Page 2

Criterion	Analysis Value	Design Value	Unit	Analysis/Desig	n
Shear	fv = 15	Fv' = 145	psi	fv/Fv' = 0	.10
Bending(+)	fb = 101	Fb' = 1265	psi		.08
Bending(-)	fb = 59	Fb' = 1170	psi	fb/Fb' = 0	.05
Deflection:					
Interior Dead	negligible				
Live	0.00 = < L/999	0.13 = L/360	in		.02
Total	0.00 = < L/999	0.20 = L/240	in	0	.02
Cantil. Dead	negligible				
Live	-0.00 = < L/999	0.10 = L/180	in		.03
Total	-0.00 = < L/999	0.15 = L/120	in	0	.02
dditional Data:					
ACTORS: F/E(ps:			Cfu Cr		C#
Fv' 145	1.00 1.00 1.00				2
Fb'+ 1000	1.00 1.00 1.00		- 1.15		5
Fb'- 1000			- 1.15		2
Fcp' 405	- 1.00 1.00				_
E' 1.6 m:					5
	illion 1.00 1.00) – –		1.00 1.00	5
RITICAL LOAD CON					
	#2 = D + L				
	#5 = D + L (patternel)	ern: L_)			
Bending(-): LC					
	#5 = D + L (patter)				
	#5 = D + L (patternel)			1	
	port 1 - LC #8 = I		(pattern: L_	_)	
	port 2 - LC #3 = I) + 0.75(L + S)			
D=dead L=live S=					
	sted in the Analys				
	s=S/2, X=L+S or I ns: ASD Basic from				
ALCULATIONS:	IS. ADU DASIC IIO	ANCE /-10 2.4	, TDC 7010 1	1003.3.1	
	dogian _ 100 lt-	M(1) = 170 1	E+. M() 1	INE The ft	
	design = 139 lbs;	M(+) = 1/9 IDS-	$L_{i} \mathbb{M}(-) = 1$	LUD IDS-IL	
EIy = 158.29		on doad loade (
	on is due to all r h = 0.5 dead + "li		LIVE, WIND,	SHOW)	
	n = 0.5 dead + "11 ty(-): Lu = 4' I		$2 - 10 2 \cdot \tau$	1 baged on full	anar
aterar Stapili	Ly(-): Lu = 4'	$Ie = 7^{-5}.75^{\circ}$ R	5 — тэ.с; Ш	u paseu on tull :	span

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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WoodWorks®	5642 E Mercer Way Mercer Island, WA 2_3 Beam Mar. 27, 2023 13:57	

Design Check Calculation Sheet WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitu	de	Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL	No			40.0		plf
LL	Live	Full UDL	Yes			225.0		plf
SL	Snow	Full UDL	No			95.0		plf

Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) :

	15'-0	15'-0.41"					
	口 〇'	13'	15'				
Unfactored: Dead Live Snow	255 1470 606	346 1947 822					
Factored: Total	1812	2423					
Bearing: Capacity Beam Support Des ratio Beam Support Load comb Length Min req'd Cb Cb min Cb support Fcp sup	1812 2988 1.00 0.61 #8 0.81 0.81 1.00 1.00 1.07 625	2423 2617 1.00 0.93 #3 0.71 0.71 1.53 1.53 1.07 625					
To	Timber-soft, Hem-Fir (N), No.2, 6 Supports: All - Timber-soft Beam, al length: 15'-0.44"; Clear span: 12'-11.25", 1'-11.63 Incised; Lateral support: top = continuou	D.Fir-L (N) No.2 "; Volume = 6.6 cu.ft.; Beam or stringer					
	This section FAILS the de ection violates the following design criteria: Be						

SOFTWARE FOR WOOD DESIGN

2_3 Beam

WoodWorks® Sizer 2019 (Update 4)

Page 2

Criterion	Analysis Value	Design	Value	Uni	.t	Analy	sis/Des	sign	
Shear	fv = 36	Fv' =		psi			/Fv' =		
Bending(+)	fb = 550	Fb' =		psi	I		/Fb' =		
Bending(-)	fb = 52	Fb' =	536	psi	-	fb	/Fb' =	0.10	
Deflection: Interior Dead	0.03 = < L/999								
Live	0.03 = < L/999 0.21 = L/749	0.43 =	т /260	in				0.48	
Total	0.21 = L/749 0.24 = L/646	0.43 = 0.65 =		in				0.40	
Cantil. Dead	-0.02 = < L/999	0.05	Ш/ 2 Ч О	111				0.37	
Live	-0.10 = L/237	0.13 =	L/180	in				0.76	
Total	-0.12 = L/205	0.20 =		in				0.58	
		•		1					
Additional Data:									
	i) CD CM Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#	
Fv' 135	1.00 1.00 1.0	0 –	-	_	-	1.00	0.80	2	
Fb ' + 675	1.00 1.00 1.0	0 1.000	1.000	_	1.00	1.00	0.80	5	
Fb'- 675	1.00 1.00 1.0	0.992	1.000	-	1.00	1.00	0.80	2	
Fcp' 405	- 1.00 1.0		-	-	-	1.00	1.00	_	
	illion 1.00 1.0		-	-	-	1.00	0.95	8	
	illion 1.00 1.0	0 –	-	-	-	1.00	0.95	8	
CRITICAL LOAD CO									
	#2 = D + L	- \							
	#5 = D + L (patt	ern: L_)							
Bending(-): LC	#2 = D + L #8 = D + 0.75(L		+) (1	÷)				
	#8 = D + 0.75(L) #8 = D + 0.75(L)								
	port $1 - LC #8 = 1$)			
	port 2 - LC $\#3 = 1$			(pacee	· · · · · · · ·	_/			
D=dead L=live S	÷		,						
All LC's are li	sted in the Analy	sis outpu	t						
Load Patterns:	s=S/2, X=L+S or	L+Lr, _=	no patt						
Load combinatio	ns: ASD Basic from								
CALCULATIONS:									
	design = 1501 lb	s; M(+) =	5558 1	bs-ft;	M(-)	= 530	lbs-ft		
EIy = 766.76									
	on is due to all		loads (live,	wind,	snow)			
	n = 0.5 dead + "1		- 10-	55	o o -	,	1 -		
Lateral stabili	ty(-): Lu = 13'	Le = 21'	-/.13"	KR =	9.9; I	u base	a on fi	ı⊥i span	

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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WoodWorks®	5642 E Mercer Way Mercer Island, WA 2_4 Beam Mar. 27, 2023 14:05

Design Check Calculation Sheet

WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	le	Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL	No			120.0		plf
LL	Live	Full UDL	Yes			725.0		plf

Maximum Reactions (Ibs), Bearing Capacities (Ibs) and Bearing Lengths (in) :

	文 O'	× 7'	10'-6"
Unfactored: Dead Live Factored: -	322 2577	945 5709	
Uplift Total Bearing: -	-274 2898	6654	
Capacity Beam Support Des ratio	2898 4778	6654 9592	
Beam Support Load comb	1.00 0.61 #3	1.00 0.69 #2	
Length Min req'd Cb	1.30 1.30 1.00	2.61 2.61 1.14	
Cb min Cb support Fcp sup	1.00 1.07 625	1.14 1.07 625	

This section PASSES the design code check.

SOFTWARE FOR WOOD DESIGN

2_4 Beam

WoodWorks® Sizer 2019 (Update 4)

Page 2

Criterion	Analysis Value	Design	Value	Uni	t	Analy	sis/Des	sign
hear	fv = 66	Fv' =		psi			/Fv' =	
sending(+)	fb = 477	Fb' =		psi			/Fb' =	
ending(-)	fb = 512	Fb' =	538	psi		fb	/Fb' =	0.95
eflection:								
Interior Dead	0.00 = < L/999		- /0.00					0 0 0
Live	0.05 = < L/999	0.23 =		in				0.23
Total Cantil Dood	0.06 = < L/999	0.35 =	L/Z40	in				0.16
Cantil. Dead Live	0.01 = < L/999 0.12 = L/355	0.23 =	т /100	in				0.51
Total	0.12 = L/335 0.12 = L/339	0.23 = 0.35 =		in				0.31
10141	0.12 = 1/339	0.33 =	Ц/120	11				0.35
ditional Data.								
dditional Data:		~-	~-	<i>~ .</i>	~	a 6 1	~ '	
ACTORS: F/E(ps:			CF	Cfu	Cr	Cfrt	Ci	LC#
'v' 135 'b'+ 675	1.00 1.00 1.00 1.00 1.00 1.00		_ 1.000	_	_ 1.00	1.00 1.00	0.80 0.80	2 3
b'- 675	1.00 1.00 1.00			_	1.00	1.00	0.80	2
cp' 405	- 1.00 1.00		1.000	_	-	1.00	1.00	ے _
	illion 1.00 1.00		_	_	_	1.00	0.95	3
min' 0.40 mi			_	_	_	1.00	0.95	3
						1.00	0.90	5
	#2 = D + L							
	#3 = D + L (patte	ern:L)						
ending(-): LC								
	#3 = D + L (patte	ern: L_)	(live)					
	#3 = D + L (patternel)							
	port 1 - LC #3 = I		ttern:	L_)				
	port 2 - LC #2 = I							
	port 1 - LC #4 = I) + L (pa	ttern:	_L)				
=dead L=live								
	sted in the Analys			-				
	s=S/2, $X=L+S$ or I							
	ns: ASD Basic from	NASCE /-	10 2.4	\ IRC	2018 1	605.3.	T	
LCULATIONS:	1		4015 3	1 C			11. C.	
-	design = 2802 lbs	s; M(+) =	4815 l	.bs-it;	M(−)	= 5176	⊥bs-ft	-
EIy = 766.76		an alaa -l	laada (14	ام مد ا			
	on is due to all r n = 0.5 dead + "li		roads (⊥⊥ve,	wind,	S110W)		
	r = 0.5 dead + "1 cy(-): Lu = 7' I		11 // "	DD -	7 7. т	u baco	donfi	
LEIAI SLADIIII	-y(-): = 1 = 1	16 - IS -	тт . 44"	KD -	′•′ ; ⊥	iu base		arr shau

Design Notes:

 Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
 Please verify that the default deflection limits are appropriate for your application.

3. Continuous or Cantilevered Beams: NDS Clause 4.2.5.5 requires that normal grading provisions be extended to the middle 2/3 of 2 span beams and to the full length of cantilevers and other spans.

4. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

Wood	dworks SOFTWARE FOR WOOD DESIGN			2_5 Post Mar. 27, 2023 14:13	33
Loads:		Design Cheo WoodWorks	ck Calculation Sl Sizer 2019 (Update	heet 4)	
Load PDL PLL	Type Dead Live	Distribution Axial Axial	Location [ft] Start End (Ecc. = 0.00") (Ecc. = 0.00")	Magnitude Unit Start End 945 lbs 5710 lbs	
Reactions (Ibs ແລະອິ	€): 0'				8'
Unfactored: Lateral: Dead Live Axial: Dead Live Factored: L->R	945 5710				94 571
Load comb		Supp Total length: 8'; Volu e; Incised; Ke x Lb: 1	r (N), No.2, 6x6 (5- cort: Non-wood ume = 1.7 cu.ft.; Post .0 x 8.0 = 8.0 ft; Ke x GES the design code	: or timber : Ld: 1.0 x 8.0 = 8.0 ft;	#.

Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Va	lue	Design	Value	Uni	t	Analy	sis/De	sign
Axial	fc = 220)	Fc' =	394	psi		fc	:/Fc' =	0.56
Axial Bearing	fc = 220)	$Fc \star =$	460	psi		fc	Fc* =	0.48
Additional Data: FACTORS: F/E(psi Fc' 575 Fc* 575	1.00 1.00 1.00 1.00	Ct 1.00 1.00	CL/CP 0.856 -		Cfu - -		Cfrt 1.00 1.00	Ci 0.80 0.80	LC# 2 2
RITICAL LOAD CON	IBINATIONS:								
Axial : LC #	‡2 = D + L								
D=dead L=live									
All LC's are lis	sted in the A	nalys	is outpu	t					
Load combination	ns: ASD Basic	from	ASCE 7-	16 2.4	/ IBC	2018 2	L605.3.	1	

SOFTWARE FOR WOOD DESIGN

2_5 Post

WoodWorks® Sizer 2019 (Update 4)

Page 2

Design Notes:

 Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.
 Please verify that the default deflection limits are appropriate for your application.

WoodWorks® SOFTWARE FOR WOOD DESIGN	5642 E Mercer Way Mercer Island, WA 2_8 Exist Header Mar. 29, 2023 13:47	

Design Check Calculation Sheet WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	е	Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL				220.0		plf
LL	Live	Full UDL				600.0		plf

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

	<u>}</u>	8'-1.37"	
	کم 0'		8'
	0'		8'
Unfactored:			
Dead	893		893
Live	2434		2434
Factored:			
Total	3327		3327
Bearing:			
Capacity			
Beam	9857		985
Support	3327		3327
Des ratio	0.24		
Beam	0.34 1.00		0.34
Support Load comb	#2		1.00
Load Comb Length	#2 1.37		#2
Min req'd	1.37**		1.37**
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625
		governed by the required width of the supporting member.	
	3 - 3-	5 • • • 9 • • • • • • • • • • • • • • • • • • •	
		LSL, 1.55E, 2325Fb, 3-1/2"x9-1/4"	
		Supports: All - Timber-soft Beam, D.Fir-L (N) No.2	
		Total length: $8'-1.38"$; Clear span: $7'-10.63"$; Volume = 1.8 cu.ft.	
		Lateral support: top = at supports, bottom = at supports;	
		This section PASSES the design code check.	

SOFTWARE FOR WOOD DESIGN

2_8 Exist Header

WoodWorks® Sizer 2019 (Update 4)

Page 2

riterion	Analysis V		Design		Uni	t	Analys		
hear	fv = 12		Fv' =		psi		,		0.39
ending(+)	fb = 157		Fb' =	2270	psi		fb,	/Fb' =	0.69
ead Defl'n	0.03 = < L								
ive Defl'n	0.15 = L/		0.27 =		in				0.58
otal Defl'n	0.18 = L/	524	0.40 =	L/240	in				0.46
ditional Data:									
TORS: F/E(ps	i) CD CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	LC#
	1.00 -	1.00		_	-	-	1.00	-	2
'+ 2325			0.976	1.000	_	1.00	1.00		2
p' 2050		1.00	_	_	_	_	1.00	_	_
	illion -	1.00	-	-	-	_	1.00	_	2
iny' 0.80 m	illion -	1.00	-	-	-	-	1.00	-	2
TICAL LOAD CON	MBINATIONS:								
	#2 = D + L								
nding(+): LC									
flection: LC		(live)							
	#2 = D + L								
aring : Sup									
sup dead L=live	port 2 - LC	#Z = D	+ L						
l LC's are li	stad in the	Apolyci	c outou	+					
ad combinatio					/ TBC	2018 1	605 3	1	
CULATIONS:	110. 1100 DAST			10 2.1	, 100	2010 1		±	
max = 3280, V	design = 26	01 lbs:	M(+) =	6560 1	bs-ft				
EIy = 357.80						ect of	shear	defle	ction.
ive" deflecti									
	n = 0.5 dead			(- /	- /	,		
.al dellectio	II – U.J ueau								

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. FIRE RATING: LVL, PSL and LSL are not rated for fire endurance.

4. SCL: Structural composite lumber design has assumed: - dry service conditions - no preservative or fire-retardant treatment - no notches

5. SCL: Deflection is calculated using an apparent modulus of elasticity E that incorporates the effect of shear deflection.

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Design Check Calculation Sheet

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Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	.e	Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL				220.0		plf
LL	Live	Full UDL				600.0		plf

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

	4'-0.76" —	
	∑ 0'	¥ 4'
	0'	4'
Infactored:		
Dead	447	4
Live	1219	12
actored:		
Total	1666	16
earing:		
Capacity		
Beam	1666	16
Support	1845	18
Des ratio		
Beam	1.00	1.
Support	0.90	0.
Load comb	#2	
Length	0.76	0.
Min req'd	0.76	0.
Cb	1.00	1.
Cb min	1.00	1.
Cb support Fcp sup	1.11	1.
	625	6.

Lumber-soft, D.Fir-L (N), No.1/No.2, 4x8 (3-1/2"x7-1/4")

Supports: All - Timber-soft Beam, D.Fir-L (N) No.2

Total length: 4'-0.75"; Clear span: 3'-11.25"; Volume = 0.7 cu.ft. Incised; Lateral support: top = at supports, bottom = at supports;

This section PASSES the design code check.

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Criterion	Analysis Value	Design	Value	Uni	t	Analy	sis/Des	sign
Shear	fv = 66	Fv' =	144	psi		fv	/Fv' =	0.46
Bending(+)	fb = 642	Fb' =	880	psi		fb	/Fb' =	0.73
Dead Defl'n	0.00 = < L/999							
Live Defl'n	0.02 = < L/999	0.13 =		in				0.15
Total Defl'n	0.02 = < L/999	0.20 =	L/240	in				0.12
ditional Data:								
CTORS: F/E(ps	i) CD CM Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
v' 180	1.00 1.00 1.0			_	_	1.00	0.80	2
	1.00 1.00 1.0		1.300	_	1.00	1.00	0.80	2
	- 1.00 1.0		-	_		1.00	1.00	_
	illion 1.00 1.0		_	_	_	1.00	0.95	2
min' 0.58 m			_	_	_	1.00	0.95	2
RITICAL LOAD CON								
	#2 = D + L							
ending(+): LC	#2 = D + L							
eflection: LC		re)						
LC	#2 = D + L (tot	al)						
earing : Sup	port 1 - LC #2 =	D + L						
± .	port 2 - LC #2 =	D + L						
=dead L=live								
	sted in the Analy							
	ns: ASD Basic fro	m ASCE 7-	16 2.4	/ IBC	2018 1	605.3.	1	
LCULATIONS:								
	design = 1119 lk	s; M(+) =	: 1640 l	bs-ft				
EIy = 177.83								
	on is due to all		loads (live,	wind,	snow)		
	n = 0.5 dead + "]	-		_				
	ty(+): Lu = 4'	-	.88" R	в = 7.	6			

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.

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Design Check Calculation Sheet WoodWorks Sizer 2019 (Update 4)

Loads:

Load	Туре	Distribution	Pat-	Location	[ft]	Magnitud	е	Unit
			tern	Start	End	Start	End	
DL	Dead	Full UDL				180.0		plf
LL	Live	Full UDL				360.0		plf

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

	<u> </u>	4'-0.5"	
	1	ד ⁻ 0.0	1
]	
	X		×
	⊠ 0'		4 '
	Ū		
Unfactored:			
Dead	364		364
Live	728		728
Factored:			
Total	1091		1091
Bearing:			
Capacity			
Beam	1094		1094
Support	1211		1211
Des ratio	1 0 0		1 00
Beam	1.00		1.00
Support	0.90		0.90
Load comb	#2		#2
Length	0.50* 0.50*		0.50*
Min req'd Cb	1.00		
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625
		setting used: 1/2" for end supports	020
Winning Dean	ng iongtri		
		lumber-coft D Fir-1 (N) No 1/No 2 /y6 (3-1/2"y5-1/2")	
		Lumber-soft, D.Fir-L (N), No.1/No.2, 4x6 (3-1/2"x5-1/2")	
		Supports: All - Timber-soft Beam, D.Fir-L (N) No.2	
		Total length: 4'-0.5"; Clear span: 3'-11.5"; Volume = 0.5 cu.ft.	
		Incised; Lateral support: top = at supports, bottom = at supports;	
		This section PASSES the design code check.	

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Criterion	hear $fv = 64$		lue	Design	Value	Unit psi psi		Analysis/Design		
Shear				Fv' =	144			fv	0.44	
Bending(+)				Fb' =	884			fb/Fb' = 0.		
Dead Defl'n	0.01	, ,								
Live Defl'n				0.13 =					0.21 0.18	
Total Defl'n			999	0.20 =	L/240					
ditional Data:										
CTORS: F/E(ps	i) CD	СМ	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	LC#
v' 180		1.00	1.00		_	_	_	1.00		2
b'+ 850		1.00	1.00	1.000	1.300	_	1.00	1.00	0.80	2
ср' 625	_	1.00	1.00	-	-	-	-	1.00	1.00	-
' 1.6 m	illion	1.00	1.00	_	-	_	_	1.00	0.95	2
RITICAL LOAD CON	/IBINATIC	DNS:								
hear : LC	#2 = D	+ L								
ending(+): LC	#2 = D	+ L								
eflection: LC			(live)							
	#2 = D									
earing : Sup	-									
	port 2	- LC #2	2 = D	+ L						
=dead L=live			_							
ll LC's are li						(
oad combinatio	ns: ASD	Basic	from	ASCE 7-	16 2.4	/ IBC	2018 1	605.3.	1	
LCULATIONS:		0.0.1		2011	1000 11	<i>c</i> .				
max = 1080, V		= 821	lbs;	M(+) =	1080 lb	s-it				
EIY = 77.64 1]] . (1 /				
Live" deflecti otal deflectio					ιυaαs (ilve,	wina,	snow)		
			+ "' זי	70"						

Design Notes:

1. Analysis and design are in accordance with the ICC International Building Code (IBC 2018) and the National Design Specification (NDS 2018), using Allowable Stress Design (ASD). Design values are from the NDS Supplement.

2. Please verify that the default deflection limits are appropriate for your application.

3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.