March 12, 2024

Mr. Kendall Breunig
Sunset Investors
10700 W Venture Dr, Suite G1
Franklin, WI 53132

RE: 324 N 15th Street, Milwaukee, WI

Mr. Breunig:

At your request, Spire Engineering, Inc. ("Spire) has analyzed the existing timber framing at 324 North 15th Street in Milwaukee, Wisconsn because of concerns over its capacity.

You had the wood species identified as Red Pine by the Forest Products Lab in Madison, Wisconsin. Then you hired Wood Science Consulting of Millbrook New York to advise us on design values to use for the Red Pine. Using those structural properties, we have analyzed the floor joists, beams and the roof for use as both residential and commercial. Per Section 1607 of the *2015 International Building Code*, the design load for Residential use is 40 pounds per square foot; for Office use it is 65 psf; and for Retail it is 100 psf. Because the floors are very unlevel, we have added 15 psf of dead load for a system of Styrofoam and 2" of gypcrete for leveling the floors.

The building is L-shaped. The main north building area facing St Paul Ave is about 8,500 sf, and the southern portion is about 4,400 sf. The framing spans are different in the two areas, so there are separate calculations for each area. The floor joists are uniform in size on all floors, but the beam sizes get smaller as you go up higher in the building. Also, there was a fire on the south side of the building in about the year 2000. About half of the floor joists have been replaced with wood truss joists (TJIs). Visual grading of the original wood joists will still be done, but based on the knots in the beams, they will not be graded any higher than No 1, which is what we have used for our analysis. Additionally, there are water damaged beams and joists that will require further evaluation.

The results are:

North Side	Residential Use	Office Use	Snow Loads Use
Floor joists	Pass	Pass	
1st floor beams	Pass	Fail	
2nd floor beams	Pass	Fail	
3rd floor beams	Pass	Fail	
4th floor beams	Pass	Fail	
Roof beams	n/a	n/a	Fail

South Side	Residential Use	Office Use	Snow Loads
Floor joists	Pass	Fail	
TJI floor joists	Pass	Fail	
3rd floor beams	Pass	Fail	
4th floor beams	Pass	Fail	
Roof beams	n/a	n/a	Fail

No areas of the building capable of supporting Office floor loads, including the areas rebuilt with TJI's after the fire on the south side of the building. All floors of the building are capable of supporting Residential use. At one time, the building probably was capable of supporting an office load using a historical value of 50 psf for Live Load instead of the current required loading of 65 psf (50 psf Live Load plus 15 psf for Partitions per Section 1607.5). All of the roof framing beams will need to be reinforced.

There are no floor design loads that are less than residential.

Sincerely,

Spire Engineering, Inc.

Alan T. Rentmeester, P.E.
President | Senior Structural Engineer

ATR:bef

2024-03-12 timber structural analysis results.docx

Kendall Breunig

From: Arevalo Burbano, Jorge - FS, WI <Jorge.ArevaloBurbano@usda.gov>
Sent: Friday, February 16, 2024 12:45 PM
To: Kendall Breunig
Subject: Wood Identification Public Service
Attachments: Breunig.pdf

Dear Kendall Breunig,

Attached you will find our response regarding your submissions to the Wood Identification Public Service. Your specimen required more than the customary working time to identify.

Sincerely,

J. Rafael E. Arevalo B., PhD
Botanist-Collections Manager
Forest Service
Forest Products Laboratory, FPL-4715
p: 1-608-231-9492
Jorge.ArevaloBurbano@usda.gov
One Gifford Pinchot Drive
Madison, WI 53726
www.fs.fed.us

Caring for the land and serving people

This electronic message contains information generated by the USDA solely for the intended recipients. Any unauthorized interception of this message or the use or disclosure of the information it contains may violate the law and subject the violator to civil or criminal penalties. If you believe you have received this message in error, please notify the sender and delete the email immediately.

United States Department of Agriculture
Forest Service
Forest Products Laboratory
One Gifford Pinchot Dr.
Madison, WI 53726-2398

Date: February 16, 2024

Kendall Breunig
10700 W Venture Dr #G1
Franklin, WI 53132

Dear Kendall Breunig,

I have identified the specimen(s) you submitted to the Center for Wood Anatomy Research wood identification service. Your specimen(s) was/were received on 14-Feb-24 and identification(s) was/were completed on 14-Feb-24 the identification(s) is/are as follows:

1. *Pinus* sp. (Red Pine Group) 1st Floor Beam
2. *Pinus* sp. (White Pine Group) Bsmnt Beam
3. *Pinus* sp. (Red Pine Group) Joists

Respectfully,

Alex C. Wiedenhoeft, Ph.D.

The Forest Products Laboratory's website has a wealth of information about a broad range of topics related to wood.

By submitting specimens for identification, you have accepted the terms and conditions of the wood identification public service.

Kendall Breunig

From: Matt Anderson <matt@woodscienceconsulting.com>
Sent: Friday, February 16, 2024 2:30 PM
To: Kendall Breunig
Cc: Alan Rentmeester (atr@spireengineer.com)
Subject: Re: FW: Wood Identification Public Service

Below are the preliminary base design values for the timbers and joists. What would be very helpful for me to know before I prepare a proposal is what grade does not work for the desired loading conditions. The values provided below are base design values, seasoning adjustments of up to 20% may be applicable for the Fb in the timbers based upon the current moisture content levels in the timbers and joists.

Design Values for Red and White Pine Timbers (5x5 and larger)

Visual Grade	F_b (psi)	F_t (psi)	F_v (psi)	$F_{c//}$ (psi)	$F_{c\perp}$ (psi)	E (psi)	SG^3
SS	1,050	625	130	725	440	1,100,000	0.44
No. 1	875	450	130	600	440	1,100,000	
No. 2	575	300	130	375	440	900,000	

Design Values for Red and White Pine 12" Deep Joists (2" to 4" thick)

Visual Grade	F_b (psi)	F_t (psi)	F_v (psi)	$F_{c//}$ (psi)	$F_{c\perp}$ (psi)	E (psi)	SG^3
SS	1,300	575	135	1,200	335	1,300,000	0.36
No. 1	875	400	135	1,050	335	1,200,000	
No. 2	775	350	135	1,000	335	1,100,000	
No. 3	450	200	135	575	335	1,000,000	

Matt Anderson
Wood Science Consulting
PO Box 1381
20 Ciferri Drive
Millbrook, NY 12545
o: 845-605-1225 m: 914-489-6727
www.woodscienceconsulting.com

BRIAN JENDUSA

On Fri, Feb 16, 2024 at 3:08 PM Kendall Breunig <ken@sunsetinvestors.com> wrote:

Breunig Engineering, Inc.
10700 W Venture Drive, Ste G1
Franklin WI 53132-2804
414-529-8352

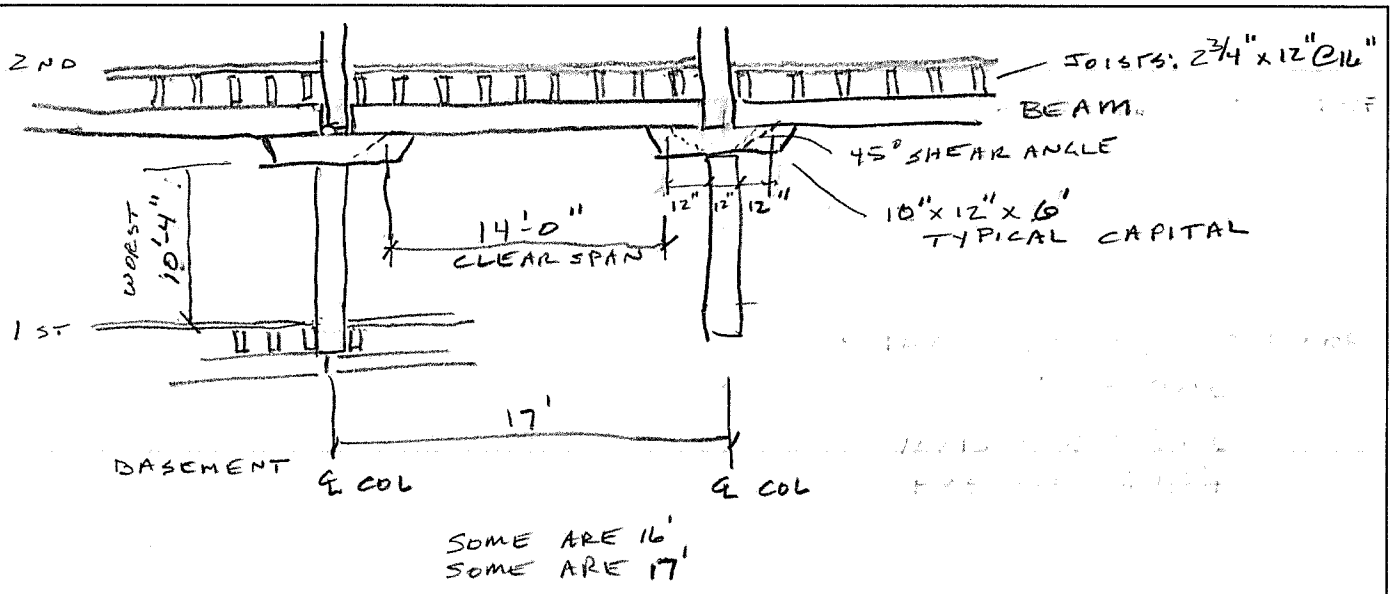
JOB 324 N. 15th ST

SHEET NO. _____ OF _____

CALCULATED BY KLB DATE 2/5/24

CHECKED BY _____ DATE _____

SCALE _____



SOME ARE 16'
SOME ARE 17'

NORTH WING

	COLUMNS	BEAM	CAPITAL
B/ST	10x12	12x16	10x12x6'
2ND	12x14	12x16	12x12x6'
3RD	12x12	12x16	
4th	10x12	10x16	
ROOF	8x8	8x12	8"x12"x6'

2/28/24

SOUTH WING

SECTION SIMILAR
COL CENTERS = 16' CLEAR SPAN = 13'
JOIST SPANS = 17'

	BEAMS
3RD	12x16
4th	10x16
ROOF	8x12

SPIRE ENGINEERING, INC.

Project	Project Number
15th & St Paul	24011
By: AJT	Date: 3-8-24
	Sheet Number

SOUTH SECTION

- Check floor framing for office loading Vs residential loading

- Office
  - DL = 35 psf - (2" conc topping)
  - LL = 65 psf - (50 psf + 15 psf partition)

Roof Loading
- DL - 20 psf (assumed)
- SL - 25 psf (assumed)

Res
- DL = 35 psf (2" conc topping)
- LL = 40 psf

- Joist Design

Joist L = 17'-0"

Dm - 2¾" x 12" @ 16" OC

- Office - $\frac{fb}{Fb'} = 1.06$ - Fails

Res - $\frac{fb}{Fb'} = 0.81$ - OK

SPIRE ENGINEERING, INC.

Project		Project Number
15th & St. Paul		24011
By: AJT	Date: 3-8-24	Sheet Number:

SOUTH SECTION

Beam Design

Beam L = 13'-0"
trib Width = 17'-0"

- Roof - 8" x 12"
4th - 10" x 16"
3rd - 12" x 16"
2nd - Steel Beam

Roof

8"x12" - $\frac{fb}{Fb'}$ = 1.21 - Failed

4th

10x16 - Office - $\frac{fb}{Fb'}$ = 1.26 - Fail

- Res - $\frac{fb}{Fb'}$ = 0.94 - OK

3rd

12" x 16" - office - $\frac{fb}{Fb'}$ = 1.05 - Fail

- res - $\frac{fb}{Fb'}$ = 0.78 - OK

2nd

30" Steel Girder - Not checked

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
Mar. 8, 2024 15:49	Beam_13ft (3rd - Office Loading)

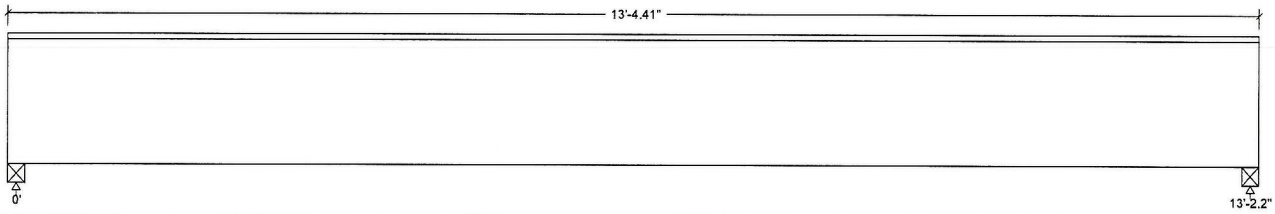
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(17.00')		psf
Load2	Live	Full Area				65.00(17.00')		psf
Self-weight	Dead	Full UDL				40.5		plf

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



Unfactored:			
Dead	4244		4244
Live	7386		7386
Factored:			
Total	11629		11629
Bearing:			
Capacity			
Beam	11629		11629
Support	16519		16519
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	2.20		2.20
Min req'd	2.20		2.20
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red & White, No.1, 12"x16" actual, 1-ply

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

Total length: 13'-4.41"; Clear span: 13'; volume = 17.8 cu.ft.

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

This section FAILS the design check

WARNING: This section violates the following design criteria: Bending

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 70	Fv' = 130	psi	fv/Fv' = 0.54
Bending(+)	fb = 886	Fb' = 847	psi	fb/Fb' = 1.05
Live Defl'n	0.17 = L/949	0.44 = L/360	in	0.38
Total Defl'n	0.31 = L/509	0.66 = L/240	in	0.47

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 11473, V design = 8993 lbs

Bending(+): LC #2 = D+L, M = 37815 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 4506e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow...)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Mar. 8, 2024 15:50	Beam_13ft (3rd - Res Loading)

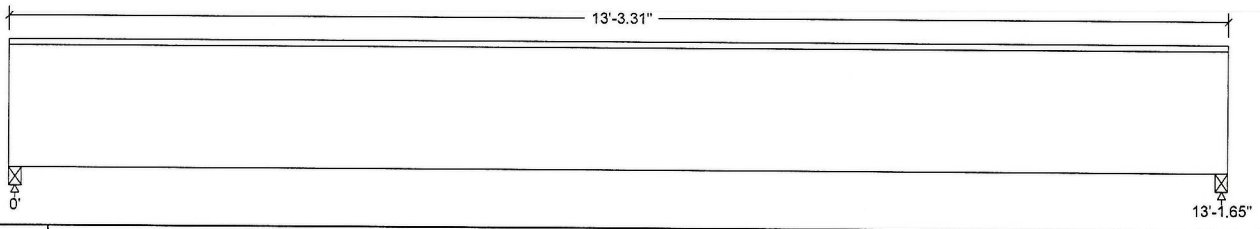
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(17.00')		psf
Load2	Live	Full Area				40.00(17.00')		psf
Self-weight	Dead	Full UDL				40.5		plf

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



Unfactored:			
Dead	4216		4216
Live	4514		4514
Factored:			
Total	8729		8729
Bearing:			
Capacity			
Beam	8729		8729
Support	12400		12400
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	1.65		1.65
Min req'd	1.65		1.65
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red & White, No.1, 12"x16" actual, 1-ply

Supports: All - Timber-sort Beam, D.Fir-L No.2

Total length: 13'-3.31"; Clear span: 13'; volume = 17.7 cu.ft.

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

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 53	Fv' = 130	psi	fv/Fv' = 0.41
Bending(+)	fb = 665	Fb' = 847	psi	fb/Fb' = 0.78
Live Defl'n	0.10 = <L/999	0.44 = L/360	in	0.23
Total Defl'n	0.24 = L/648	0.66 = L/240	in	0.37

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 8642, V design = 6797 lbs

Bending(+): LC #2 = D+L, M = 28383 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 4506e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

COMPANY	PROJECT
Mar. 8, 2024 15:49	Beam_13ft (4th - Office Loading)

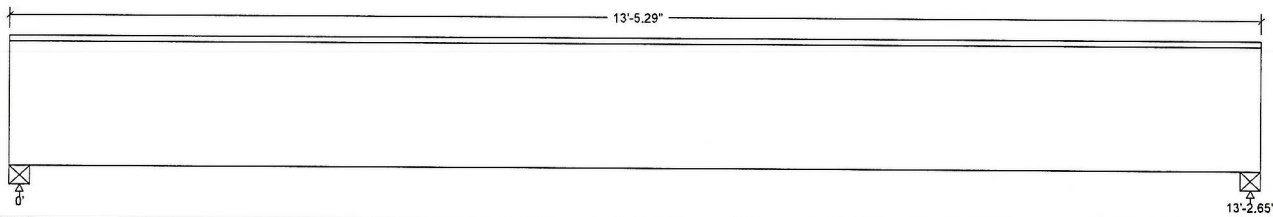
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00	(17.00')	psf
Load2	Live	Full Area				65.00	(17.00')	psf
Self-weight	Dead	Full UDL				33.8		plf

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



Unfactored:			
Dead	4222		4222
Live	7427		7427
Factored:			
Total	11649		11649
Bearing:			
Capacity			
Beam	11649		11649
Support	16546		16546
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	2.65		2.65
Min req'd	2.65		2.65
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red & White, No.1, 10"x16" actual, 1-ply

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

Total length: 13'-5.29"; Clear span: 13'; volume = 14.9 cu.ft.

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

This section FAILS the design check

WARNING: This section violates the following design criteria: Bending

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 84	Fv' = 130	psi	fv/Fv' = 0.65
Bending(+)	fb = 1065	Fb' = 847	psi	fb/Fb' = 1.26
Live Defl'n	0.20 = L/784	0.44 = L/360	in	0.46
Total Defl'n	0.37 = L/423	0.66 = L/240	in	0.57

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 11461, V design = 8958 lbs

Bending(+): LC #2 = D+L, M = 37881 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 3755e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Mar. 8, 2024 15:49	Beam_13ft (4th - Res Loading)

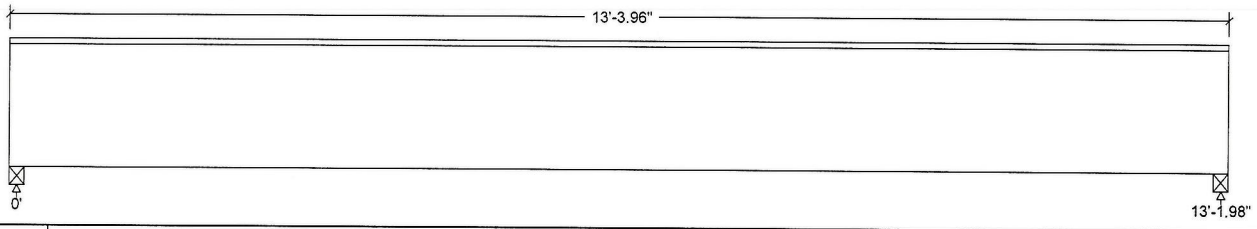
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00	(17.00')	psf
Load2	Live	Full Area				40.00	(17.00')	psf
Self-weight	Dead	Full UDL				33.8		plf

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



Unfactored:			
Dead	4188		4188
Live	4532		4532
Factored:			
Total	8721		8721
Bearing:			
Capacity			
Beam	8721		8721
Support	12387		12387
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	1.98		1.98
Min req'd	1.98		1.98
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red & White, No.1, 10"x16" actual, 1-ply

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

Total length: 13'-3.96"; Clear span: 13'; volume = 14.8 cu.ft.

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

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 63	Fv' = 130	psi	fv/Fv' = 0.49
Bending(+)	fb = 797	Fb' = 847	psi	fb/Fb' = 0.94
Live Defl'n	0.12 = <L/999	0.44 = L/360	in	0.28
Total Defl'n	0.29 = L/540	0.66 = L/240	in	0.44

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 8615, V design = 6762 lbs

Bending(+): LC #2 = D+L, M = 28355 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 3755e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow...)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Mar. 8, 2024 15:48	Beam_13ft (Roof Loading)

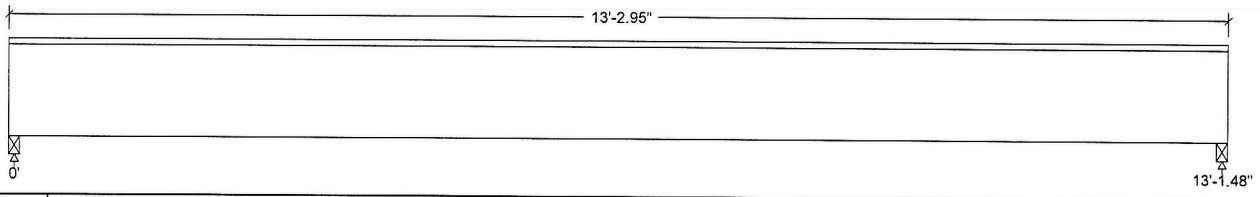
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				20.00(17.00')		psf
Load2	Live	Full Area				25.00(17.00')		psf
Self-weight	Dead	Full UDL				20.3		plf

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



Unfactored:			
Dead	2385		2385
Live	2815		2815
Factored:			
Total	5200		5200
Bearing:			
Capacity			
Beam	5200		5200
Support	7386		7386
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	1.48		1.48
Min req'd	1.48		1.48
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red & White, No.1, 8"x12" actual, 1-ply

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

Total length: 13'-2.95"; Clear span: 13'; volume = 8.8 cu.ft.

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

This section FAILS the design check

WARNING: This section violates the following design criteria: Bending

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 67	Fv' = 130	psi	fv/Fv' = 0.52
Bending(+)	fb = 1057	Fb' = 875	psi	fb/Fb' = 1.21
Live Defl'n	0.22 = L/703	0.44 = L/360	in	0.51
Total Defl'n	0.51 = L/309	0.66 = L/240	in	0.77

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 5153, V design = 4319 lbs

Bending(+): LC #2 = D+L, M = 16905 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 1267e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN

COMPANY	PROJECT
Mar. 8, 2024 15:48	Joist_17ft (Office Loading)

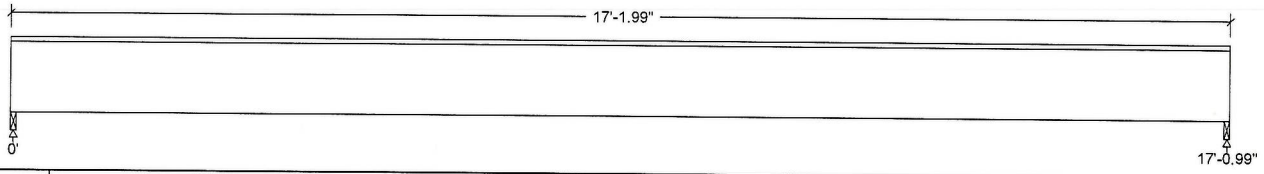
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pattern	Location [ft] Start	Location [ft] End	Magnitude Start	Magnitude End	Unit
Load1	Dead	Full Area				35.00(1.33')		psf
Load2	Live	Full Area				65.00(1.33')		psf
Self-weight	Dead	Full UDL				7.0		plf

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



Unfactored:			
Dead	460		460
Live	744		744
Factored:			
Total	1204		1204
Bearing:			
Capacity			
Beam	1204		1204
Support	1943		1943
Des ratio			
Beam	1.00		1.00
Support	0.62		0.62
Load comb	#2		#2
Length	0.99		0.99
Min req'd	0.99		0.99
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.14		1.14
Fcp sup	625		625

Special Lumber, Red & White, No.1, 2-3/4"x12", 1-ply

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

Total length: 17'-1.99"; Clear span: 17'; volume = 3.9 cu.ft.

Lateral support: top= full, bottom= at supports; Repetitive factor: applied where permitted (refer to online help);

This section FAILS the design check

WARNING: This section violates the following design criteria: Bending

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 48	Fv' = 130	psi	fv/Fv' = 0.37
Bending(+)	fb = 931	Fb' = 875	psi	fb/Fb' = 1.06
Live Defl'n	0.38 = L/537	0.57 = L/360	in	0.67
Total Defl'n	0.74 = L/278	0.85 = L/240	in	0.86

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.57 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 1198, V design = 1052 lbs

Bending(+): LC #2 = D+L, M = 5118 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 436e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Mar. 8, 2024 15:47	Joist_17ft (Res Loading)

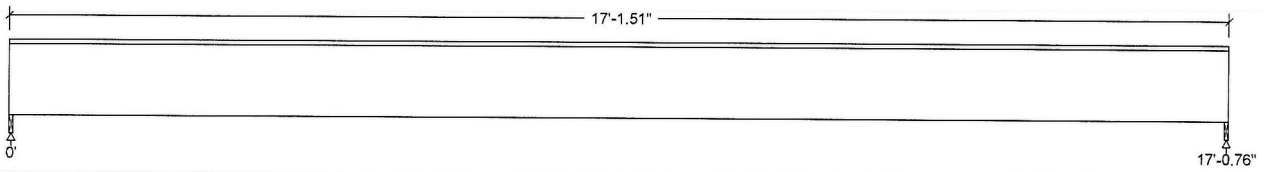
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(1.33')		psf
Load2	Live	Full Area				40.00(1.33')		psf
Self-weight	Dead	Full UDL				7.0		plf

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



Unfactored:			
Dead	459		459
Live	457		457
Factored:			
Total	916		916
Bearing:			
Capacity			
Beam	916		916
Support	1478		1478
Des ratio			
Beam	1.00		1.00
Support	0.62		0.62
Load comb	#2		#2
Length	0.76		0.76
Min req'd	0.76		0.76
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.14		1.14
Fcp sup	625		625

Special Lumber, Red & White, No.1, 2-3/4"x12", 1-ply

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

Total length: 17'-1.51"; Clear span: 17'; volume = 3.9 cu.ft.

Lateral support: top= full, bottom= at supports; Repetitive factor: applied where permitted (refer to online help);

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 36	Fv' = 130	psi	fv/Fv' = 0.28
Bending(+)	fb = 708	Fb' = 875	psi	fb/Fb' = 0.81
Live Defl'n	0.23 = L/876	0.57 = L/360	in	0.41
Total Defl'n	0.59 = L/349	0.85 = L/240	in	0.69

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.57 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 913, V design = 802 lbs

Bending(+): LC #2 = D+L, M = 3893 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 436e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

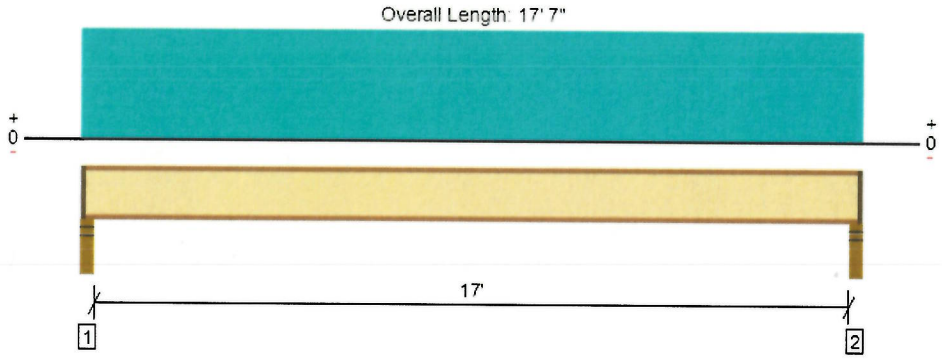
FORTEWEB

MEMBER REPORT

PASSED

Level, Floor: Joist

1 piece(s) 11 7/8" TJI® 360 @ 16" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	869 @ 2 1/2"	1202 (2.25")	Passed (72%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	850 @ 3 1/2"	1705	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3684 @ 8' 9 1/2"	6180	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.245 @ 8' 9 1/2"	0.429	Passed (L/841)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.460 @ 8' 9 1/2"	0.858	Passed (L/448)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	46	40	Passed	--	--

Member Length : 17' 4 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	2.25"	1.75"	410	469	879	1 1/4" Rim Board
2 - Stud wall - SPF	3.50"	2.25"	1.75"	410	469	879	1 1/4" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 10" o/c	
Bottom Edge (Lu)	17' 5" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 17' 7"	16"	35.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Adam Tuchscherer Spire (920) 312-3157 ajtuchscherer@gmail.com	

Weyerhaeuser

3/8/2024 9:09:20 PM UTC
ForteWEB v3.7, Engine: V8.4.0.40, Data: V8.1.5.0
File Name: 23106

SPIRE ENGINEERING, INC.

Project	Project Number
15th + St Paul	24011
By: ATT	Date:	Sheet Number:

NORTH SECTION

Joists

L = 15'-2"
Spacing = 16" OC

Loading - Res
DL = 35psf
LL = 40psf

Loading - Office
DL = 35psf
LL = 65psf

Roof (Assumed)
DL = 20psf
SL = 25psf

Office - OK $\frac{f_b}{F_b'} = 0.85$

Res - OK $\frac{f_b}{F_b'} = 0.64$

Beam

L = 14'-0"
trib width = 14'-8"

Roof 8" x 12" - $\frac{f_b}{F_b'} = 1.20$ - Failed

4th 10" x 16" - [Office - $\frac{f_b}{F_b'}$ 1.26 - Fail
Res - $\frac{f_b}{F_b'} = 0.94$ - OK]

3rd 11" x 16" - [Office - $\frac{f_b}{F_b'} = 1.14$ - Fail
Res - $\frac{f_b}{F_b'} = 0.86$ - OK]

2nd 12 x 16 - [Office - $\frac{f_b}{F_b'} = 1.05$ - Fail
Res - $\frac{f_b}{F_b'} = 0.79$ - OK]

1st - See 2nd floor results

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 15:17	Beam_14ft (2nd - Office Loading)

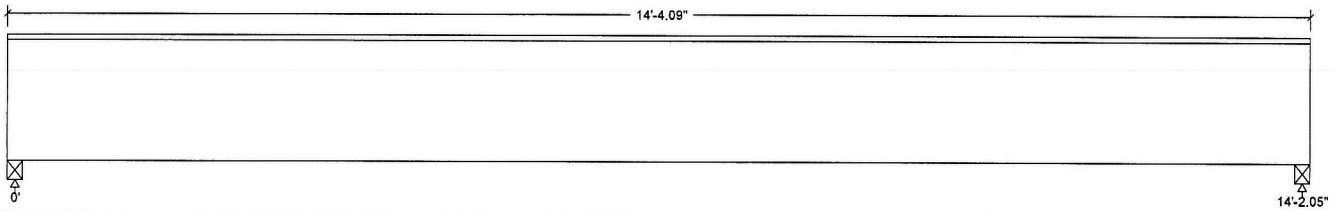
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(14.67')		psf
Load2	Live	Full Area				65.00(14.67')		psf
Self-weight	Dead	Full UDL				40.5		plf

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



Unfactored:			
Dead	3968		3968
Live	6836		6836
Factored:			
Total	10804		10804
Bearing:			
Capacity			
Beam	10804		10804
Support	15346		15346
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	2.05		2.05
Min req'd	2.05		2.05
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red&White, No.1, 12"x16" actual, 1-ply

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

Total length: 14'-4.09"; Clear span: 14'; volume = 19.1 cu.ft.

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

This section FAILS the design check

WARNING: This section violates the following design criteria: Bending

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 67	Fv' = 130	psi	fv/Fv' = 0.51
Bending(+)	fb = 887	Fb' = 847	psi	fb/Fb' = 1.05
Live Defl'n	0.19 = L/885	0.47 = L/360	in	0.41
Total Defl'n	0.36 = L/473	0.71 = L/240	in	0.51

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 10679, V design = 8541 lbs

Bending(+): LC #2 = D+L, M = 37832 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 4506e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 15:18	Beam_14ft (2nd - Res Loading)

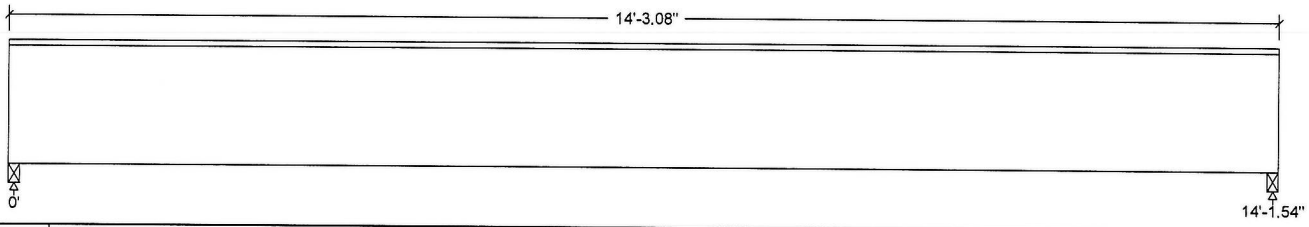
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(14.67')		psf
Load2	Live	Full Area				40.00(14.67')		psf
Self-weight	Dead	Full UDL				40.5		plf

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



Unfactored:			
Dead	3945		3945
Live	4182		4182
Factored:			
Total	8127		8127
Bearing:			
Capacity			
Beam	8127		8127
Support	11544		11544
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	1.54		1.54
Min req'd	1.54		1.54
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red&White, No.1, 12"x16" actual, 1-ply

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

Total length: 14'-3.08"; Clear span: 14'; volume = 19.0 cu.ft.

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

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 50	Fv' = 130	psi	fv/Fv' = 0.39
Bending(+)	fb = 667	Fb' = 847	psi	fb/Fb' = 0.79
Live Defl'n	0.12 = <L/999	0.47 = L/360	in	0.25
Total Defl'n	0.28 = L/601	0.71 = L/240	in	0.40

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 8057, V design = 6463 lbs

Bending(+): LC #2 = D+L, M = 28457 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 4506e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 15:15	Beam_14ft (3rd - Office Loading)

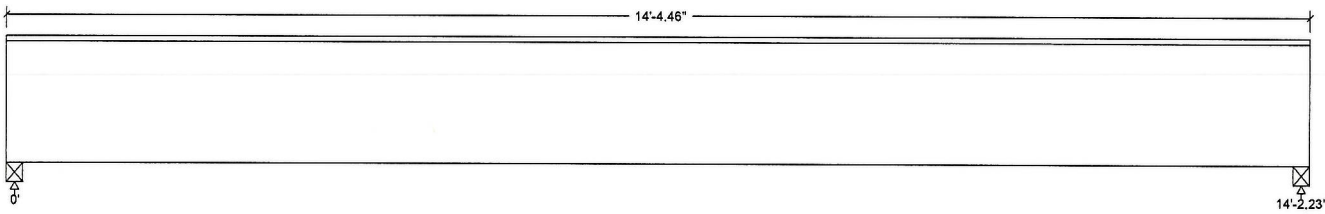
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00 (14.67')		psf
Load2	Live	Full Area				65.00 (14.67')		psf
Self-weight	Dead	Full UDL				37.1		plf

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



Unfactored:			
Dead	3952		3952
Live	6851		6851
Factored:			
Total	10803		10803
Bearing:			
Capacity			
Beam	10803		10803
Support	15345		15345
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	2.23		2.23
Min req'd	2.23		2.23
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red&White, No.1, 11"x16" actual, 1-ply

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

Total length: 14'-4.46"; Clear span: 14'; volume = 17.6 cu.ft.

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

This section FAILS the design check

WARNING: This section violates the following design criteria: Bending

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING. Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 73	Fv' = 130	psi	fv/Fv' = 0.56
Bending(+)	fb = 967	Fb' = 847	psi	fb/Fb' = 1.14
Live Defl'n	0.21 = L/809	0.47 = L/360	in	0.44
Total Defl'n	0.39 = L/433	0.71 = L/240	in	0.55

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 10667, V design = 8522 lbs

Bending(+): LC #2 = D+L, M = 37830 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 4130e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow...)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 15:16	Beam_14ft (3rd - Res Loading)

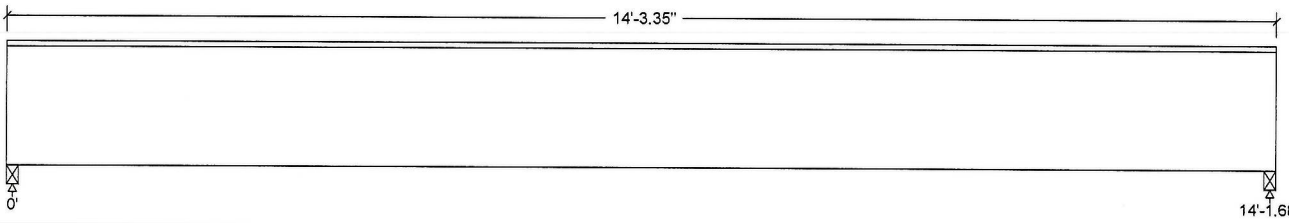
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(14.67')		psf
Load2	Live	Full Area				40.00(14.67')		psf
Self-weight	Dead	Full UDL				37.1		plf

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



Unfactored:			
Dead	3928		3928
Live	4189		4189
Factored:			
Total	8116		8116
Bearing:			
Capacity			
Beam	8116		8116
Support	11529		11529
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	1.68		1.68
Min req'd	1.68		1.68
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red&White, No.1, 11"x16" actual, 1-ply

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

Total length: 14'-3.35"; Clear span: 14'; volume = 17.5 cu.ft.

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

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 55	Fv' = 130	psi	fv/Fv' = 0.42
Bending(+)	fb = 727	Fb' = 847	psi	fb/Fb' = 0.86
Live Defl'n	0.13 = <L/999	0.47 = L/360	in	0.27
Total Defl'n	0.31 = L/551	0.71 = L/240	in	0.44

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 8039, V design = 6444 lbs

Bending(+): LC #2 = D+L, M = 28419 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 4130e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 15:10	Beam_14ft (4th - Office Loading)

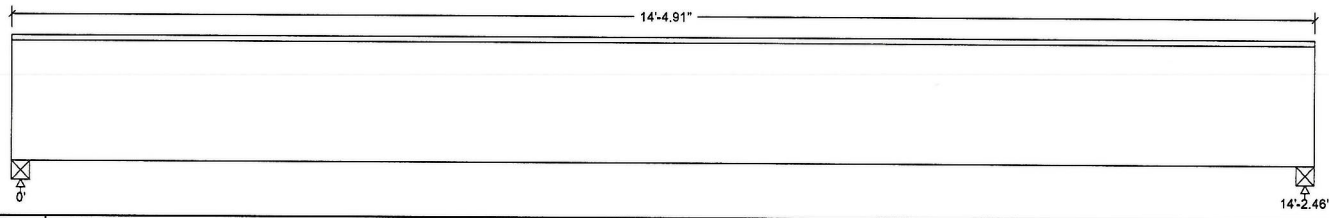
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(14.67')		psf
Load2	Live	Full Area				65.00(14.67')		psf
Self-weight	Dead	Full UDL				33.8		plf

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



Unfactored:			
Dead	3938		3938
Live	6869		6869
Factored:			
Total	10807		10807
Bearing:			
Capacity			
Beam	10807		10807
Support	15351		15351
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	2.46		2.46
Min req'd	2.46		2.46
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red&White, No.1, 10"x16" actual, 1-ply

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

Total length: 14'-4.91"; Clear span: 14'; volume = 16.0 cu.ft.

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

This section FAILS the design check

WARNING: This section violates the following design criteria: Bending

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 80	Fv' = 130	psi	fv/Fv' = 0.61
Bending(+)	fb = 1064	Fb' = 847	psi	fb/Fb' = 1.26
Live Defl'n	0.23 = L/732	0.47 = L/360	in	0.49
Total Defl'n	0.43 = L/393	0.71 = L/240	in	0.61

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 10657, V design = 8503 lbs

Bending(+): LC #2 = D+L, M = 37844 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 3755e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 15:14	Beam_14ft (4th - Res Loading)

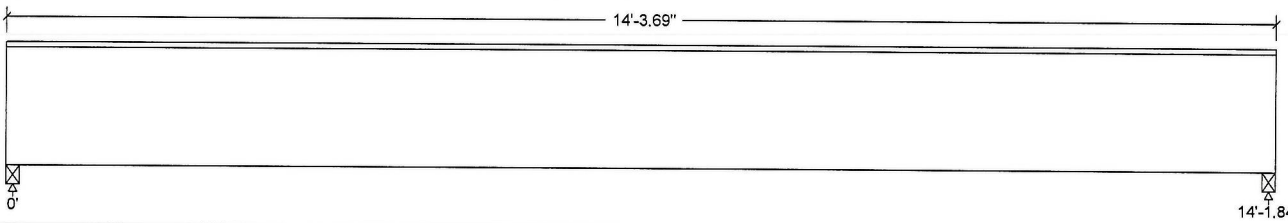
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(14.67')		psf
Load2	Live	Full Area				40.00(14.67')		psf
Self-weight	Dead	Full UDL				33.8		plf

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



Unfactored:			
Dead	3911		3911
Live	4197		4197
Factored:			
Total	8108		8108
Bearing:			
Capacity			
Beam	8108		8108
Support	11517		11517
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	1.84		1.84
Min req'd	1.84		1.84
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red&White, No.1, 10"x16" actual, 1-ply

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

Total length: 14'-3.69"; Clear span: 14'; volume = 15.9 cu.ft.

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

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 60	Fv' = 130	psi	fv/Fv' = 0.46
Bending(+)	fb = 798	Fb' = 847	psi	fb/Fb' = 0.94
Live Defl'n	0.14 = <L/999	0.47 = L/360	in	0.30
Total Defl'n	0.34 = L/501	0.71 = L/240	in	0.48

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	0.969	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 8023, V design = 6425 lbs

Bending(+): LC #2 = D+L, M = 28390 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 3755e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 15:08	Beam_14ft (Roof - Office Loading)

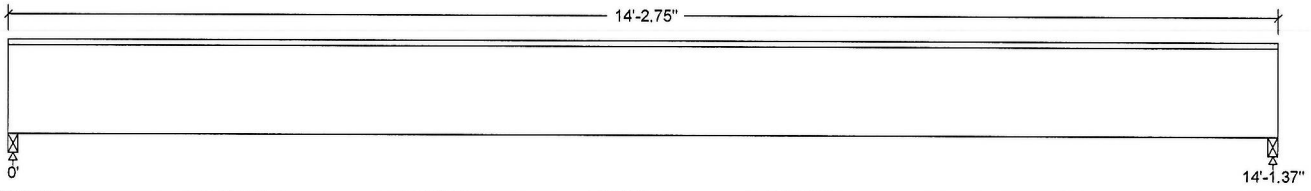
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				20.00(14.67')		psf
Load2	Live	Full Area				25.00(14.67')		psf
Self-weight	Dead	Full UDL				20.3		plf

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



Unfactored:			
Dead	2230		2230
Live	2609		2609
Factored:			
Total	4839		4839
Bearing:			
Capacity			
Beam	4839		4839
Support	6873		6873
Des ratio			
Beam	1.00		1.00
Support	0.70		0.70
Load comb	#2		#2
Length	1.37		1.37
Min req'd	1.37		1.37
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

Special Lumber, Red&White, No.1, 8"x12" actual, 1-ply

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

Total length: 14'-2.75"; Clear span: 14'; volume = 9.5 cu.ft.

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

This section FAILS the design check

WARNING: This section violates the following design criteria: Bending

WARNING: this CUSTOM SIZE is not in the database. Refer to online help.

WARNING: Your custom section is too thick for the lumber grade properties from Table 4A/B.Select a timber material with properties from Table 4D instead.

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 64	Fv' = 130	psi	fv/Fv' = 0.49
Bending(+)	fb = 1059	Fb' = 875	psi	fb/Fb' = 1.21
Live Defl'n	0.26 = L/655	0.47 = L/360	in	0.55
Total Defl'n	0.59 = L/287	0.71 = L/240	in	0.84

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 4801, V design = 4082 lbs

Bending(+): LC #2 = D+L, M = 16940 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 1267e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 14:55	Joist_15.17ft (Office Loading)

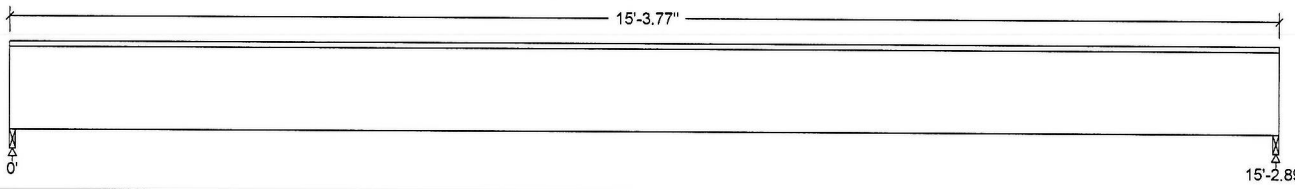
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(1.33')		psf
Load2	Live	Full Area				65.00(1.33')		psf
Self-weight	Dead	Full UDL				7.0		plf

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



Unfactored:			
Dead	410		410
Live	663		663
Factored:			
Total	1074		1074
Bearing:			
Capacity			
Beam	1074		1074
Support	1733		1733
Des ratio			
Beam	1.00		1.00
Support	0.62		0.62
Load comb	#2		#2
Length	0.89		0.89
Min req'd	0.89		0.89
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.14		1.14
Fcp sup	625		625

Special Lumber, Red&White, No.1, 2-3/4"x12", 1-ply

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

Total length: 15'-3.77"; Clear span: 15'-2"; volume = 3.5 cu.ft.

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

WARNING: Member length exceeds typical stock length of 0.0 [ft]

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 42	Fv' = 130	psi	fv/Fv' = 0.32
Bending(+)	fb = 740	Fb' = 875	psi	fb/Fb' = 0.85
Live Defl'n	0.24 = L/757	0.51 = L/360	in	0.48
Total Defl'n	0.47 = L/392	0.76 = L/240	in	0.61

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.57 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 1069, V design = 923 lbs

Bending(+): LC #2 = D+L, M = 4073 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 436e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow...)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY	PROJECT
	Feb. 20, 2024 14:59	Joist_15.17ft (Res Loading)

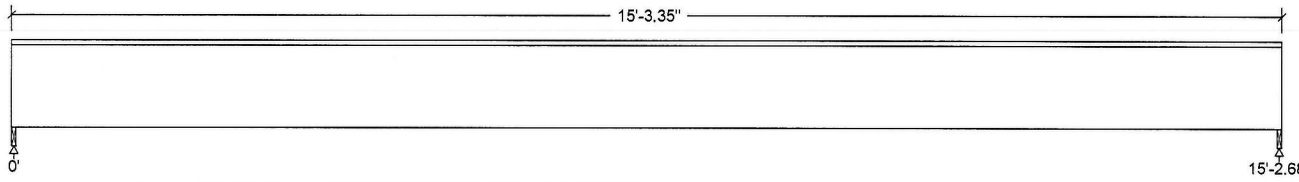
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area				35.00(1.33')		psf
Load2	Live	Full Area				40.00(1.33')		psf
Self-weight	Dead	Full UDL				7.0		plf

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



Unfactored:			
Dead	409		409
Live	407		407
Factored:			
Total	817		817
Bearing:			
Capacity			
Beam	817		817
Support	1319		1319
Des ratio			
Beam	1.00		1.00
Support	0.62		0.62
Load comb	#2		#2
Length	0.68		0.68
Min req'd	0.68		0.68
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.14		1.14
Fcp sup	625		625

Special Lumber, Red&White, No.1, 2-3/4"x12", 1-ply

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

Total length: 15'-3.35"; Clear span: 15'-2"; volume = 3.5 cu.ft.

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

WARNING: Member length exceeds typical stock length of 0.0 [ft]

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 32	Fv' = 130	psi	fv/Fv' = 0.25
Bending(+)	fb = 563	Fb' = 875	psi	fb/Fb' = 0.64
Live Defl'n	0.15 = <L/999	0.51 = L/360	in	0.29
Total Defl'n	0.37 = L/492	0.76 = L/240	in	0.49

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	130	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.00	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	440	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.1 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.57 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V max = 814, V design = 704 lbs

Bending(+): LC #2 = D+L, M = 3098 lbs-ft

Deflection: LC #2 = D+L (live)

LC #2 = D+L (total)

D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake

All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2015

CALCULATIONS:

Deflection: EI = 436e06 lb-in2

"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)

Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design 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. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.