

STRUCTURAL CALCULATIONS

For

**640 West Main Street
Lake Geneva, Wisconsin**

by



Date: May 2, 2017



Index

DESIGN DATA	DD
ROOF FRAMING	RF
FLOOR FRAMING	FF
WOOD COLUMNS	WC
LATERAL DESIGN	LD

Code Search**Code:** International Building Code 2009**Occupancy:**

Occupancy Group = R Residential

Occupancy Category & Importance Factors:

Occupancy Category = II

Wind factor = 1.00

Snow factor = 1.00

Seismic factor = 1.00

Type of Construction:

Fire Rating:

Roof = 0.0 hr

Floor = 0.0 hr

Building Geometry:Roof angle (θ) 6.00 / 12 26.6 deg

Building length (L) 50.0 ft

Least width (B) 40.0 ft

Mean Roof Ht (h) 28.0 ft

Parapet ht above grd 0.0 ft

Minimum parapet ht 0.0 ft

Live Loads:

Roof 0 to 200 sf: 18 psf
 200 to 600 sf: 21.6 - 0.018Area, but not less than 12 psf
 over 600 sf: 12 psf

Floor:

Typical Floor 40 psf

Partitions 15 psf

Public rooms & corridors serving the 100 psf

Corridors above first floor 80 psf

Balconies (exterior) - same as occup 40 psf

Storage warehouses: Light 125 psf

Wind Loads :

ASCE 7 - 05

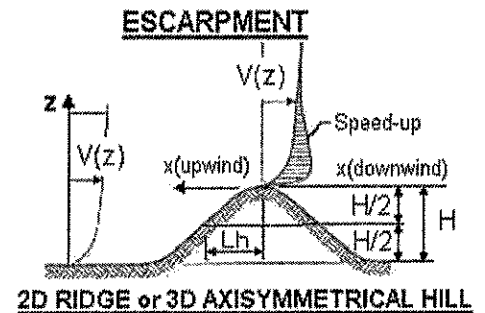
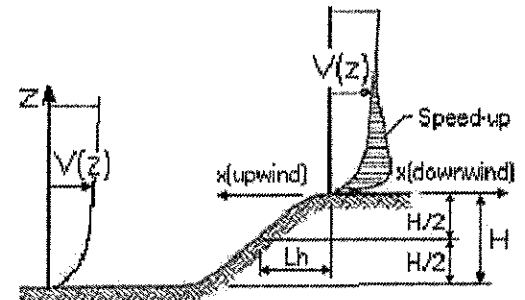
Basic Wind Speed 90 mph
Importance Factor 1.00
Occupancy Category II
Exposure Category C
Enclosure Classif. Enclosed Building
Internal pressure +/-0.18
Directionality (Kd) 0.85
Kh case 1 0.968
Kh case 2 0.968
Type of roof Gable

Topographic Factor (Kzt)

Topography Flat
Hill Height (H) 80.0 ft
Half Hill Length (Lh) 100.0 ft
Actual H/Lh = 0.80
Use H/Lh = 0.50
Modified Lh = 160.0 ft
From top of crest: x = 50.0 ft
Bldg up/down wind? downwind
H/Lh = 0.50 K₁ = 0.000
x/Lh = 0.31 K₂ = 0.792
z/Lh = 0.18 K₃ = 1.000

At Mean Roof Ht:

$$K_{zt} = (1 + K_1 K_2 K_3)^2 = 1.00$$



Gust Effect Factor

h = 28.0 ft
B = 40.0 ft
/z (0.6h) = 16.8 ft

Flexible structure if natural frequency < 1 Hz (T > 1 second).

However, if building h/B < 4 then probably rigid structure (rule of thumb).

h/B = 0.70 Rigid structure

G = 0.85 Using rigid structure default

Rigid Structure

$\bar{\sigma} = 0.20$
 $\ell = 500$ ft
 $z_{min} = 15$ ft
c = 0.20
 $g_Q, g_v = 3.4$
 $L_z = 436.8$ ft
Q = 0.91
 $I_z = 0.22$
G = 0.88 use G = 0.85

Flexible or Dynamically Sensitive Structure

Natural Frequency (η_1) = 0.0 Hz
Damping ratio (β) = 0
 $/b = 0.65$
 $/\alpha = 0.15$
 $V_z = 77.3$
 $N_1 = 0.00$
 $R_n = 0.000$
 $R_h = 28.282$ $\eta = 0.000$ h = 28.0 ft
 $R_B = 28.282$ $\eta = 0.000$
 $R_L = 28.282$ $\eta = 0.000$
 $g_R = 0.000$
R = 0.000
G = 0.000

Enclosure Classification

Test for Enclosed Building: A building that does not qualify as open or partially enclosed.

Test for Open Building: All walls are at least 80% open.
 $A_o \geq 0.8A_g$

Test for Partially Enclosed Building:

Input		Test	
Ao	100000.0 sf	$A_o \geq 1.1A_{oi}$	YES
Ag	0.0 sf	$A_o > 4'$ or $0.01A_g$	YES
Aoi	0.0 sf	$A_{oi} / A_{gi} \leq 0.20$	NO
Agi	0.0 sf		

Building is NOT
Partially Enclosed

ERROR: Ag must be greater than Ao

Conditions to qualify as Partially Enclosed Building. Must satisfy all of the following:

- $A_o \geq 1.1A_{oi}$
- $A_o > \text{smaller of } 4' \text{ or } 0.01 A_g$
- $A_{oi} / A_{gi} \leq 0.20$

Where:

A_o = the total area of openings in a wall that receives positive external pressure.

A_g = the gross area of that wall in which A_o is identified.

A_{oi} = the sum of the areas of openings in the building envelope (walls and roof) not including A_o .

A_{gi} = the sum of the gross surface areas of the building envelope (walls and roof) not including A_g .

Reduction Factor for large volume partially enclosed buildings (R_i) :

If the partially enclosed building contains a single room that is unpartitioned , the internal pressure coefficient may be multiplied by the reduction factor R_i .

Total area of all wall & roof openings (A_{og}): 0 sf
Unpartitioned internal volume (V_i): 0 cf
 $R_i = 1.00$

Altitude adjustment to constant 0.00256 (caution - see code) :

Altitude = 0 feet Average Air Density = 0.0765 lbm/ft³
Constant = 0.00256

Wind Loads - MWFRS $h \leq 60'$ (Low-rise Buildings) Enclosed/partially enclosed only

$K_z = K_h$ (case 1) = 0.97
 Base pressure (qh) = **17.1 psf**
 $G C_{pi}$ = +/-0.18

Edge Strip (a) = 4.0 ft
 End Zone (2a) = 8.0 ft
 Zone 2 length = 20.0 ft

Wind Pressure Coefficients

Surface	Transverse Direction			Longitudinal Direction		
	Perpendicular $\theta = 26.6$ deg			Parallel $\theta = 0.0$		
	$G C_{pf}$	w/- $G C_{pi}$	w/+ $G C_{pi}$	$G C_{pf}$	w/- $G C_{pi}$	w/+ $G C_{pi}$
1	0.55	0.73	0.37	0.40	0.58	0.22
2	-0.10	0.08	-0.28	-0.69	-0.51	-0.87
3	-0.45	-0.27	-0.63	-0.37	-0.19	-0.55
4	-0.39	-0.21	-0.57	-0.29	-0.11	-0.47
5	-0.45	-0.27	-0.63	-0.45	-0.27	-0.63
6	-0.45	-0.27	-0.63	-0.45	-0.27	-0.63
1E	0.73	0.91	0.55	0.61	0.79	0.43
2E	-0.19	-0.01	-0.37	-1.07	-0.89	-1.25
3E	-0.58	-0.40	-0.76	-0.53	-0.35	-0.71
4E	-0.53	-0.35	-0.71	-0.43	-0.25	-0.61

Nominal Wind Surface Pressures (psf)

1	12.5	6.3	9.9	3.8
2	1.4	-4.8	-8.7	-14.8
3	-4.6	-10.7	-3.2	-9.4
4	-3.6	-9.7	-1.9	-8.0
5	-4.6	-10.7	-4.6	-10.7
6	-4.6	-10.7	-4.6	-10.7
1E	15.5	9.3	13.5	7.3
2E	-0.2	-6.3	-15.2	-21.3
3E	-6.9	-13.1	-6.0	-12.1
4E	-6.1	-12.2	-4.3	-10.4

Parapet

Windward parapet = 0.0 psf ($G C_{pn} = +1.5$)
 Leeward parapet = 0.0 psf ($G C_{pn} = -1.0$)

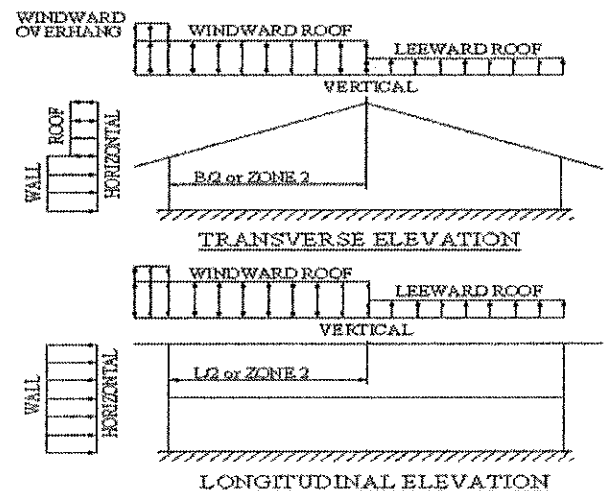
Windward roof overhangs = 11.6 psf (upward) add to windward roof pressure

Horizontal MWFRS Simple Diaphragm Pressures (psf)
Transverse direction (normal to L)

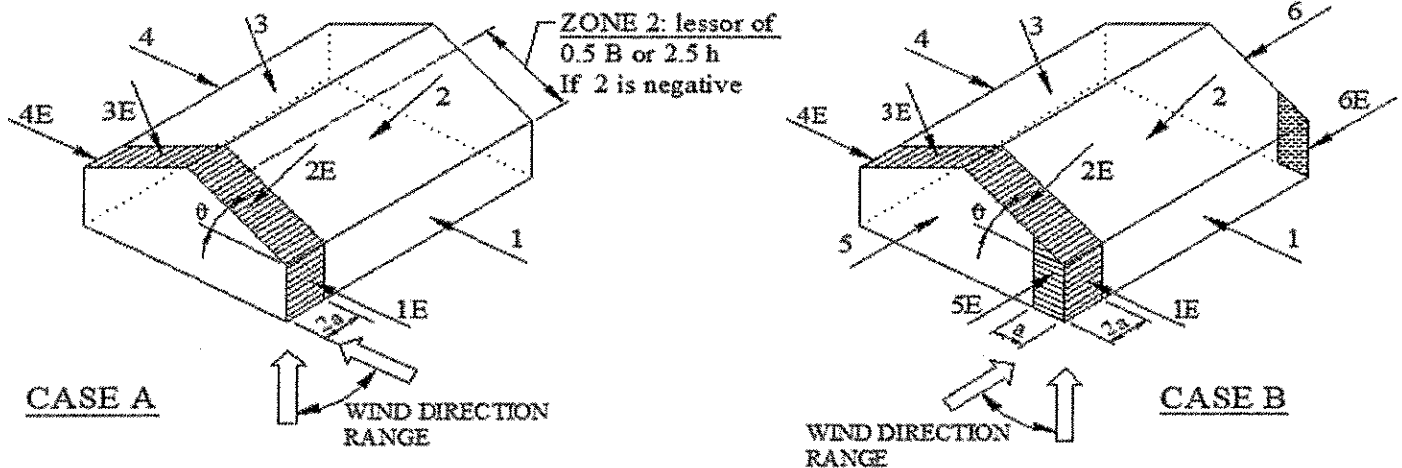
Interior Zone: Wall 16.0 psf
 Roof 5.9 psf
 End Zone: Wall 21.5 psf
 Roof 6.7 psf

Longitudinal direction (parallel to L)

Interior Zone: Wall 11.8 psf
 End Zone: Wall 17.7 psf

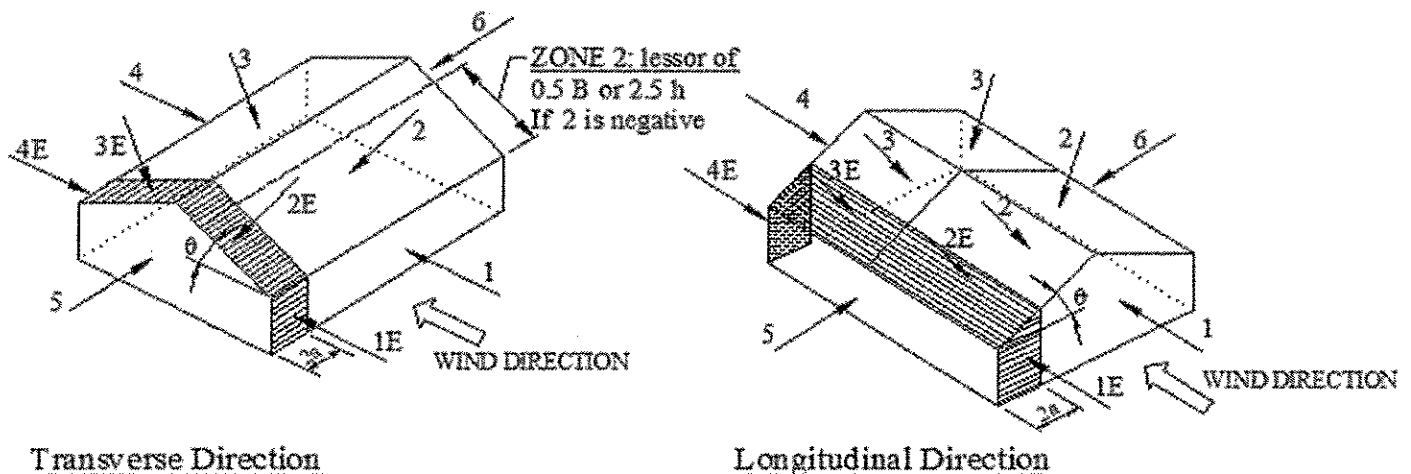


Location of MWFRS Wind Pressure Zones



NOTE: Torsional loads are 25% of zones 1 - 6. See code for loading diagram.

ASCE 7-99 and ASCE 7-10 (& later)



NOTE: Torsional loads are 25% of zones 1 - 4. See code for loading diagram.

ASCE 7-02 and ASCE 7-05

Address
City, State
Phone

JOB NO. _____ SHEET NO. _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____

Nominal Wind Pressures

Wind Loads - Components & Cladding : h ≤ 60'

Kh (case 1) = 0.97 h = 28.0 ft
Base pressure (qh) = **17.1 psf** a = 4.0 ft
Minimum parapet ht = 0.0 ft GCpi = +/-0.18
Roof Angle (θ) = 26.6 deg
Type of roof = Gable

Roof	Area	GCp +/- GCpi			Surface Pressure (psf)			User input	
		10 sf	50 sf	100 sf	10 sf	50 sf	100 sf	75 sf	500 sf
Negative Zone 1		-1.08	-1.01	-0.98	-18.4	-17.2	-16.7	-16.9	-16.7
Negative Zone 2		-1.88	-1.53	-1.38	-32.1	-26.1	-23.5	-24.6	-23.5
Negative Zone 3		-2.78	-2.36	-2.18	-47.4	-40.3	-37.2	-38.5	-37.2
Positive All Zones		0.68	0.54	0.48	11.6	10.0	10.0	10.0	10.0
Overhang Zone 2		-2.20	-2.20	-2.20	-37.5	-37.5	-37.5	-37.5	-37.5
Overhang Zone 3		-3.70	-2.86	-2.50	-63.1	-48.8	-42.7	-45.2	-42.7

Overhang pressures in the table above assume an internal pressure coefficient (GCpi) of 0.0

Parapet

qp = 0.0 psf

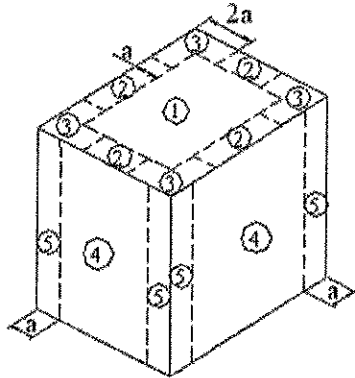
CASE A = pressure towards building (pos)
CASE B = pressure away from bldg (neg)

Solid Parapet Pressure	Surface Pressure (psf)			User input
	10 sf	100 sf	500 sf	40 sf
CASE A : Interior zone:	0.0	0.0	0.0	0.0
Corner zone:	0.0	0.0	0.0	0.0
CASE B : Interior zone:	0.0	0.0	0.0	0.0
Corner zone:	0.0	0.0	0.0	0.0

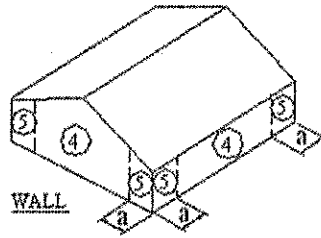
Walls

Area	GCp +/- GCpi			Surface Pressure (psf)			User input	
	10 sf	100 sf	500 sf	10 sf	100 sf	500 sf	25 sf	200 sf
Negative Zone 4	-1.28	-1.10	-0.98	-21.8	-18.8	-16.7	-20.6	-17.9
Negative Zone 5	-1.58	-1.23	-0.98	-27.0	-20.9	-16.7	-24.6	-19.1
Positive Zone 4 & 5	1.18	1.00	0.88	20.1	17.1	15.0	18.9	16.2

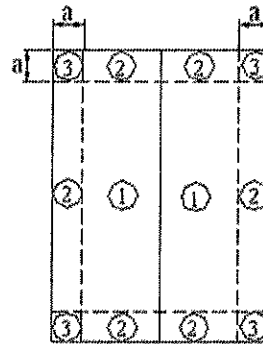
Location of C&C Wind Pressure Zones



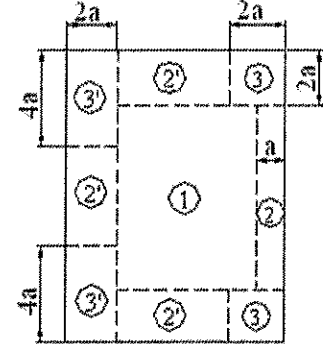
Roofs w/ $\theta \leq 10^\circ$
and all walls
 $h > 60'$



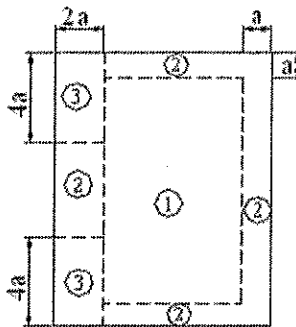
Walls $h \leq 60'$
& alt design $h < 90'$



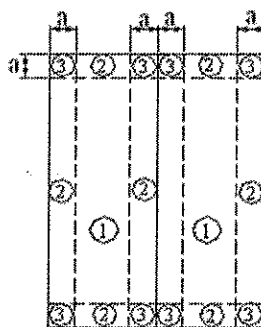
Gable, Sawtooth and
Multispan Gable $\theta \leq 7$ degrees &
Monoslope ≤ 3 degrees
 $h \leq 60'$ & alt design $h < 90'$



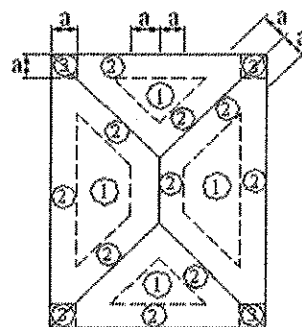
Monoslope roofs
 $3^\circ < \theta \leq 10^\circ$
 $h \leq 60'$ & alt design $h < 90'$



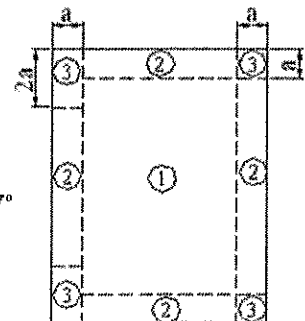
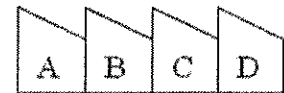
Monoslope roofs
 $10^\circ < \theta \leq 30^\circ$
 $h \leq 60'$ & alt design $h < 90'$



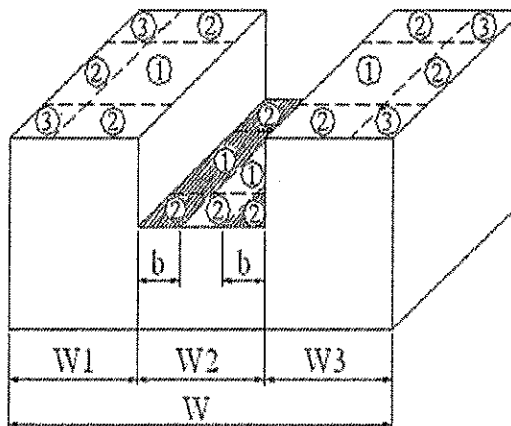
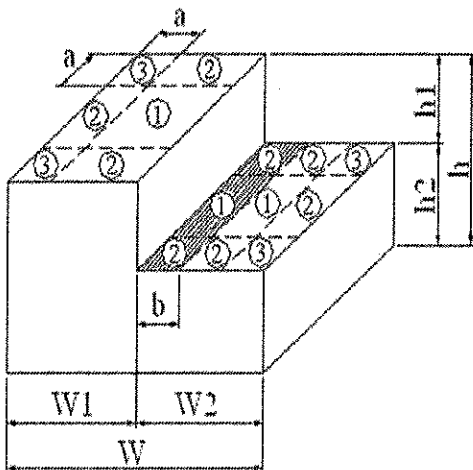
Multispan Gable &
Gable $7^\circ < \theta \leq 45^\circ$



Hip $7^\circ < \theta \leq 27^\circ$



Sawtooth $10^\circ < \theta \leq 45^\circ$
 $h \leq 60'$ & alt design $h < 90'$



Stepped roofs $\theta \leq 3^\circ$
 $h \leq 60'$ & alt design $h < 90'$

Snow Loads : ASCE 7-05

Nominal Snow Forces

Roof slope = 26.6 deg
 Horiz. eave to ridge dist (W) = 20.0 ft
 Roof length parallel to ridge (L) = 50.0 ft

Type of Roof Hip and gable w/ trussed systems
 Ground Snow Load $P_g = 30.0$ psf
 Occupancy Category = II
 Importance Factor $I = 1.0$
 Thermal Factor $C_t = 1.10$
 Exposure Factor $C_e = 1.0$

$P_f = 0.7 \cdot C_e \cdot C_t \cdot I \cdot P_g = 23.1$ psf
 Unobstructed Slippery Surface no

Sloped-roof Factor $C_s = 1.00$
 Balanced Snow Load $P_s = 23.1$ psf

Rain on Snow Surcharge Angle 0.40 deg
 Code Maximum Rain Surcharge 5.0 psf
 Rain on Snow Surcharge = 0.0 psf
 Ps plus rain surcharge = 23.1 psf
 Minimum Snow Load $P_{fmin} = 0.0$ psf

Uniform Roof Design Snow Load = 23.1 psf

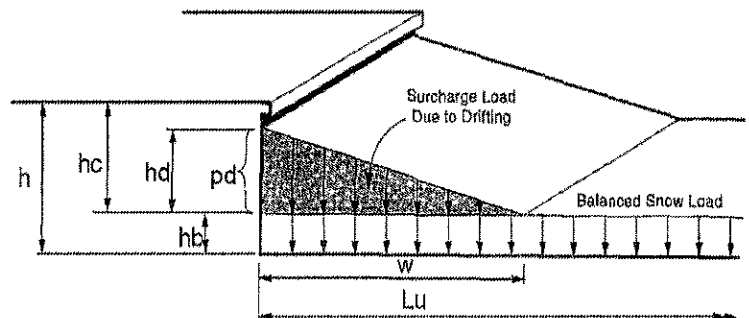
NOTE: Alternate spans of continuous beams and other areas shall be loaded with half the design roof snow load so as to produce the greatest possible effect - see code.

Unbalanced Snow Loads - for Hip & Gable roofs only

Required if slope is between 70.00 deg and larger of 2.38 degrees or $70/W + 0.5 = 4.00$ deg **Unbalanced snow loads must be applied**
 Windward snow load = 6.9 psf = $0.3P_s$
 Leeward snow load from ridge to 6.27' = 44.1 psf = $hdy / \sqrt{S} + P_s$
 Leeward snow load from 6.27' to the eave = 23.1 psf = P_s

Windward Snow Drifts 1 - Against walls, parapets, etc more than 15' long

Upwind fetch $l_u = 10.0$ ft
 Projection height $h = 12.0$ ft
 Snow density $g = 17.9$ pcf
 Balanced snow height $h_b = 1.29$ ft
 $h_d = 1.25$ ft
 $h_c = 10.71$ ft
 $h_c/h_b > 0.2 = 8.3$ **Therefore, design for drift**
 Drift height (h_d) = 1.25 ft
 Drift width $w = 4.99$ ft
 Surcharge load: $pd = \gamma \cdot h_d = 22.3$ psf
 Balanced Snow load: = 23.1 psf
 45.4 psf

**Windward Snow Drifts 2 - Against walls, parapets, etc > 15'**

Upwind fetch $l_u = 0.0$ ft
 Projection height $h = 0.0$ ft
 Snow density $g = 17.9$ pcf
 Balanced snow height $h_b = 1.29$ ft
 $h_d = 1.25$ ft
 $h_c = -1.29$ ft
 $h_c/h_b < 0.2 = -1.0$ **Therefore, no drift**
 Drift height (h_c) = 0.00 ft
 Drift width $w = -10.32$ ft
 Surcharge load: $pd = \gamma \cdot h_d = 0.0$ psf
 Balanced Snow load: = 23.1 psf
 23.1 psf

DESIGN DATA SUMMARY

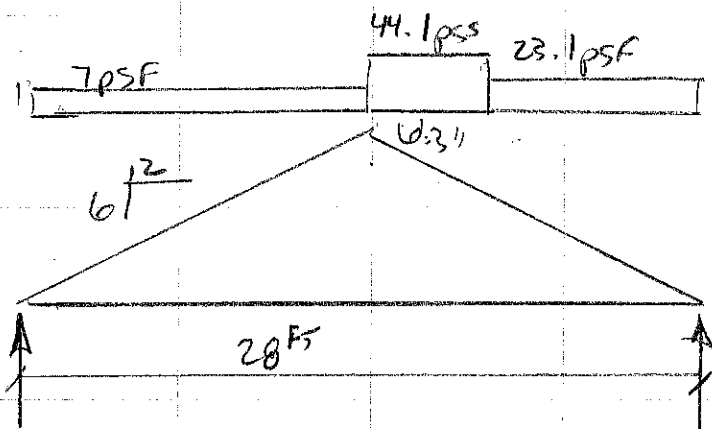
GRAVITY LOADS

ROOF

SNOW = 30psf
+ DRIFT AND/OR
UNBALANCE LOAD

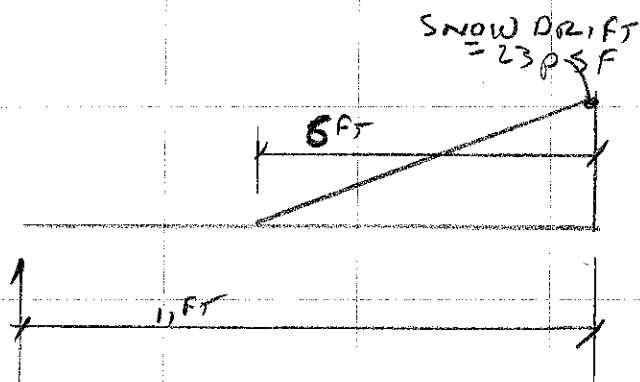
DEAD = 20psf

UNBALANCE SNOW



NOTE: UNIFORM
SNOW OF 30PSF
GOVERNS OVER UNBALANCE

SNOW DRIFT & FLAT AREA



FLOOR

LIVE LOAD = 40psf
DEAD LOAD = 15psf
PARTITION = 15psf

PATIO / DECKS

LIVE LOAD = 75psf
DEAD LOAD = 15psf

WIND

MWFRS = 17.2psf

CdC = 22psf (ZONE 4)
= 27psf (ZONE 5)

FOUNDATION DESIGN

EARTH PRESSURES

ACTIVE = 35psf/ft
AT REST = 55psf/ft

ASSUMED ALLOWABLE SOIL BRG = 2000psf

SERVICEABILITY

DEFLECTION LIMITS

ROOF

SNOW: $\Delta \leq L/360$

TOTAL $\Delta \leq L/240$

FLOOR

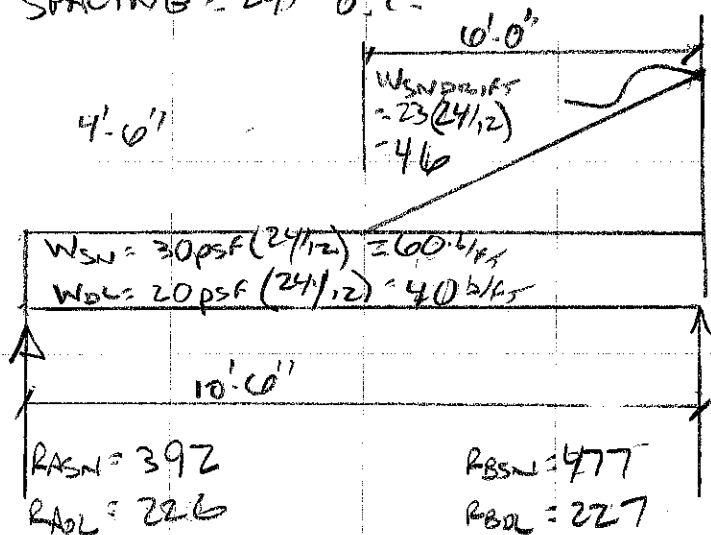
LIVE LOAD = $\Delta \leq L/480$

TOTAL LOAD = $\Delta \leq L/240$

NEW ROOF JOISTS

CRITICAL SPAN = 10'-0"

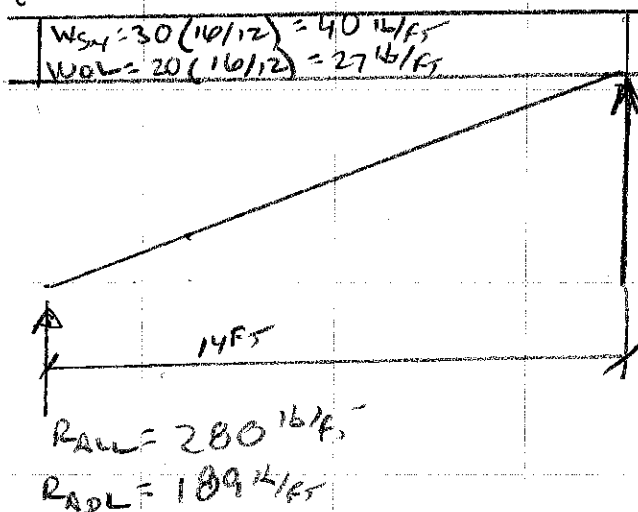
SPACING = 24" O.C.



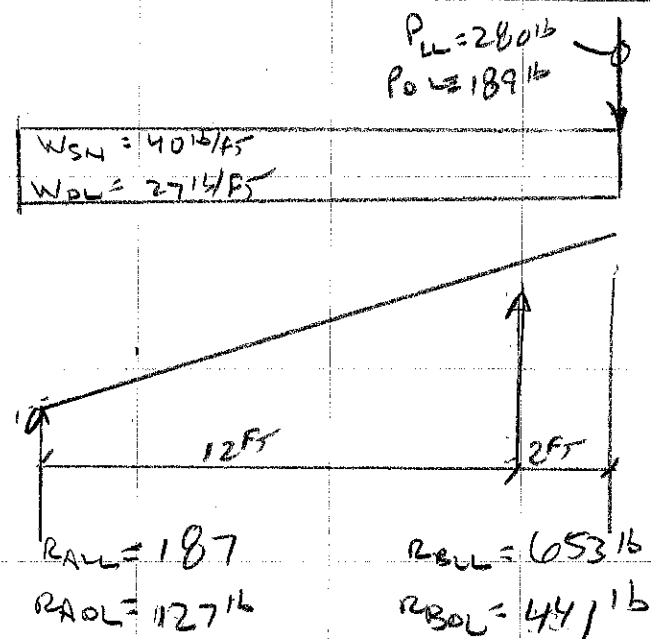
USE 2x10's @ 24"

EXISTING ROOF RAFTERS

(SPACING = 16" O.C.)



EXISTG. ROOF JOIST - NEW CANTILEVERED COND.



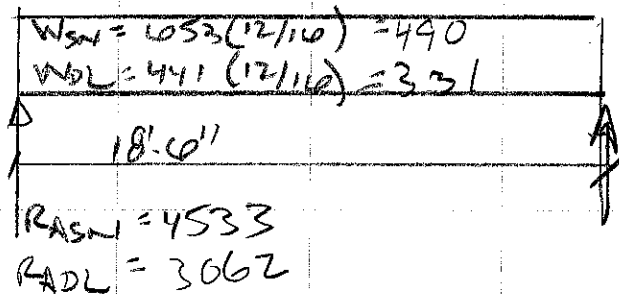
PROJECT LAKE GENEVA - VACATION RENTAL

DESCR. _____ PROJ. NO. _____

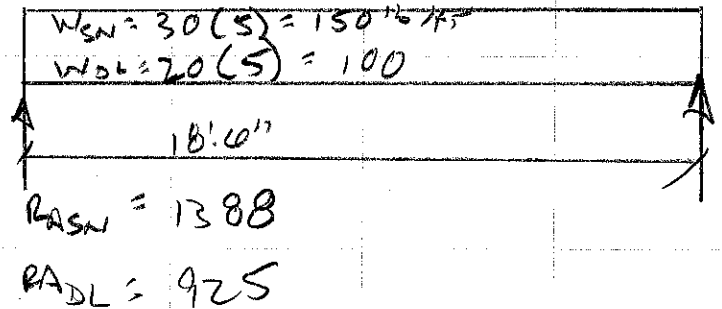
CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

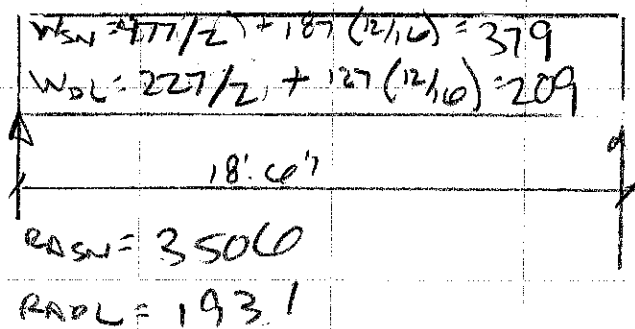
SCALE _____ SHEET NO. _____

NEW RIDGE BEAM (GRID LINE B)

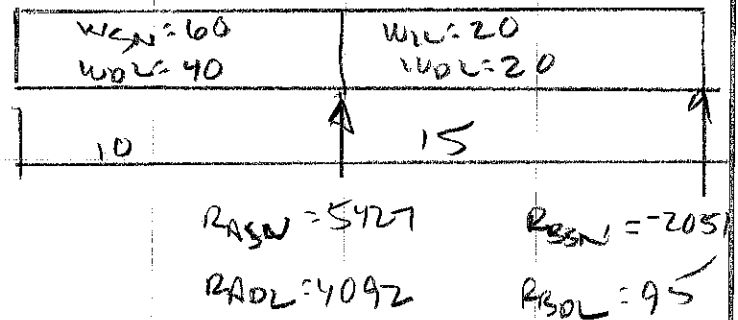
USE $5\frac{1}{2} \times 15$ GLULAM
DOUG FIR 24F. 1.8E
BALANCED

NEW RIM BEAM - LINE E-2NEW CANTILEVER ROOF BEAM

$P_{SN} = 2(1388) = 2776$
 $P_{DL} = 925(2) = 1850$

NEW BEAM @ EXISTING WALL (LINE C-2)

USE $5\frac{1}{2} \times 13\frac{1}{2}$ GLULAM
DOUG FIR 24F. 1.8E
BALANCED





WoodWorks®
SOFTWARE FOR WOOD DESIGN

COMPANY

PROJECT

May 1, 2017 03:26

New Roof Joists over Deck Area

Design Check Calculation Sheet

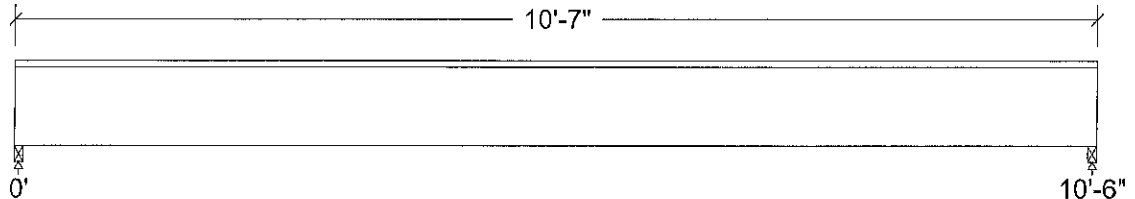
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Snow	Full UDL			69.0	plf
Load2	Dead	Full UDL			40.0	plf
Load3	Snow	Triangular		4.53 10.53	0.0 46.0	plf
Self-weight	Dead	Full UDL			2.8	plf

Load magnitude does not include Normal Importance factor from Table 4.2.3.2, which is applied during analysis.

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



Unfactored:			
Dead	226		227
Snow	392		477
Factored:			
Total	618		703
Bearing:			
Capacity			
Joist	618		703
Support	1136		1293
Anal/Des			
Joist	1.00		1.00
Support	0.54		0.54
Load comb	#2		#2
Length	0.97		1.10
Min req'd	0.97		1.10
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.25		1.25
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Roof Joists

Lumber-soft, S-P-F, No.1/No.2, 2x10 (1-1/2"x9-1/4")

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

Roof joist spaced at 16.0" c/c; Total length: 10'-7.0"; volume = 1.0 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 62$	$F_v' = 155$	psi	$f_v/F_v' = 0.40$
Bending(+)	$f_b = 943$	$F_b' = 1273$	psi	$f_b/F_b' = 0.74$
Live Defl'n	$0.16 = L/802$	$0.53 = L/240$	in	0.30
Total Defl'n	$0.28 = L/443$	$0.70 = L/180$	in	0.41

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Roof Joists over Deck Area

WoodWorks® Sizer 10.4

Page 2

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	135	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	875	1.15	1.00	1.00	1.000	1.100	1.00	1.15	1.00	1.00	-	2
Fcp'	425	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.4 million	-	1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.51 million	-	1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 698, V design = 574 lbs

Bending(+): LC #2 = D+S, M = 1682 lbs-ft

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

LC #2 = D+S (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 2012

CALCULATIONS:Deflection: EI = 139e06 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 2012), the National Design Specification (NDS 2012), 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

May 1, 2017 03:26

New Ridge Beam - Grid Line B

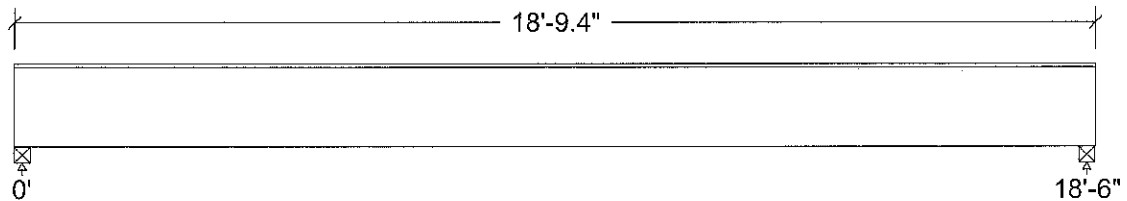
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Snow	Full UDL			490.0	plf
Load2	Dead	Full UDL			331.0	plf
Self-weight	Dead	Full UDL			13.3	plf

Load magnitude does not include Normal Importance factor from Table 4.2.3.2, which is applied during analysis.

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

Unfactored:			
Dead	3232		3232
Snow	4603		4603
Factored:			
Total	7835		7835
Bearing:			
Capacity			
Beam	7835		7835
Support	8341		8341
Anal/Des			
Beam	1.00		1.00
Support	0.94		0.94
Load comb	#2		#2
Length	3.44		3.44
Min req'd	3.44		3.44
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Roof Joists
Glulam-Bal., West Species, 24F-1.8E WS, 3-1/2"x16-1/2"

11 laminations, 3-1/2" maximum width,
 Supports: All - Timber-soft Beam, D.Fir-L No.2
 Total length: 18'-9.4"; volume = 7.5 cu.ft.;
 Lateral support: top= full, bottom= at supports;

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Ridge Beam - Grid Line B

WoodWorks® Sizer 10.4

Page 2

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 168$	$F_v' = 305$	psi	$f_v/F_v' = 0.55$
Bending (+)	$f_b = 2697$	$F_b' = 2760$	psi	$f_b/F_b' = 0.98$
Live Defl'n	$0.55 = L/405$	$0.62 = L/360$	in	0.89
Total Defl'n	$1.12 = L/197$	$1.23 = L/180$	in	0.91

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrr	Notes	Cn*Cvr	LC#
F_v'	265	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
$F_b' +$	2400	1.15	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	1.00	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	1.00	1.00	-	-	-	-	-	1.00	-	-	2
E_{min}'	0.85 million	1.00	1.00	-	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 7717, V design = 6450 lbs

Bending(+): LC #2 = D+S, M = 35692 lbs-ft

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

LC #2 = D+S (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 2012

CALCULATIONS:Deflection: $EI = 2358e06 \text{ lb-in}^2$

"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 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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 F_{cp} (tension), F_{cp} (comp'n).


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PROJECT

May 1, 2017 03:25

New Beam @ Existing Wall - Grid
Line C2

Design Check Calculation Sheet

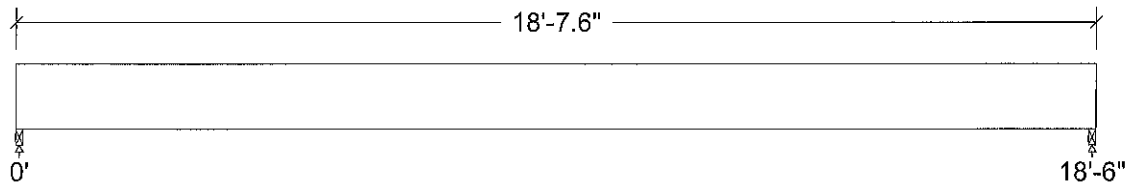
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Snow	Full UDL			379.0	plf
Load2	Dead	Full UDL			209.0	plf
Self-weight	Dead	Full UDL			17.1	plf

Load magnitude does not include Normal Importance factor from Table 4.2.3.2, which is applied during analysis.

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



Unfactored:			
Dead	2105		2105
Snow	3531		3531
Factored:			
Total	5636		5636
Bearing:			
Capacity			
Beam	5636		5636
Support	5788		5788
Anal/Des			
Beam	1.00		1.00
Support	0.97		0.97
Load comb	#2		#2
Length	1.58		1.58
Min req'd	1.58		1.58
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Beam @ Existing Wall (Line C2)

Glulam-Bal., West Species, 24F-1.8E WS, 5-1/2"x13-1/2"

9 laminations, 5-1/2" maximum width,

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

Total length: 18'-7.6"; volume = 9.6 cu.ft.;

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

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Beam @ Existing Wall - Grid Line C2 WoodWorks® Sizer 10.4

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Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 99$	$F_v' = 305$	psi	$f_v/F_v' = 0.32$
Bending(+)	$f_b = 1859$	$F_b' = 2642$	psi	$f_b/F_b' = 0.70$
Live Defl'n	$0.49 = L/451$	$0.62 = L/360$	in	0.80
Total Defl'n	$0.93 = L/238$	$1.23 = L/180$	in	0.76

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
F_v'	265	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
$F_b'+$	2400	1.15	1.00	1.00	0.957	0.994	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	1.00	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	-	1.00	1.00	-	-	-	-	1.00	-	-	2
E_{min}'	0.85 million	-	1.00	1.00	-	-	-	-	1.00	-	-	2

Only the lesser of CL and CV is applied, as per NDS 5.3.6

CRITICAL LOAD COMBINATIONS:Shear : LC #2 = D+S, $V = 5597$, $V_{design} = 4877$ lbsBending(+): LC #2 = D+S, $M = 25887$ lbs-ft

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

LC #2 = D+S (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 2012

CALCULATIONS:Deflection: $EI = 2030e06$ lb-in²

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

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

Lateral stability (+): $L_u = 18'-6.00"$ $L_e = 34'-0.50"$ $RB = 13.50$ **Design Notes:**

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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 $F_{cp}(\text{tension})$, $F_{cp}(\text{comp'n})$.


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PROJECT

May 1, 2017 03:25

New Cantilever Roof Beam

Design Check Calculation Sheet

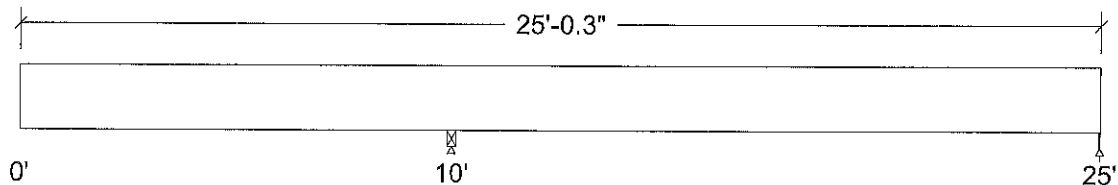
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Snow	Point	Yes	0.00		2776		lbs
Load2	Dead	Point	No	0.00		1850		lbs
Load3	Dead	Partial UDL	No	0.00	10.00	40.0	40.0	plf
Load4	Snow	Partial UDL	Yes	0.00	10.00	60.0	60.0	plf
Self-weight	Dead	Full UDL	No			22.8		plf

Load magnitude does not include Normal Importance factor from Table 4.2.3.2, which is applied during analysis.

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



Unfactored:				
Dead			4092	95
Snow			5427	-2051
Factored:				
Uplift				3322
Total			9518	95
Bearing:				
Capacity				
Beam			10608	1787
Support			9518	1836
Anal/Des				
Beam			0.90	0.05
Support			1.00	0.05
Load comb			#2	#1
Length			2.59	0.50*
Min req'd			2.59**	0.50*
Cb			1.14	1.00
Cb min			1.14	1.00
Cb support			1.07	1.07
Fcp sup			625	625

*Minimum bearing length setting used: 1/2" for end supports

**Minimum bearing length governed by the required width of the supporting member.

Maximum reaction on at least one support is from a different load combination than the critical one for bearing design, shown here, due to Kd factor. See Analysis results for reaction from critical load combination.

Lake Geneva - Vacation Rental - New Cantilever Roof Beam

Glulam-Bal., West Species, 24F-1.8E WS, 5-1/2"x18"

12 laminations, 5-1/2" maximum width,

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

Total length: 25'-0.3"; volume = 17.2 cu.ft.;

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

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Cantilever Roof Beam

WoodWorks® Sizer 10.4

Page 2

This section FAILS the design check**WARNING:** This section violates the following design criteria: Deflection**Analysis vs. Allowable Stress and Deflection using NDS 2012 :**

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 86$	$F_v' = 305$	psi	$f_v/F_v' = 0.28$
Bending(-)	$f_b = 2117$	$F_b' = 2586$	psi	$f_b/F_b' = 0.82$
Deflection:				
Interior Live	$-0.16 = < L/999$	$0.50 = L/360$	in	0.32
Total	$-0.32 = L/562$	$1.00 = L/180$	in	0.32
Cantil. Live	$0.91 = L/131$	$0.67 = L/180$	in	1.37
Total	$1.85 = L/64$	$1.33 = L/90$	in	1.39

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
F_v'	265	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
F_b'	2400	1.15	1.00	1.00	0.974	0.937	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	1.00	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	1.00	1.00	1.00	-	-	-	-	1.00	-	-	2
E_{min}'	0.85 million	1.00	1.00	1.00	-	-	-	-	1.00	-	-	2

Only the lesser of CL and CV is applied, as per NDS 5.3.6

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 5854, V design = 5669 lbs

Bending(-): LC #2 = D+S, M = 52400 lbs-ft

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

LC #2 = D+S (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 Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span

Load combinations: ASCE 7-10 / IBC 2012

CALCULATIONS:Deflection: EI = 4811e06 lb-in²

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

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

Lateral stability (-): Lu = 10' Le = 18'-8.38" RB = 11.56

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
4. Grades with equal bending capacity in the top and bottom edges of the beam cross-section are recommended for continuous beams.
5. GLULAM: bxd = actual breadth x actual depth.
6. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
7. GLULAM: bearing length based on smaller of $F_{cp}(\text{tension})$, $F_{cp}(\text{comp'n})$.


WoodWorks®
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PROJECT

May 1, 2017 03:26

New Rim Beam - Line E.2

Design Check Calculation Sheet

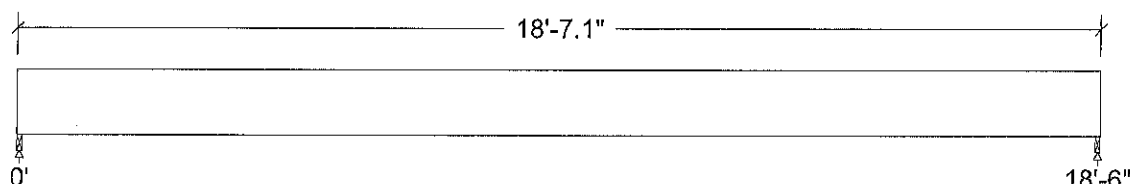
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Snow	Full UDL			150.0	plf
Load2	Dead	Full UDL			100.0	plf
Self-weight	Dead	Full UDL			10.9	plf

Load magnitude does not include Normal Importance factor from Table 4.2.3.2, which is applied during analysis.

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



Unfactored:			
Dead	1030		1030
Snow	1394		1394
Factored:			
Total	2424		2424
Bearing:			
Capacity			
Beam	2424		2424
Support	2581		2581
Anal/Des			
Beam	1.00		1.00
Support	0.94		0.94
Load comb	#2		#2
Length	1.07		1.07
Min req'd	1.07		1.07
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Beam @ Existing Wall (Line C2)

Glulam-Bal., West Species, 24F-1.8E WS, 3-1/2"x13-1/2"

9 laminations, 3-1/2" maximum width,

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

Total length: 18'-7.1"; volume = 6.1 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 67$	$F_v' = 305$	psi	$f_v/F_v' = 0.22$
Bending(+)	$f_b = 1260$	$F_b' = 2002$	psi	$f_b/F_b' = 0.63$
Live Defl'n	$0.31 = L/725$	$0.62 = L/360$	in	0.50
Total Defl'n	$0.65 = L/343$	$1.23 = L/180$	in	0.52

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Rim Beam - Line E.2

WoodWorks® Sizer 10.4

Page 2

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*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	0.725	1.000	1.00	1.00	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, V = 2413, V design = 2108 lbs

Bending(+): LC #2 = D+S, M = 11161 lbs-ft

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

LC #2 = D+S (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 2012

CALCULATIONS:Deflection: EI = 1292e06 lb-in²

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

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

Lateral stability (+): Lu = 18'-6.00" Le = 34'-0.50" RB = 21.22

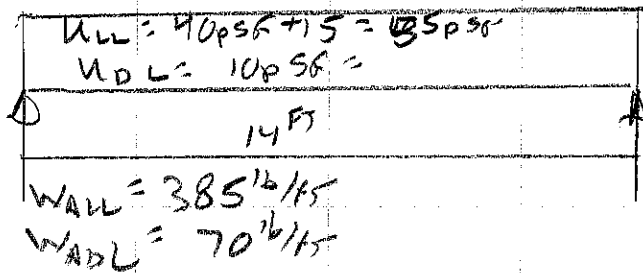
Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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).

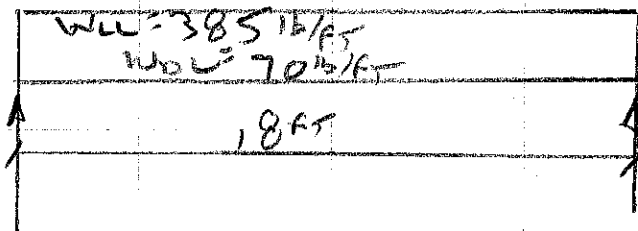
PROJECT _____
 DESCR. _____ PROJ. NO. _____
 CALCULATED BY _____ DATE _____
 CHECKED BY _____ DATE _____
 SCALE _____ SHEET NO. _____

2ND & 1ST FLOOR JOIST REACTIONS

SPAN = 14.0"

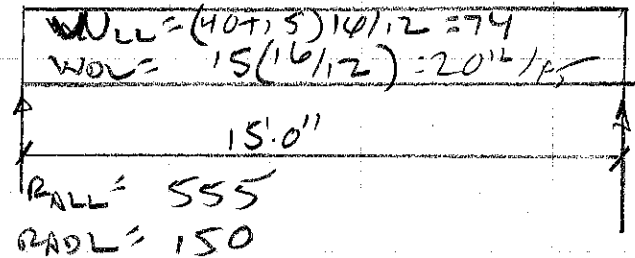


BEAM - LINE C.2



USE $5\frac{1}{2} \times 13\frac{1}{2}$ "
GLULAM

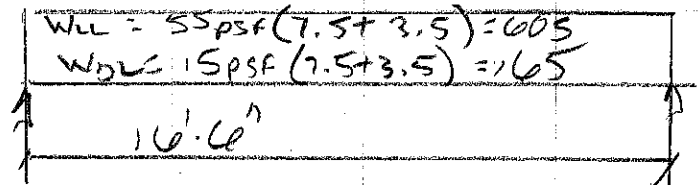
NEW FLOOR JOISTS / SCREEN PATIO (SPACING = 10'0")



USE 2×12 's { N.G.
@ 10"

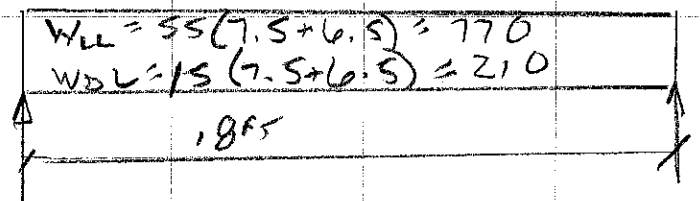
SPACE @ 12" O.C.

BEAM - LINE C.2 (SCREEN PATIO)



$5\frac{1}{2} \times 13\frac{1}{2}$ GLULAM

NEW GLULAM - LINE B



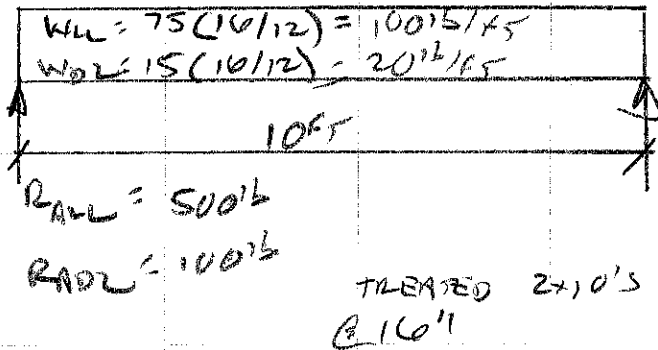
$5\frac{1}{2} \times 16\frac{1}{2}$ GLULAM

PROJECT _____
 DESCR. _____ PROJ. NO. _____
 CALCULATED BY _____ DATE _____
 CHECKED BY _____ DATE _____
 SCALE _____ SHEET NO. _____

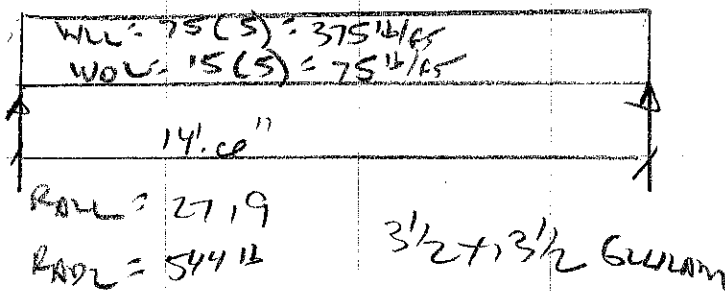
SECOND FLOOR FRAMING

NEW DECK JOISTS

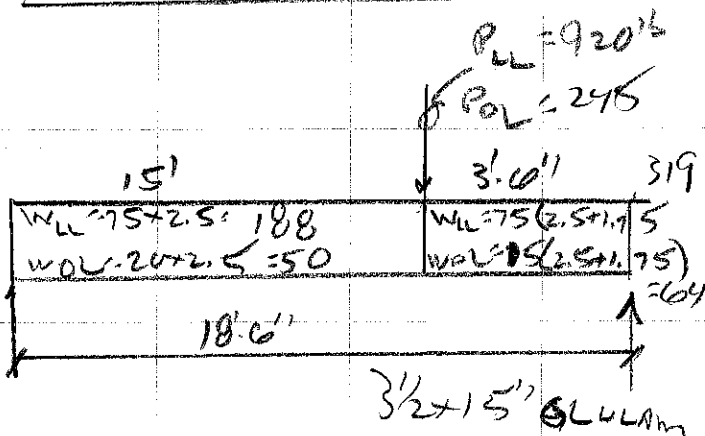
(SPACING = 10" O.C.)



NEW DECK RIM BEAM



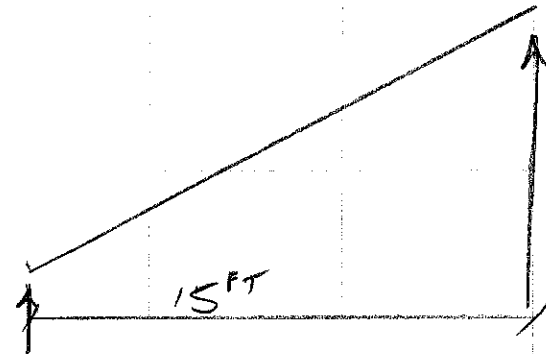
BEAM ALONG STAIR



NEW DECK STAIR SPRINGER

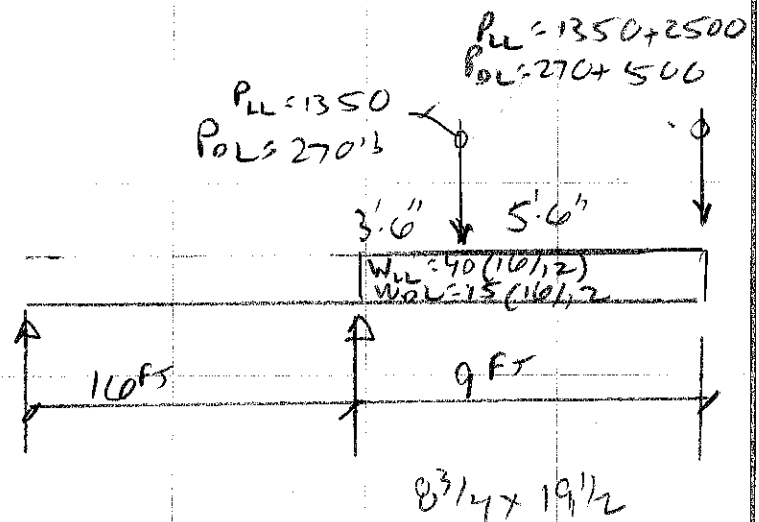
$$W_{LL} = 75(2) = 150$$

$$W_{DL} = 20(2) = 40$$



3 1/8 x 12" GLULAM

CANTILEVERED BM-LINE 2



LINE 3 8 3/4 x 18 1/2
 LINE 1 8 3/4 x 19 1/2
 LINE 5 8 3/4 x 19 1/2
 LINE 6 5 1/2 x 10 1/2



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May 1, 2017 03:28

New Deck Joists

Design Check Calculation Sheet

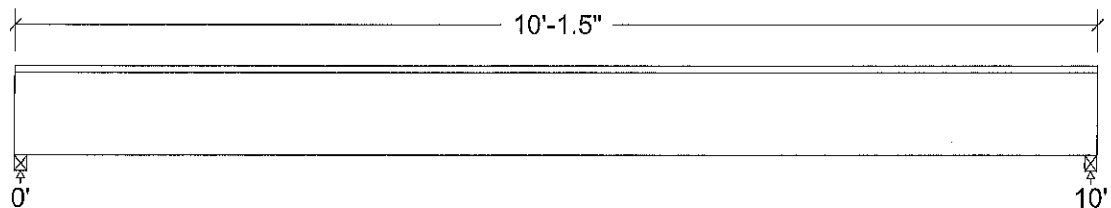
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start End	Magnitude Start End	Unit
Load3	Dead	Full UDL			20.0	plf
Load4	Snow	Full UDL			100.0	plf
Self-weight	Dead	Full UDL			2.8	plf

Load magnitude does not include Normal Importance factor from Table 4.2.3.2, which is applied during analysis.

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



Unfactored:			
Dead	115		115
Snow	506		506
Factored:			
Total	621		621
Bearing:			
Capacity			
Joist	621		621
Support	1142		1142
Anal/Des			
Joist	1.00		1.00
Support	0.54		0.54
Load comb	#2		#2
Length	1.45		1.45
Min req'd	1.45		1.45
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.25		1.25
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Deck Joists

Lumber-soft, S-P-F, No.1/No.2, 2x10 (1-1/2"x9-1/4")

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

Floor joist spaced at 16.0" c/c; Total length: 10'-1.5"; volume = 1.0 cu.ft.;

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

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New Deck Joists

WoodWorks® Sizer 10.4

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Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 55$	$F_v' = 151$	psi	$f_v/F_v' = 0.37$
Bending(+)	$f_b = 861$	$F_b' = 1273$	psi	$f_b/F_b' = 0.68$
Live Defl'n	$0.18 = L/664$	$0.33 = L/360$	in	0.54
Total Defl'n	$0.26 = L/456$	$0.50 = L/240$	in	0.53

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
F_v'	135	1.15	0.97	1.00	-	-	-	-	1.00	1.00	1.00	2
$F_b' +$	875	1.15	1.00	1.00	1.000	1.100	1.00	1.15	1.00	1.00	-	2
F_{cp}'	425	-	0.67	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.4 million	0.90	1.00	-	-	-	-	-	1.00	1.00	-	2
E_{min}'	0.51 million	0.90	1.00	-	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 614, V design = 512 lbs

Bending(+): LC #2 = D+S, M = 1535 lbs-ft

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

LC #2 = D+S (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 2012

CALCULATIONS:

Deflection: $EI = 139e06 \text{ lb-in}^2$

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

Total Deflection = 2.00 (Dead Load Deflection) + Live Load Deflection.

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), 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.


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2ND Floor

New Deck Rim Beam

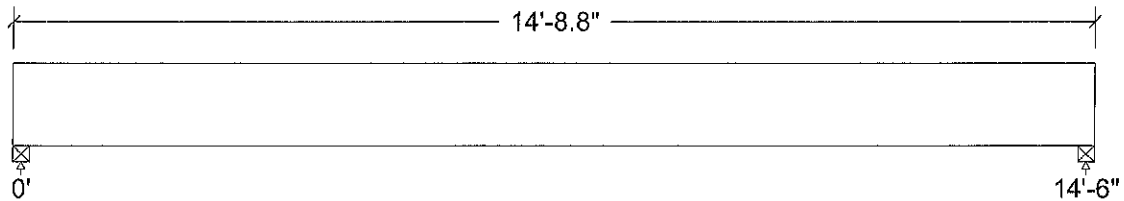
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft] Start End	Magnitude Start End	Unit
Load3	Dead	Full UDL			75.0	plf
Load4	Live	Full UDL			375.0	plf
Self-weight	Dead	Full UDL			10.9	plf

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



Unfactored:			
Dead	631		631
Live	2763		2763
Factored:			
Total	3394		3394
Bearing:			
Capacity			
Beam	3394		3394
Support	4568		4568
Anal/Des			
Beam	1.00		1.00
Support	0.74		0.74
Load comb	#2		#2
Length	2.82		2.82
Min req'd	2.82		2.82
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Deck Rim Beam

Glulam-Bal., West Species, 24F-1.8E WS, 3-1/2"x13-1/2"

9 laminations, 3-1/2" maximum width,

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

Total length: 14'-8.8"; volume = 4.8 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 88$	$F_v' = 232$	psi	$f_v/F_v' = 0.38$
Bending(+)	$f_b = 1367$	$F_b' = 1705$	psi	$f_b/F_b' = 0.80$
Live Defl'n	$0.35 = L/501$	$0.48 = L/360$	in	0.72
Total Defl'n	$0.51 = L/344$	$0.72 = L/240$	in	0.70

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Deck Rim Beam

WoodWorks® Sizer 10.4

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Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
Fv'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	2400	1.00	0.80	1.00	0.888	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	-	0.83	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.85 million	-	0.83	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 3341, V design = 2769 lbs

Bending(+): LC #2 = D+L, M = 12112 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 2012

CALCULATIONS:

Deflection: EI = 1292e06 lb-in²

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

Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection.

Lateral stability (+): Lu = 14'-6.00" Le = 27'-0.13" RB = 18.90

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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).



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2ND FLOOR
New Beam Along Stair

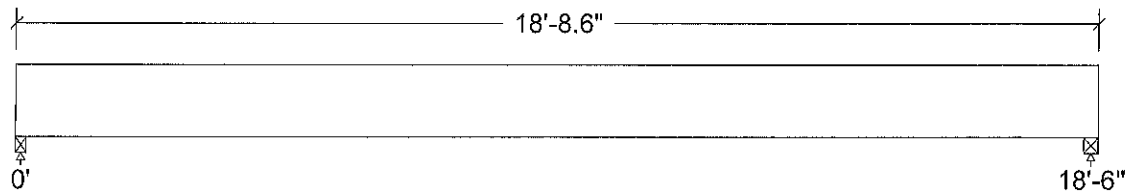
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load3	Live	Partial UDL		0.00	15.00	188.0	188.0	plf
Load4	Dead	Partial UDL		0.00	15.00	50.0	50.0	plf
Load5	Live	Partial UDL		15.00	18.50	319.0	319.0	plf
Load6	Dead	Partial UDL		15.00	18.50	64.0	64.0	plf
Load7	Dead	Point		15.00		245		lbs
Load8	Live	Point		15.00		920		lbs
Self-weight	Dead	Full UDL				12.1		plf

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



Unfactored:			
Dead	631		811
Live	1980		2876
Factored:			
Total	2612		3687
Bearing:			
Capacity			
Beam	2612		3687
Support	3515		4962
Anal/Des			
Beam	1.00		1.00
Support	0.74		0.74
Load comb	#2		#2
Length	2.17		3.06
Min req'd	2.17		3.06
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.11		1.11
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Deck Rim Beam

Glulam-Bal., West Species, 24F-1.8E WS, 3-1/2"x15"

10 laminations, 3-1/2" maximum width,

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

Total length: 18'-8.6"; volume = 6.8 cu.ft.;

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

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Beam Along Stair

WoodWorks® Sizer 10.4

Page 2

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 91$	$F_v' = 232$	psi	$f_v/F_v' = 0.39$
Bending(+)	$f_b = 1226$	$F_b' = 1464$	psi	$f_b/F_b' = 0.84$
Live Defl'n	$0.43 = L/510$	$0.62 = L/360$	in	0.71
Total Defl'n	$0.70 = L/315$	$0.93 = L/240$	in	0.76

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
F_v'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
$F_b' +$	2400	1.00	0.80	1.00	0.762	1.000	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	-	0.83	1.00	-	-	-	-	1.00	-	-	2
E_{min}'	0.85 million	-	0.83	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 3687, V design = 3186 lbs

Bending(+): LC #2 = D+L, M = 13410 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 2012

CALCULATIONS:Deflection: $EI = 1772e06 \text{ lb-in}^2$

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

Total Deflection = 2.00 (Dead Load Deflection) + Live Load Deflection.

Lateral stability (+): $L_u = 18'-6.00"$ $L_e = 34'-0.50"$ $RB = 22.36$ **Design Notes:**

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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 $F_{cp}(\text{tension})$, $F_{cp}(\text{comp'n})$.



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New Beam Along Stair-1st Floor

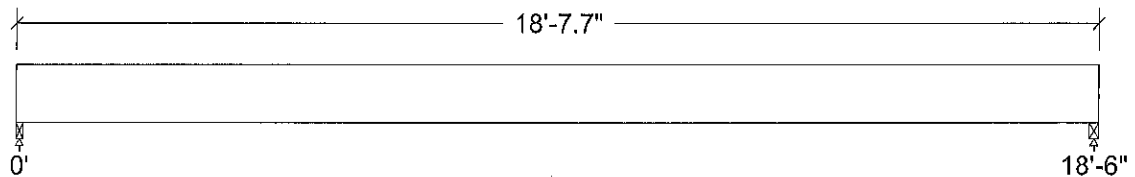
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load3	Live	Partial UDL		0.00	15.00	188.0	188.0	plf
Load4	Dead	Partial UDL		0.00	15.00	50.0	50.0	plf
Load5	Live	Partial UDL		15.00	18.50	319.0	319.0	plf
Load6	Dead	Partial UDL		15.00	18.50	64.0	64.0	plf
Load7	Dead	Point		15.00		245		lbs
Load8	Live	Point		15.00		920		lbs
Self-weight	Dead	Full UDL				15.2		plf

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



Unfactored:			
Dead	658		842
Live	1972		2885
Factored:			
Total	2630		3727
Bearing:			
Capacity			
Beam	2630		3727
Support	3415		4839
Anal/Des			
Beam	1.00		1.00
Support	0.77		0.77
Load comb	#2		#2
Length	1.39		1.97
Min req'd	1.39		1.97
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Deck Rim Beam-1st Floor

Glulam-Bal., West Species, 24F-1.8E WS, 5-1/2"x12"

8 laminations, 5-1/2" maximum width,

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

Total length: 18'-7.7"; volume = 8.5 cu.ft.;

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

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Beam Along Stair-1st Floor

WoodWorks® Sizer 10.4

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Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 76$	$F_v' = 232$	psi	$f_v/F_v' = 0.33$
Bending(+)	$f_b = 1228$	$F_b' = 1868$	psi	$f_b/F_b' = 0.66$
Live Defl'n	$0.54 = L/411$	$0.62 = L/360$	in	0.87
Total Defl'n	$0.89 = L/250$	$0.93 = L/240$	in	0.96

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
F_v'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
$F_b'+$	2400	1.00	0.80	1.00	0.973	1.000	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	0.83	1.00	-	-	-	-	-	1.00	-	-	2
E_{min}'	0.85 million	0.83	1.00	-	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 3727, V design = 3323 lbs

Bending(+): LC #2 = D+L, M = 13510 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 2012

CALCULATIONS:Deflection: $EI = 1426e06 \text{ lb-in}^2$

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

Total Deflection = 2.00 (Dead Load Deflection) + Live Load Deflection.

Lateral stability (+): $L_u = 18'-6.00"$ $L_e = 34'-0.50"$ $RB = 12.73$ **Design Notes:**

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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 $F_{cp}(\text{tension})$, $F_{cp}(\text{comp'n})$.



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New Deck Rim Beam-1st Floor

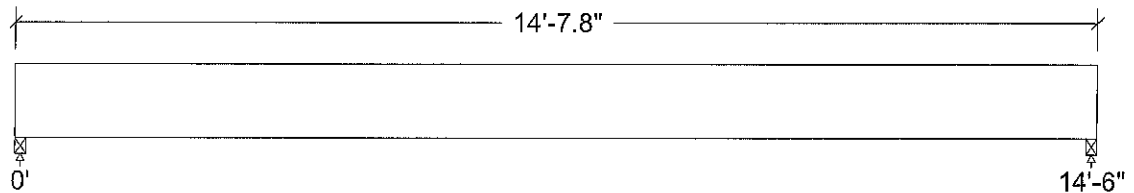
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start End	Magnitude Start End	Unit
Load3	Dead	Full UDL			75.0	plf
Load4	Live	Full UDL			375.0	plf
Self-weight	Dead	Full UDL			15.2	plf

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



Unfactored:			
Dead	660		660
Live	2747		2747
Factored:			
Total	3406		3406
Bearing:			
Capacity			
Beam	3406		3406
Support	4423		4423
Anal/Des			
Beam	1.00		1.00
Support	0.77		0.77
Load comb	#2		#2
Length	1.80		1.80
Min req'd	1.80		1.80
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Deck Rim Beam-1st Floor

Glulam-Bal., West Species, 24F-1.8E WS, 5-1/2"x12"

8 laminations, 5-1/2" maximum width,

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

Total length: 14'-7.8"; volume = 6.7 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 65$	$F_v' = 232$	psi	$f_v/F_v' = 0.28$
Bending(+)	$f_b = 1111$	$F_b' = 1883$	psi	$f_b/F_b' = 0.59$
Live Defl'n	$0.31 = L/553$	$0.48 = L/360$	in	0.65
Total Defl'n	$0.47 = L/374$	$0.72 = L/240$	in	0.64

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Deck Rim Beam-1st Floor

WoodWorks® Sizer 10.4

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Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
Fv'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	2400	1.00	0.80	1.00	0.981	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	-	0.83	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.85 million	-	0.83	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 3373, V design = 2873 lbs

Bending(+): LC #2 = D+L, M = 12226 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 2012

CALCULATIONS:

Deflection: EI = 1426e06 lb-in²

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

Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection.

Lateral stability (+): Lu = 14'-6.00" Le = 26'-8.19" RB = 11.27

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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).


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New Deck Stair Stringer Beam

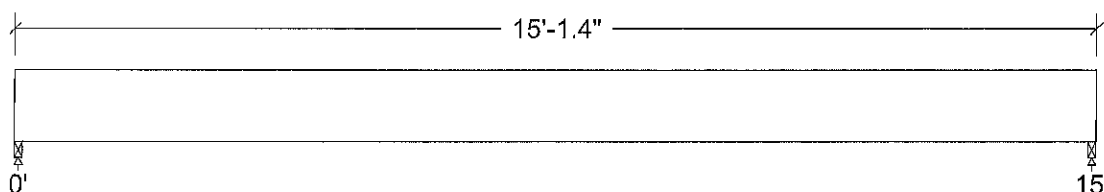
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Live	Full UDL			150.0	plf
Load2	Dead	Full UDL			40.0	plf
Self-weight	Dead	Full UDL			8.6	plf

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



Unfactored:			
Dead	367		367
Live	1134		1134
Factored:			
Total	1501		1501
Bearing:			
Capacity			
Beam	1501		1501
Support	2043		2043
Anal/Des			
Beam	1.00		1.00
Support	0.73		0.73
Load comb	#2		#2
Length	1.39		1.39
Min req'd	1.39		1.39
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.12		1.12
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Deck Stair Stringer

Glulam-Bal., West Species, 24F-1.8E WS, 3-1/8"x12"

8 laminations, 3-1/8" maximum width,

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

Total length: 15'-1.4"; volume = 3.9 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 51$	$F_v' = 232$	psi	$f_v/F_v' = 0.22$
Bending(+)	$f_b = 894$	$F_b' = 1630$	psi	$f_b/F_b' = 0.55$
Live Defl'n	$0.25 = L/710$	$0.50 = L/360$	in	0.51
Total Defl'n	$0.42 = L/431$	$0.75 = L/240$	in	0.56

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN****New Deck Stair Stringer Beam****WoodWorks® Sizer 10.4****Page 2****Additional Data:**

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
Fv'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	2400	1.00	0.80	1.00	0.849	1.000	1.00	1.00	1.00	1.00	-	2
Fcp'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	-	0.83	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.85 million	-	0.83	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 1490, V design = 1280 lbs

Bending(+): LC #2 = D+L, M = 5587 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 2012

CALCULATIONS:Deflection: EI = 810e06 lb-in²

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

Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection.

Lateral stability (+): Lu = 15' Le = 27'-7.19" RB = 20.17

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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).



WoodWorks®
SOFTWARE FOR WOOD DESIGN

COMPANY

PROJECT

May 1, 2017 03:30

New Floor Beam Line B

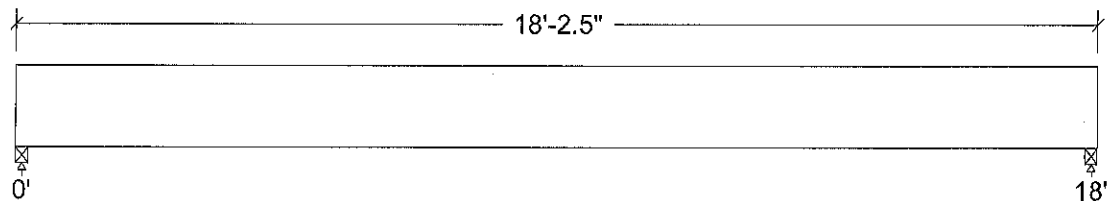
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Live	Full UDL			770.0	plf
Load2	Dead	Full UDL			210.0	plf
Self-weight	Dead	Full UDL			20.9	plf

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



Unfactored:			
Dead	2100		2100
Live	7012		7012
Factored:			
Total	9112		9112
Bearing:			
Capacity			
Beam	9112		9112
Support	9359		9359
Anal/Des			
Beam	1.00		1.00
Support	0.97		0.97
Load comb	#2		#2
Length	2.55		2.55
Min req'd	2.55		2.55
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Beam Line B Glulam-Bal., West Species, 24F-1.8E WS, 5-1/2"x16-1/2"

11 laminations, 5-1/2" maximum width,

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

Total length: 18'-2.5"; volume = 11.5 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 124	Fv' = 265	psi	fv/Fv' = 0.47
Bending(+)	fb = 1949	Fb' = 2289	psi	fb/Fb' = 0.85
Live Defl'n	0.49 = L/440	0.60 = L/360	in	0.82
Total Defl'n	0.71 = L/303	0.90 = L/240	in	0.79

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Floor Beam Line B

WoodWorks® Sizer 10.4

Page 2

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
Fv'	265	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	2400	1.00	1.00	1.00	0.954	0.977	1.00	1.00	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

Only the lesser of CL and CV is applied, as per NDS 5.3.6

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 9008, V design = 7526 lbs

Bending(+): LC #2 = D+L, M = 40536 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 2012

CALCULATIONS:Deflection: EI = 3706e06 lb-in²

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

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

Lateral stability (+): Lu = 18' Le = 33'-5.56" RB = 14.80

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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).


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SOFTWARE FOR WOOD DESIGN

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May 1, 2017 03:30

New Floor Beam - Line C.2

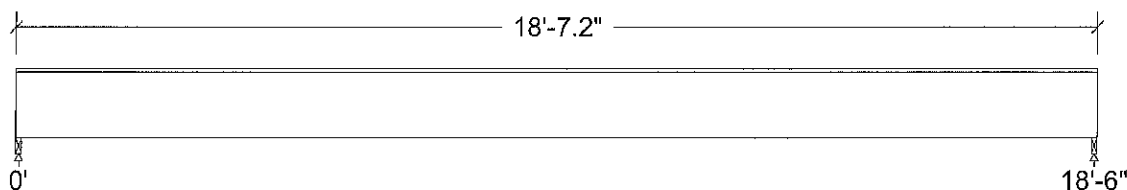
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Live	Full UDL			385.0	plf
Load2	Dead	Full UDL			70.0	plf
Self-weight	Dead	Full UDL			17.1	plf

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



Unfactored:			
Dead	809		809
Live	3581		3581
Factored:			
Total	4390		4390
Bearing:			
Capacity			
Beam	4390		4390
Support	4509		4509
Anal/Des			
Beam	1.00		1.00
Support	0.97		0.97
Load comb	#2		#2
Length	1.23		1.23
Min req'd	1.23		1.23
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Floor Beam - Line C.2

Glulam-Bal., West Species, 24F-1.8E WS, 5-1/2"x13-1/2"

9 laminations, 5-1/2" maximum width,

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

Total length: 18'-7.2"; volume = 9.6 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 77$	$F_v' = 265$	psi	$f_v/F_v' = 0.29$
Bending(+)	$f_b = 1451$	$F_b' = 2385$	psi	$f_b/F_b' = 0.61$
Live Defl'n	$0.50 = L/444$	$0.62 = L/360$	in	0.81
Total Defl'n	$0.67 = L/331$	$0.93 = L/240$	in	0.72

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Floor Beam - Line C.2

WoodWorks® Sizer 10.4

Page 2

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
Fv'	265	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	2400	1.00	1.00	1.00	1.000	0.994	1.00	1.00	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+L, V = 4367, V design = 3812 lbs

Bending(+): LC #2 = D+L, M = 20197 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 2012

CALCULATIONS:Deflection: EI = 2030e06 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 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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).


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PROJECT

May 1, 2017 03:30

New Floor Joists Screen Patio (12 inches o.c.)

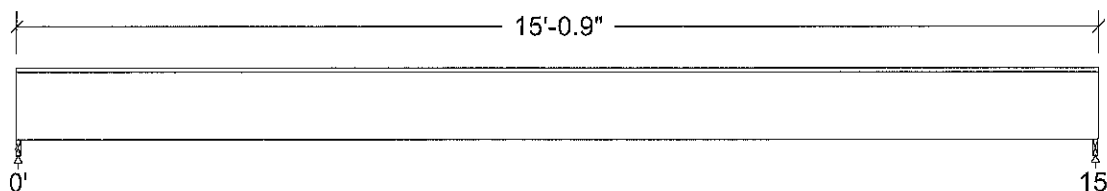
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Live	Full UDL			55.0	plf
Load2	Dead	Full UDL			15.0	plf
Self-weight	Dead	Full UDL			3.4	plf

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



Unfactored:			
Dead	139		139
Live	414		414
Factored:			
Total	553		553
Bearing:			
Capacity			
Joist	553		553
Support	1017		1017
Anal/Des			
Joist	1.00		1.00
Support	0.54		0.54
Load comb	#2		#2
Length	0.87		0.87
Min req'd	0.87		0.87
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.25		1.25
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Floor Joists Screen Patio

Lumber-soft, S-P-F, No.1/No.2, 2x12 (1-1/2"x11-1/4")

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

Floor joist spaced at 12.0" c/c; Total length: 15'-0.9"; volume = 1.8 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 43$	$F_v' = 135$	psi	$f_v/F_v' = 0.32$
Bending(+)	$f_b = 783$	$F_b' = 1006$	psi	$f_b/F_b' = 0.78$
Live Defl'n	$0.25 = L/715$	$0.50 = L/360$	in	0.50
Total Defl'n	$0.38 = L/476$	$0.75 = L/240$	in	0.50

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

New Floor Joists Screen Patio (12 inches o.c.) WoodWorks® Sizer 10.4

Page 2

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	135	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	1.15	1.00	1.00	-	2
Fcp'	425	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.4 million	1.00	1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.51 million	1.00	1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 551, V design = 479 lbs

Bending(+): LC #2 = D+L, M = 2065 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 2012

CALCULATIONS:Deflection: EI = 249e06 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 2012), the National Design Specification (NDS 2012), 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.


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May 1, 2017 03:30

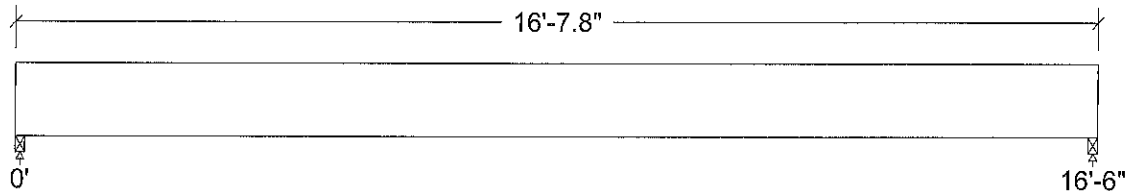
New Floor Beam Line C.2 @
Screen Patio

Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Live	Full UDL			605.0	plf
Load2	Dead	Full UDL			165.0	plf
Self-weight	Dead	Full UDL			17.1	plf

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

Unfactored:			
Dead	1515		1515
Live	5037		5037
Factored:			
Total	6552		6552
Bearing:			
Capacity			
Beam	6552		6552
Support	6730		6730
Anal/Des			
Beam	1.00		1.00
Support	0.97		0.97
Load comb	#2		#2
Length	1.83		1.83
Min req'd	1.83		1.83
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.07		1.07
Fcp sup	625		625

Lake Geneva - Vacation Rental - New Beam Line B

Glulam-Bal., West Species, 24F-1.8E WS, 5-1/2"x13-1/2"

9 laminations, 5-1/2" maximum width,

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

Total length: 16'-7.8"; volume = 8.6 cu.ft.;

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

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 112$	$F_v' = 265$	psi	$f_v/F_v' = 0.42$
Bending(+)	$f_b = 1924$	$F_b' = 2331$	psi	$f_b/F_b' = 0.83$
Live Defl'n	$0.50 = L/398$	$0.55 = L/360$	in	0.90
Total Defl'n	$0.72 = L/274$	$0.82 = L/240$	in	0.87

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN****New Floor Beam Line C.2 @ Screen Patio WoodWorks® Sizer 10.4****Page 2****Additional Data:**

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
Fv'	265	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	2400	1.00	1.00	1.00	0.971	1.000	1.00	1.00	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+L, V = 6494, V design = 5548 lbs

Bending(+): LC #2 = D+L, M = 26786 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 2012

CALCULATIONS:Deflection: EI = 2030e06 lb-in²

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

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

Lateral stability (+): Lu = 16'-6.00" Le = 30'-4.31" RB = 12.75

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
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).


WoodWorks®
SOFTWARE FOR WOOD DESIGN

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PROJECT

May 1, 2017 03:27

Cantilever Beam - Line 1

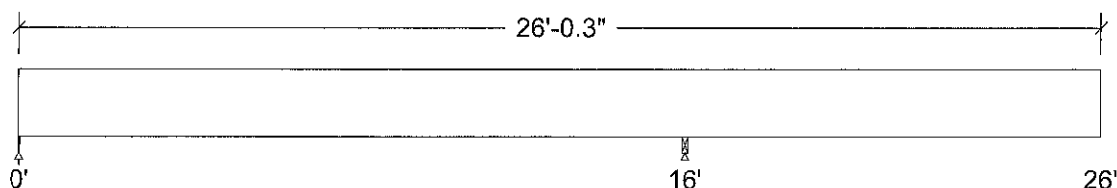
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load3	Dead	Partial UDL	No	16.00	23.00	10.0	10.0	plf
Load5	Live	Partial UDL	Yes	16.00	26.00	50.0	50.0	plf
Load7	Live	Point	No	26.00		2531		lbs
Load8	Dead	Point	No	26.00		506		lbs
Self-weight	Dead	Full UDL	No			39.3		plf

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



Unfactored:					
Dead	192			1737	
Live	-1734			4765	
Factored:					
Uplift	1873				
Total	192			6502	
Bearing:					
Capacity					
Beam	1507			6502	
Support	1832			6529	
Anal/Des					
Beam	0.13			1.00	
Support	0.10			1.00	
Load comb	#1			#2	
Length	0.50*			1.78	
Min req'd	0.50*			1.78	
Cb	1.00			1.21	
Cb min	1.00			1.21	
Cb support	1.00			1.00	
Fcp sup	625			625	

*Minimum bearing length setting used: 1/2" for end supports

Maximum reaction on at least one support is from a different load combination than the critical one for bearing design, shown here, due to Kd factor. See Analysis results for reaction from critical load combination.

Lake Geneva - Vacation Rental - Cantievered Beam Line 1

Glulam-Bal., West Species, 24F-1.8E WS, 8-3/4"x19-1/2"

13 laminations, 8-3/4" maximum width,

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

Total length: 26'-0.3"; volume = 30.8 cu.ft.;

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

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

Cantilever Beam - Line 1

WoodWorks® Sizer 10.4

Page 2

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 34$	$F_v' = 232$	psi	$f_v/F_v' = 0.15$
Bending(-)	$f_b = 757$	$F_b' = 1697$	psi	$f_b/F_b' = 0.45$
Deflection:				
Interior Live	$-0.10 = < L/999$	$0.53 = L/360$	in	0.18
Total	$-0.13 = < L/999$	$0.80 = L/240$	in	0.17
Cantil. Live	$0.51 = L/236$	$0.67 = L/180$	in	0.76
Total	$0.74 = L/162$	$1.00 = L/120$	in	0.74

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
F_v'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
F_b'	2400	1.00	0.80	1.00	0.988	0.884	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	0.83	1.00	-	-	-	-	-	1.00	-	-	2
E_{min}'	0.85 million	0.83	1.00	-	-	-	-	-	1.00	-	-	2

Only the lesser of CL and CV is applied, as per NDS 5.3.6

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 3999, V design = 3839 lbs

Bending(-): LC #2 = D+L, M = 34995 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 Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span

Load combinations: ASCE 7-10 / IBC 2012

CALCULATIONS:Deflection: $EI = 9732e06 \text{ lb-in}^2$

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

Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection.

Lateral stability (-): $L_u = 16'$ $L_e = 27'-11.00"$ $RB = 9.24$ **Design Notes:**

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
4. Grades with equal bending capacity in the top and bottom edges of the beam cross-section are recommended for continuous beams.
5. GLULAM: bxd = actual breadth x actual depth.
6. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
7. GLULAM: bearing length based on smaller of $F_{cp}(\text{tension})$, $F_{cp}(\text{comp'n})$.


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May 1, 2017 03:27

Cantilever Beam - Line 2- with
added column

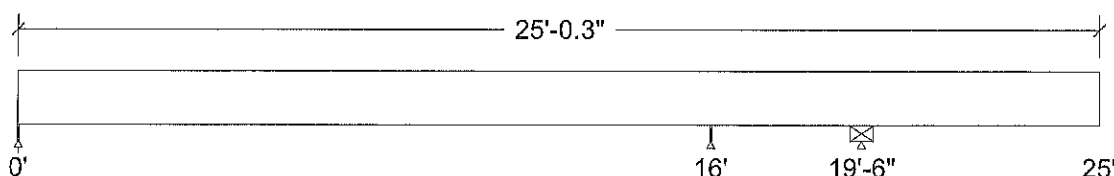
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load3	Dead	Partial UDL	No	16.02	25.02	20.0	20.0	plf
Load5	Live	Partial UDL	Yes	16.02	25.02	75.0	75.0	plf
Load4	Dead	Point	No	19.52		270		lbs
Load6	Live	Point	Yes	19.52		1350		lbs
Load7	Live	Point	No	25.02		3850		lbs
Load8	Dead	Point	No	25.02		770		lbs
Self-weight	Dead	Full UDL	No			23.3		plf

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



Unfactored:							
Dead	175		331		2698		
Live	125		-7071		12684		
Factored:							
Uplift			8142				
Total	300		331		15382		
Bearing:							
Capacity							
Beam	1163		2035		15382		
Support	1413		1413		18698		
Anal/Des							
Beam	0.26		0.16		1.00		
Support	0.21		0.23		0.82		
Load comb	#6		#1		#2		
Length	0.50*		0.50*		6.62		
Min req'd	0.50*		0.50*		6.62		
Cb	1.00		1.75		1.00		
Cb min	1.00		1.75		1.00		
Cb support	1.00		1.00		1.00		
Fcp sup	625		625		625		

*Minimum bearing length setting used: 1/2" for end supports and 1/2" for interior supports

Maximum reaction on at least one support is from a different load combination than the critical one for bearing design, shown here, due to Kd factor. See Analysis results for reaction from critical load combination.

Lake Geneva - Vacation Rental - Cantievered Beam Line 2

Glulam-Bal., West Species, 24F-1.8E WS, 6-3/4"x15"

10 laminations, 6-3/4" maximum width,

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

Total length: 25'-0.3"; volume = 17.6 cu.ft.;

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

WoodWorks® Sizer**SOFTWARE FOR WOOD DESIGN**

Cantilever Beam - Line 2- with added columnWoodWorks® Sizer 10.4

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Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 125$	$F_v' = 232$	psi	$f_v/F_v' = 0.54$
Bending(+)	$f_b = 92$	$F_b' = 1874$	psi	$f_b/F_b' = 0.05$
Bending(-)	$f_b = 1289$	$F_b' = 1910$	psi	$f_b/F_b' = 0.67$
Deflection:				
Interior Live	$-0.01 = <L/999$	$0.12 = L/360$	in	0.08
Total	$-0.01 = <L/999$	$0.17 = L/240$	in	0.08
Cantil. Live	$0.22 = L/302$	$0.37 = L/180$	in	0.59
Total	$0.31 = L/210$	$0.55 = L/120$	in	0.57

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Notes	Cn*Cvr	LC#
F_v'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
$F_b'+$	2400	1.00	0.80	1.00	0.985	0.976	1.00	1.00	1.00	1.00	-	2
$F_b'-$	2400	1.00	0.80	1.00	0.995	1.000	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	0.83	1.00	-	-	-	-	-	1.00	-	-	6
E_{min}'	0.85 million	0.83	1.00	-	-	-	-	-	1.00	-	-	6

Only the lesser of CL and CV is applied, as per NDS 5.3.6

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 8492, V design = 8414 lbs

Bending(+): LC #2 = D+L, M = 1940 lbs-ft

Bending(-): LC #2 = D+L, M = 27199 lbs-ft

Deflection: LC #6 = (live)

LC #6 = (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 Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span

Load combinations: ASCE 7-10 / IBC 2012

CALCULATIONS:Deflection: $EI = 3417e06 \text{ lb-in}^2$

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

Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection.

Lateral stability (+): $L_u = 16'$, $L_e = 26'-9.50"$ RB = 10.29Lateral stability (-): $L_u = 5'-6.00"$, $L_e = 10'-3.44"$ RB = 6.37**Design Notes:**

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
4. Grades with equal bending capacity in the top and bottom edges of the beam cross-section are recommended for continuous beams.
5. GLULAM: bxd = actual breadth x actual depth.
6. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
7. GLULAM: bearing length based on smaller of $F_{cp}(\text{tension})$, $F_{cp}(\text{comp'n})$.



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PROJECT

May 1, 2017 03:27

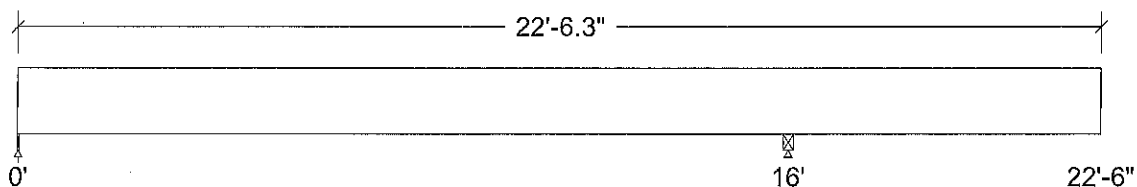
Cantilever Beam - Line 3

Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load3	Dead	Partial UDL	No	16.00	22.52	20.0	20.0	plf
Load5	Live	Partial UDL	Yes	16.00	22.52	75.0	75.0	plf
Load4	Dead	Point	No	19.50		270		lbs
Load6	Live	Point	Yes	19.50		1350		lbs
Load7	Live	Point	No	22.52		3263		lbs
Load8	Dead	Point	No	22.52		770		lbs
Self-weight	Dead	Full UDL	No			33.2		plf

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

Unfactored:					
Dead	222		2094		
Live	-1718		6820		
Factored:					
Uplift	1894				
Total	222		8914		
Bearing:					
Capacity					
Beam	1507		8914		
Support	1832		9462		
Anal/Des					
Beam	0.15		1.00		
Support	0.12		0.94		
Load comb	#1		#2		
Length	0.50*		2.58		
Min req'd	0.50*		2.58		
Cb	1.00		1.15		
Cb min	1.00		1.15		
Cb support	1.00		1.00		
Fcp sup	625		625		

*Minimum bearing length setting used: 1/2" for end supports

Maximum reaction on at least one support is from a different load combination than the critical one for bearing design, shown here, due to Kd factor. See Analysis results for reaction from critical load combination.

Lake Geneva - Vacation Rental - Cantievered Beam Line 3**Glulam-Bal., West Species, 24F-1.8E WS, 8-3/4"x16-1/2"**

11 laminations, 8-3/4" maximum width,

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

Total length: 22'-6.3"; volume = 22.6 cu.ft.;

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

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Cantilever Beam - Line 3

WoodWorks® Sizer 10.4

Page 2

This section FAILS the design check**WARNING:** This section violates the following design criteria: Deflection**Analysis vs. Allowable Stress and Deflection using NDS 2012 :**

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 66$	$F_v' = 232$	psi	$f_v/F_v' = 0.28$
Bending(-)	$f_b = 1044$	$F_b' = 1751$	psi	$f_b/F_b' = 0.60$
Deflection:				
Interior Live	$-0.16 = < L/999$	$0.53 = L/360$	in	0.30
Total	$-0.22 = L/868$	$0.80 = L/240$	in	0.28
Cantil. Live	$0.46 = L/168$	$0.43 = L/180$	in	1.07
Total	$0.67 = L/116$	$0.65 = L/120$	in	1.03

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrr	Notes	Cn*Cvr	LC#
F_v'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
F_b'	2400	1.00	0.80	1.00	0.991	0.912	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	0.83	1.00	-	-	-	-	-	1.00	-	-	2
E_{min}'	0.85 million	0.83	1.00	-	-	-	-	-	1.00	-	-	2

Only the lesser of CL and CV is applied, as per NDS 5.3.6

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 6487, V design = 6312 lbs

Bending(-): LC #2 = D+L, M = 34553 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 Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span

Load combinations: ASCE 7-10 / IBC 2012

CALCULATIONS:Deflection: EI = 5896e06 lb-in²

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

Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection.

Lateral stability (-): Lu = 16' Le = 27'-2.00" RB = 8.38

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
4. Grades with equal bending capacity in the top and bottom edges of the beam cross-section are recommended for continuous beams.
5. GLULAM: bxd = actual breadth x actual depth.
6. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
7. GLULAM: bearing length based on smaller of $F_{cp}(\text{tension})$, $F_{cp}(\text{comp'n})$.


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Cantilever Beam - Line 5

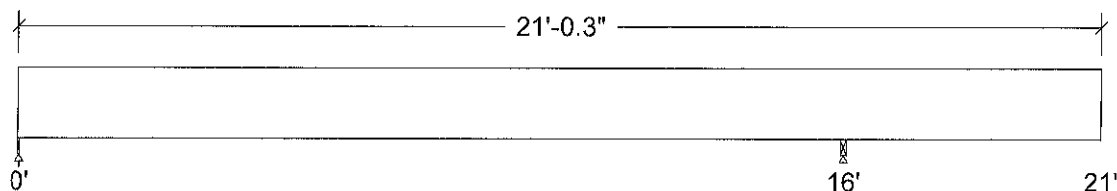
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load3	Dead	Partial UDL	No	16.00	21.00	10.0	10.0	plf
Load5	Live	Point	Yes	21.00		1913		lbs
Load4	Dead	Point	No	21.00		383		lbs
Load6	Live	Partial UDL	Yes	16.00	21.00	50.0	50.0	plf
Self-weight	Dead	Full UDL	No			20.9		plf

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



Unfactored:					
Dead	151		848		
Live	0		2797		
Factored:					
Uplift	610				
Total	151		3645		
Bearing:					
Capacity					
Beam	947		3645		
Support	1230		3810		
Anal/Des					
Beam	0.16		1.00		
Support	0.12		0.96		
Load comb	#1		#2		
Length	0.50*		1.55		
Min req'd	0.50*		1.55		
Cb	1.00		1.24		
Cb min	1.00		1.24		
Cb support	1.07		1.07		
Fcp sup	625		625		

*Minimum bearing length setting used: 1/2" for end supports

Maximum reaction on at least one support is from a different load combination than the critical one for bearing design, shown here, due to Kd factor. See Analysis results for reaction from critical load combination.

Lake Geneva - Vacation Rental - Cantievered Beam Line 1

Glulam-Bal., West Species, 24F-1.8E WS, 5-1/2"x16-1/2"

11 laminations, 5-1/2" maximum width,

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

Total length: 21'-0.3"; volume = 13.2 cu.ft.;

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

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Cantilever Beam - Line 5

WoodWorks® Sizer 10.4

Page 2

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 43$	$F_v' = 232$	psi	$f_v/F_v' = 0.18$
Bending(-)	$f_b = 598$	$F_b' = 1847$	psi	$f_b/F_b' = 0.32$
Deflection:				
Interior Live	$-0.09 = < L/999$	$0.53 = L/360$	in	0.17
Total	$-0.12 = < L/999$	$0.80 = L/240$	in	0.15
Cantil. Live	$0.20 = L/303$	$0.33 = L/180$	in	0.59
Total	$0.27 = L/224$	$0.50 = L/120$	in	0.53

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfirt	Notes	Cn*Cvr	LC#
F_v'	265	1.00	0.88	1.00	-	-	-	-	1.00	1.00	1.00	2
F_b'	2400	1.00	0.80	1.00	0.969	0.962	1.00	1.00	1.00	1.00	-	2
F_{cp}'	650	-	0.53	1.00	-	-	-	-	1.00	-	-	-
E'	1.8 million	0.83	1.00	-	-	-	-	-	1.00	-	-	2
E_{min}'	0.85 million	0.83	1.00	-	-	-	-	-	1.00	-	-	2

Only the lesser of CL and CV is applied, as per NDS 5.3.6

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+L, V = 2699, V design = 2595 lbs

Bending(-): LC #2 = D+L, M = 12433 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 Patterns: s=S/2, X=L+S or L+Lr, _=no pattern load in this span

Load combinations: ASCE 7-10 / IBC 2012

CALCULATIONS:Deflection: EI = 3706e06 lb-in²

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

Total Deflection = 2.00(Dead Load Deflection) + Live Load Deflection.

Lateral stability (-): Lu = 16' Le = 27'-2.00" RB = 13.33

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
4. Grades with equal bending capacity in the top and bottom edges of the beam cross-section are recommended for continuous beams.
5. GLULAM: bxd = actual breadth x actual depth.
6. Glulam Beams shall be laterally supported according to the provisions of NDS Clause 3.3.3.
7. GLULAM: bearing length based on smaller of F_{cp} (tension), F_{cp} (comp'n).



A Wall-tech Company

PROJECT _____

DESCR. _____ PROJ. NO. _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____ SHEET NO. _____

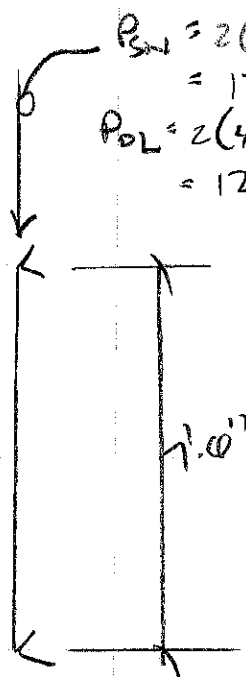
NEW POST - LINE C2

$$P_{SN} = 2(5427) + 2(3506)$$

$$= 17866$$

$$P_{DL} = 2(4092) + 2(1931)$$

$$= 12046$$

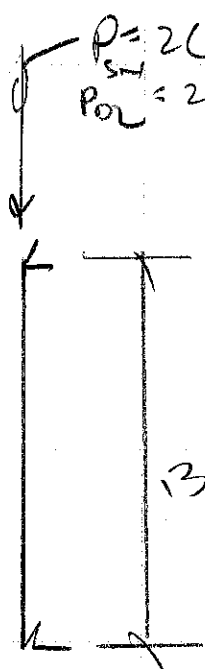


USE S18x10"
DANG F12 L2

NEW POST - BRIDGE BEAM

$$P_{SN} = 2(4533) = 9066$$

$$P_{DL} = 2(3062) = 6124$$





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New Post - Line C2

Design Check Calculation Sheet

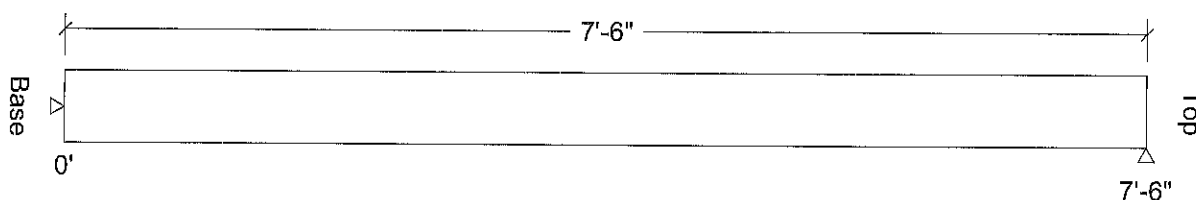
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat- tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Dead	Axial		(Ecc. = 0.00")	12046	lbs
Load2	Snow	Axial		(Ecc. = 0.00")	17866	lbs
Self-weight	Dead	Axial			53	lbs

Load magnitude does not include Normal Importance factor from Table 4.2.3.2, which is applied during analysis.

Lateral Reactions (lbs):



New Post - Line C2

Glulam-Axial, West Species, 2 (DF L2), 5-1/8"x6"

4 laminations, 5-1/8" maximum width,

Support: Non-wood

Total length: 7'-6.0"; volume = 1.6 cu.ft.;

Pinned base; Load face = width(b); $K_e \times L_b: 1.0 \times 7.5 = 7.5$ [ft]; $K_e \times L_d: 1.0 \times 7.5 = 7.5$ [ft];

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Axial	$f_c = 974$	$F_c' = 1712$	psi	$f_c/F_c' = 0.57$
Axial Bearing	$f_c = 974$	$F_c^* = 2242$	psi	$f_c/F_c^* = 0.43$

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL/CP	CV	Cfu	Cr	Cfrt	Notes	LC#
F_c'	1950	1.15	1.00	1.00	0.764	-	-	-	1.00	-	2
F_c^*	1950	1.15	1.00	1.00	-	-	-	-	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Axial : LC #2 = D+S, $P = 29965$ lbs

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 2012

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
4. GLULAM: bxd = actual breadth x actual depth.



WoodWorks® Sizer

SOFTWARE FOR WOOD DESIGN

New Post - Line C2

WoodWorks® Sizer 10.4

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PROJECT

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New Post @ Ridge Beam Line B

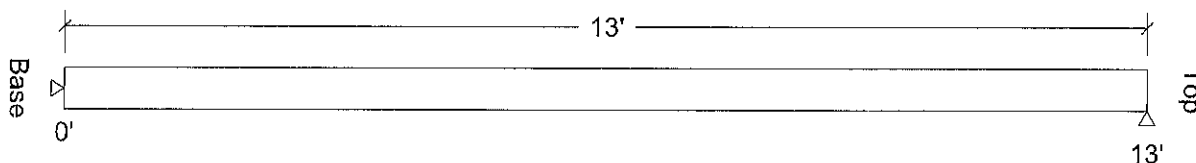
Design Check Calculation Sheet

WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start End	Magnitude Start End	Unit
Load1	Dead	Axial		(Ecc. = 0.00")	6124	lbs
Load2	Snow	Axial		(Ecc. = 0.00")	9066	lbs
Self-weight	Dead	Axial			92	lbs

Load magnitude does not include Normal Importance factor from Table 4.2.3.2, which is applied during analysis.

Lateral Reactions (lbs):**New Post - Ridge Beam****Glulam-Axial, West Species, 2 (DF L2), 5-1/8"x6"**

4 laminations, 5-1/8" maximum width,

Support: Non-wood

Total length: 13'; volume = 2.8 cu.ft.;

Pinned base; Load face = width(b); $K_e \times L_b: 1.0 \times 13.0 = 13.0$ [ft]; $K_e \times L_d: 1.0 \times 13.0 = 13.0$ [ft];**Analysis vs. Allowable Stress and Deflection using NDS 2012 :**

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Axial	$f_c = 497$	$F_c' = 720$	psi	$f_c/F_c' = 0.69$
Axial Bearing	$f_c = 497$	$F_c^* = 2242$	psi	$f_c/F_c^* = 0.22$

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL/CP	CV	Cfu	Cr	Cfrt	Notes	LC#
F_c'	1950	1.15	1.00	1.00	0.321	-	-	-	1.00	-	2
F_c^*	1950	1.15	1.00	1.00	-	-	-	-	1.00	-	2

CRITICAL LOAD COMBINATIONS:Axial : LC #2 = D+S, $P = 15282$ lbs

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

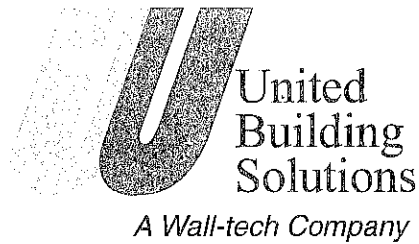
All LC's are listed in the Analysis output

Load combinations: ASCE 7-10 / IBC 2012

Design Notes:

- WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2012), the National Design Specification (NDS 2012), and NDS Design Supplement.
- Please verify that the default deflection limits are appropriate for your application.
- Glulam design values are for materials conforming to ANSI 117-2010 and manufactured in accordance with ANSI A190.1-2007
- GLULAM: bxd = actual breadth x actual depth.





PROJECT _____
 DESCR. _____ PROJ. NO. _____
 CALCULATED BY _____ DATE _____
 CHECKED BY _____ DATE _____
 SCALE _____ SHEET NO. _____

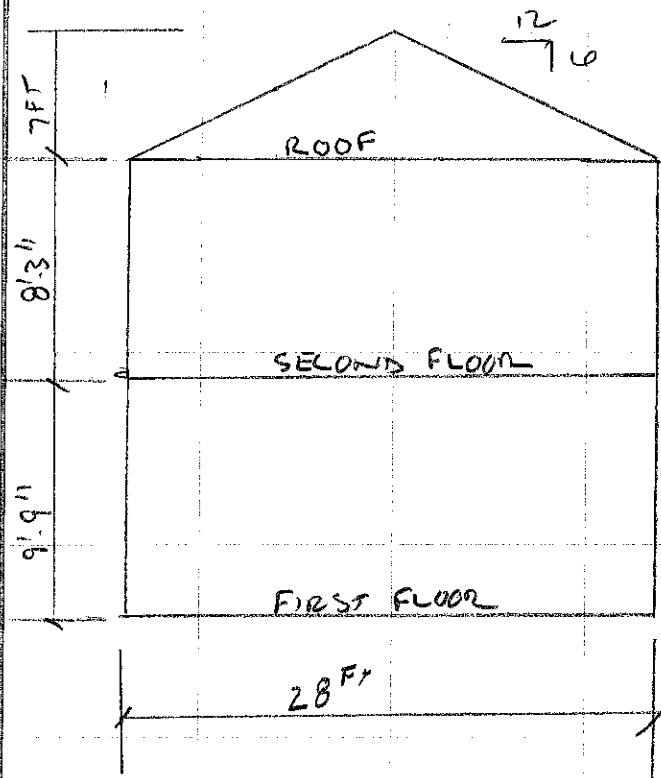
LATERAL BRACING

NEW WALL BRACING @ LINE C

MWFRS BASE PRESSURE = 17.1 psf

END WALL WIND PRESSURE

GABLE END ROOF
 PROJECTION AREA = $\frac{1}{2}(28\text{ FT} \times 7\text{ FT})$
 = 98 FT^2



END WALL WIND LOAD

ROOF LEVEL

$$P_{WZ} = \frac{17.1\text{ psf}(98\text{ FT}^2) + 17.1\text{ psf}(8.25/2)(28\text{ FT})}{2}$$

$$P_{WZ} = 1825\text{ lb}$$

USE 2000 lb

SECOND FLOOR

$$P_{WZND} = \frac{17.1\text{ psf}(8.25/2 + 9.75/2)(28\text{ FT})}{2}$$

$$P_{WZND} = 2155\text{ psf}$$

USE 2500 lb

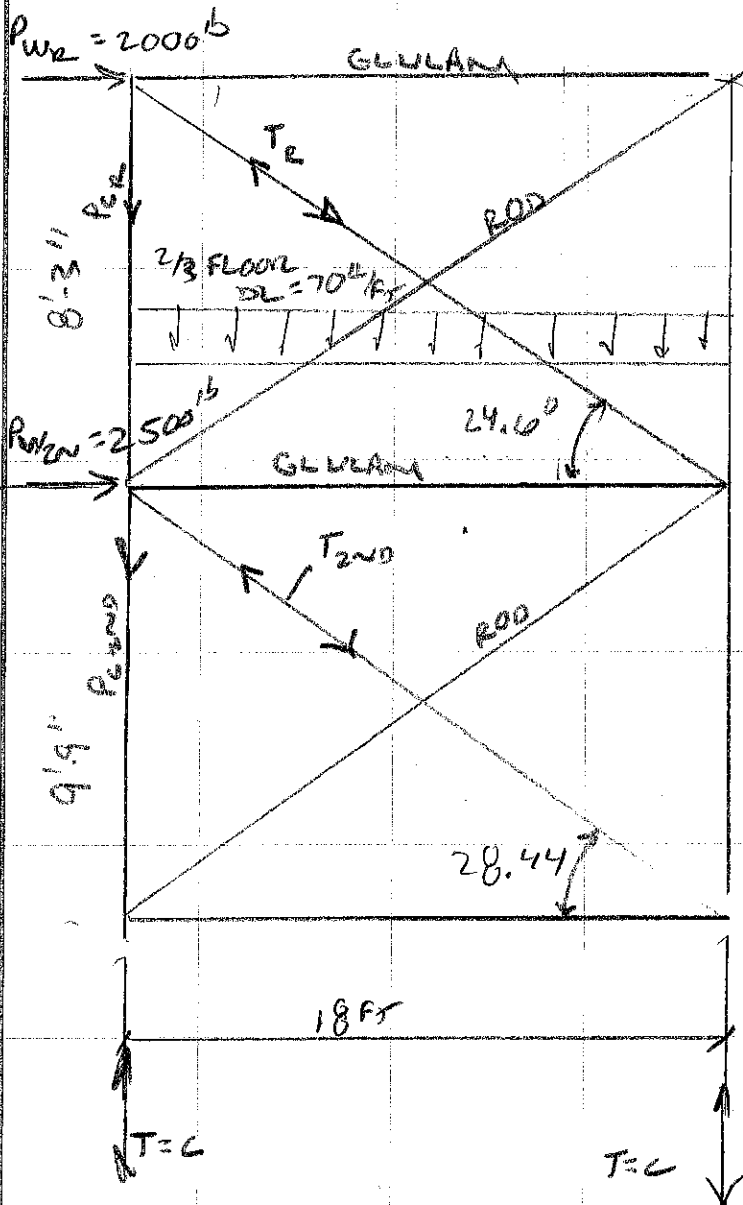
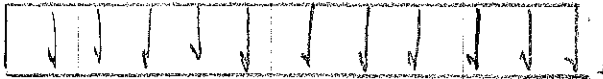
**United
Building
Solutions**

A Wall-tech Company

PROJECT _____
DESCR. _____ PROJ. NO. _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____ SHEET NO. _____

LATERAL BRACING LOADING DIAGRAM

$$2/3 \text{ ROOF DL} = 15 \text{ psf} \left(\frac{24}{3} \right) \frac{14 \text{ ft}}{2} = 70 \frac{\text{lb}}{\text{ft}}$$



$$\text{ROD } F_y = 36,000 \text{ psi}$$

$$\text{ALLOW TEN} = 0.6(36,000) = 21,600 \text{ lb}$$

2ND FLOOR BRACE

$$P_{W2} = 2000 \text{ lb}$$

$$T_2 = \frac{2000 \text{ lb}}{\cos 24.6^\circ} = 2200 \text{ lb}$$

$$A_{\text{ROD}} = \frac{2200 \text{ lb}}{21,600} = 0.101 \text{ in}^2$$

$$A = \pi d^2 / 4$$

$$\text{MIN } d = 0.36 \text{ in}$$

USE 1/2" ϕ ROD

$$P_{C2} = 2200 \text{ lb} (\sin 24.6^\circ) = 916 \text{ lb}$$

1ST FLOOR

$$P_{W1} = 2000 \text{ lb} + 2500 \text{ lb} = 4500 \text{ lb}$$

$$T_{2ND} = \frac{4500 \text{ lb}}{\cos 28.44^\circ} = 5118 \text{ lb}$$

$$A_{\text{ROD}} = \frac{5118}{21,600} = 0.24 \text{ in}^2$$

$$\text{MIN } d = 0.55 \text{ in}$$

$$P_{C2ND} = 5118 (\sin 28.44^\circ) = 2438 \text{ lb}$$

NET UPLIFT @ COLUMN BASE

$$T=C = \frac{2000 \text{ lb} (18 \text{ ft}) + 2500 (9.75) - 70(2) (18)^2 / 2}{18 \text{ ft}}$$

$$T=C = 2094 \text{ lb}$$

SUPPLEMENTAL FOUNDATION CALCULATIONS

For

**640 West Main Street
Lake Geneva, Wisconsin**

by



Date: May 14, 2017

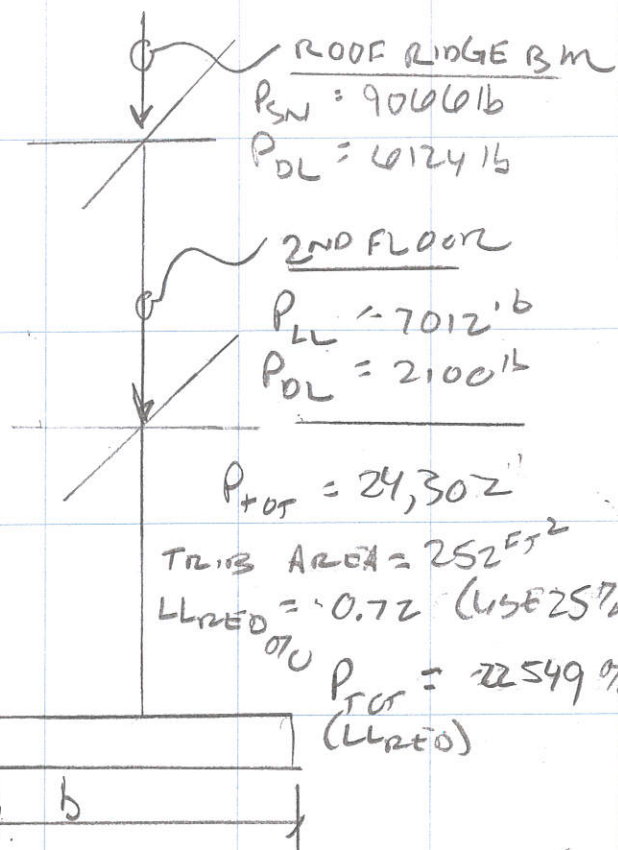


FOUNDATION

- ASSUMED ALLOWABLE SOIL BRLG PRESSURE = 1750 psf
- CONCRETE $f'_c = 3000 \text{ psi}$
- F_y (REBAR) = 60,000 psi

NEW FTG @ NEW INTERIOR COL. (LOCATION B-2)

NEW FTG. COL. LOAD (COL. B-2)

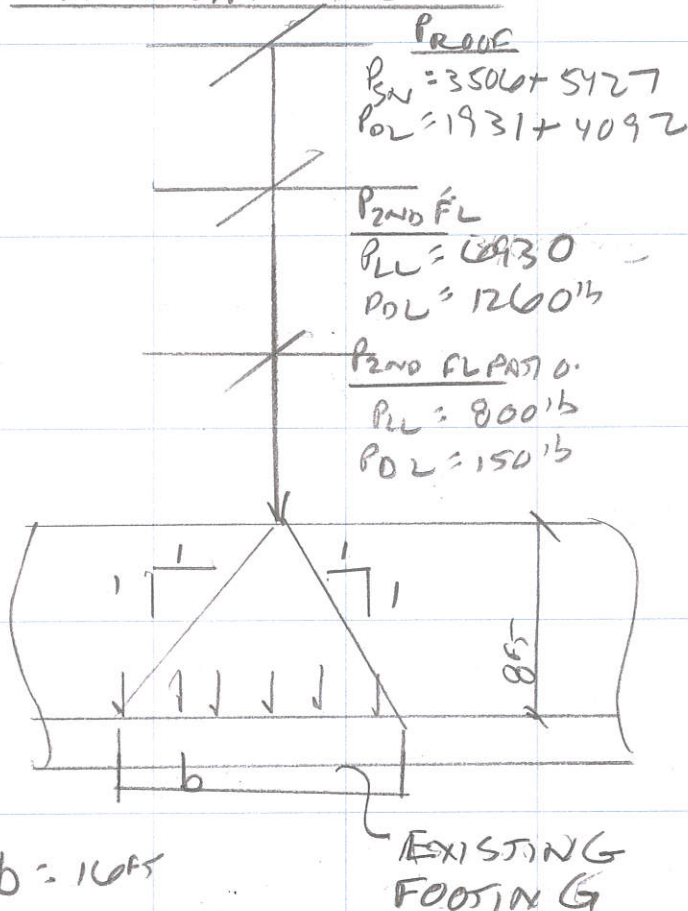


$$b = \sqrt{\frac{22549}{1750 \text{ psf}}} = 3.58 \text{ ft}$$

USE 4'-0" x 4'-0" x 12"
W/ 8 #4'S EACH WAY

EXISTING WALL FTG CHK - LINE C-2

POST LOCATION C.1-2



$$P_{TOTAL} = 17856 \text{ lb}$$

MIN. EXISTING FTG WIDTH NEEDED

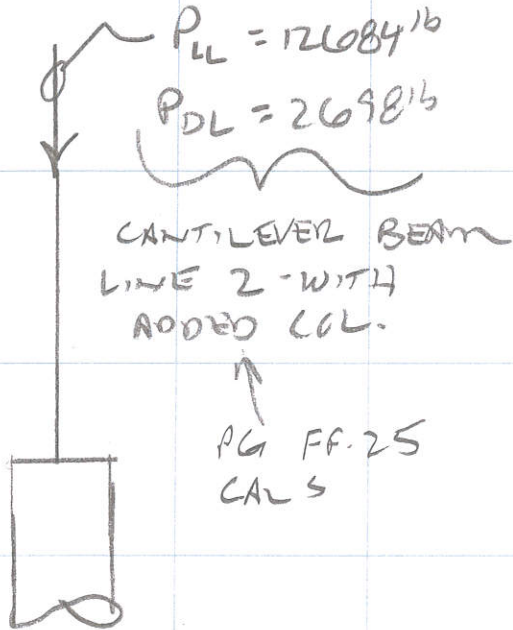
$$a = \frac{17856 \text{ lb}}{10 \text{ ft}} + (10/12) 8 \text{ ft} (150 \text{ pcf}) \leftarrow \text{WALL WT}$$

$$a = 2116 \text{ lb/ft}$$

$$\text{MIN } b_{REQ} = \frac{2116 \text{ lb/ft}}{1750 \text{ psf}} = 1.21 \text{ ft}$$

MIN EXISTING FTG WIDTH NEEDED IS 1'-3" \leftarrow FIELD VERIFY

DRILLED PIER & DECIL POST @ STAIR



$$A_{st} = 1.5\%$$

$$A_{st} = 1.88 \text{ in}^2$$

USE - 8-#5
BARS
VERTICAL

MIN PIER DIAMETER REQ'D

$$A = \pi d^2 / 4$$

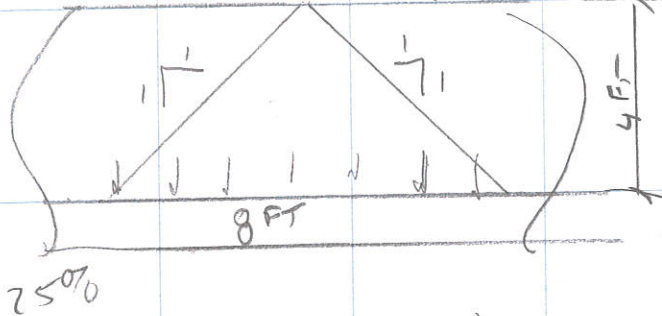
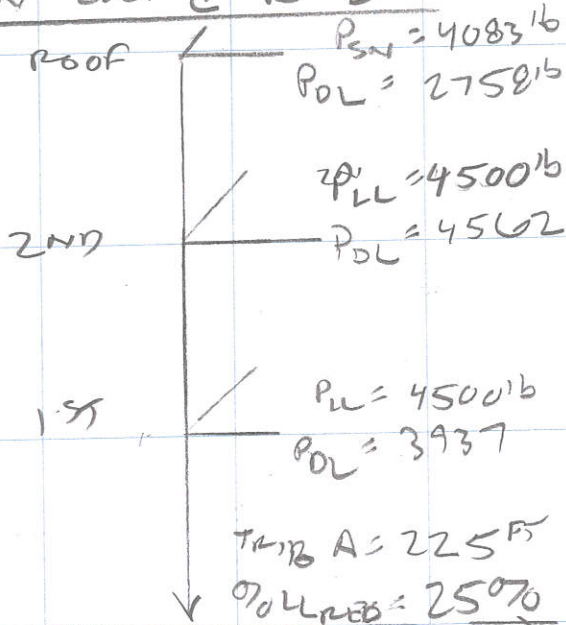
$$A_{REQ'D} = \frac{12684 \text{ lb} + 2698}{1750} = 8.79 \text{ ft}^2$$

$$d = \sqrt{\frac{8.79 (4)}{\pi}} = 3.34 \text{ ft}$$

28" ϕ PIER
N.G.

REVISE TO 40" ϕ
PIER

EXISTING FDN WALL CHK
@ NEW COL. @ B-S.O



$P_{TOT} = 22090 \text{ lb}$
(w/ L.L. REQ)

LINE LOAD (OVER 8 FT)

$W_{112/FT} = \frac{22090 + 10/12(4)(150)}{8}$

$W_{112/FT} = 3261 \text{ lb/ft}$

MIN WALL FTG = $\frac{3261 \text{ lb/ft}}{1750}$

WIDTH = 1.86 FT

FOUNDATION SUMMARY

1. ORIGINAL FTG SHOWN AS 3'0" x 3'0" IS 4.6% OVERSTRESSED
A. REVISE TO 4'0" x 4'0" x 2' DEEP W/ 5-#4'S EACH WAY
2. EXISTING FOUNDATION WALLS W/ NEW COLUMNS ON TOP REQUIRES A MIN OF 1'3" WIDE @ FULL HEIGHT WALL & 2'0" WIDE @ LINE S.O
3. REVISE 28" ϕ DRILLED PIER TO 40" WIDE