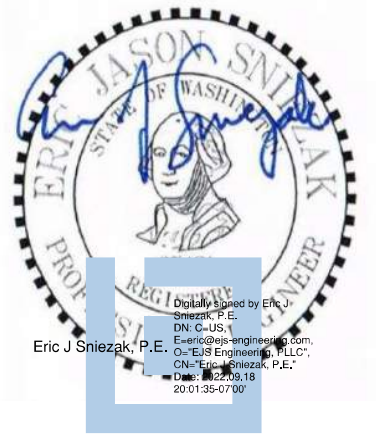
Structural Calculations for:

Roxy Theatre Addition

Randle Woods
233 West Main Street, Morton, WA
Lewis County

7/1/2022
Job #20210310BE



EJS ENGINEERING, PLLC

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Scope of Work

EJS Engineering, PLLC was asked to provide structural calculations and structural plans to the designer/architect/owner/contractor for use in obtaining a building permit for the referenced project at the referenced location.

The application and use of these calculations is limited to a single site referenced on the cover sheet. The attached calculations may or may not apply to other sites and the designer/architect/owner/contractor assumes all responsibility and liability for sites not expressly reviewed and approved. Please contact EJS Engineering PLLC for use at other sites.

The scope of this agreement covers the design phase only. If site inspections are required by the building department, these will be performed at an additional hourly fee of $150.00 per hour (including travel time). Also, revisions to the original design will be billed at the hourly rate of $150.00 per hour-including site visits and travel time due to construction not following original engineering.

EJS Engineering PLLC will use that degree of care and skill ordinarily exercised under similar circumstances by members of the engineering profession in this local. No other warranty, either expressed or implied is made in connection with our rending of professional services. For any dispute, claim, or action arising out of this design, EJS Engineering shall have liability limited to the amount of the total fee received by EJS Engineering.

All work done by EJS Engineering, PLLC is valid only for the specific project invoiced. Unless otherwise noted, payment for services are due at delivery. Failure to pay for services rendered will result in the invalidity of the professional stamp and will be reported to the proper state/county/city jurisdiction.

Questions about the attached information should be addressed to EJS Engineering, PLLC

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General Notes: Job #20210310BE

7/1/2022

Project:

Roxy Theatre Addition
Randle Woods
233 West Main Street, Morton, WA
Lewis County
Job #20210310BE

Applicable Codes and Specifications:

2018 International Building Code [IBC]
2018 International Residential Code [IRC]
ASCE 7-16 [ASCE]
2018 NDS/ASD Wood Design Manuals [NDS]
ANSI/AF&PA SDPWS-2015 Special Design Provisions for wind and seismic [AF&PA]
Simpson Strong-Tie Wood Construction Connectors C-2011 [Simpson]
Boise Engineered Wood Products-WSG 11/2005 [BCI]
WABO-SEAW White Paper Snow Load Regulations and Engineering Practices [WABO-SEAW]

Risk Category: III [ASCE Tbl 1.5-1 & IBC Tbl 1604.5]

Vertical Loads:

	Dead Loads	Live Loads		
$Roof_H$ (Heated)	15 psf	53 psf	61.6	[ASCE Tbl 4-1]
$Roof_U$ (Unheated)	15 psf	63 psf		
Floor	12 psf	40 psf		[ASCE Tbl 4-1]
Deck or Balcony	12 psf	60 psf		[ASCE Tbl 4-1]
Storage	12 psf	100 psf		[ASCE Tbl 4-1]
Timber Wall	10 psf	n/a		
Concrete	150 pcf	n/a		
Steel	490 pcf	n/a		

Lateral Loads:

IBC Seismic Design Criteria	D	(IRC SDC D1)
Wind Speed, V_{ult}	120	mph
Exposure Category	C	

Site Condition:

Vertical Founation Pressure	1500 psf	[IBC Tbl 1806.2]
Lateral Bearing Pressure	150 psf/ft	[IBC Tbl 1806.2]
Ground Snow Load	57 psf	
Frost Depth	18 inches	

Jurisdiction:

Lewis County

Wind Loads

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Wind loads for the MWFRS (Main Wind-Force Resisting System) shall be determined in accordance with Chapter 26-30 of ASCE 7.

Risk Category	III		
Basic Wind Speed, Vult	120	MPH	
Wind Directionality Factor, K_d	0.85		[ASCE table 26.6-1]
Exposure Category	C		[ASCE 26.7]
Topographic Factor, K_{zt}	1.0		[ASCE 26.8]
Enclosure Classification	Enclosed		[ASCE 26.10]
net pressure top, ph	19.70	psf	[ASCE table 27.6-1]
net pressure bot, p0	18.10	psf	[ASCE table 27.6-1]
net pressure roof, pz	14.05	psf	[ASCE table 27.6-2]
Minimum design wind load shall be:			[ASCE 27.4.7]
walls	16.0	psf	
roof	8.0	psf	
Basic Load Combination	= 1.0D + 0.6W		[IBC 16-12]
	= 0.6D + 0.6W		[IBC 16-14]

	Calc	Min	Control
ph=	19.7	16.0	*19.7 psf*
p0=	18.1	16.0	*18.1 psf*
pz=	14.0	8.0	*14.0 psf*

Seismic Loads

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Diaphragms are considered flexible for wood framing			[ASCE12.14.5]
Simplified method used			[ASCE12.14.1.1 & table 12.6-1]
Seismic Design Category =	D		[ASCE Tbl 11.6-1]
$E=E_h+E_v$			[ASCE Eqn 12.14-3]
$E_h=Q_E$			[ASCE Eqn 12.14-5]
$E_v=0.2*S_{ds}*D$			[ASCE Eqn 12.14-6]
note: 0.2*Sds*D is the v.c. Structure is adequate for this load by inspection.			
Q_E = effective horz. Seismic force = V			
$V = F*S_{DS}*W/R$ -Seismic Base Shear			[ASCE Eqn 12.14-11]
where $S_{DS} = 2/3*F_aS_S$	0.70	g	
F_a = Acceleration based Site Coefficient	0.8		[ASCE Tbl 11.4-1]
S_s = Mapped spectral accel.	132%		[ASCE Fig 22-1]
F = # of stories modifier, 1.0, 1.1, 1.2; 1, 2, 3 stories	1.2		[ASCE 12.14.8-1]
R = Response mod factor	6.5	R_{wood}	[ASCE Tbl 12.14-1]
	1.25	R_{canti}	[ASCE Tbl 12.2-1]
W = The Effective Seismic weight	**	lbs	
** Weights are as follows:			
Roofs	15	psf	[ASCE 12.14.8-1 note 2]
Floors	12	psf	
Walls	10	psf	
Basic Load Combination	= 1.0D +0.7E		[IBC 16-12]
	= 0.6D +0.7E		[IBC 16-16]

DESIGN SEISMIC LOADS:

$E = E_h = V = F*SDS*W/R_{wood}$	0.130	*W
$E = E_h = V = F*SDS*W/R_{canti}$	0.674	*W
$0.7E_{wood}$ =	*0.091*	**W*
$0.7E_{canti}$ =	*0.472*	**W*

Based on SDS value and IRC Table R301.2.2.1.1 the IRC Seismic Design Category= D1

Snow Loads

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Snow Loads

Ground Snow Load, p_g	57.0 psf		
$p_f=0.7*C_e*C_t*I_s*P_g$			[ASCE 7.3-1]
C_e	1.2		[ASCE TBL 7-2]
heated C_t	1.0		[ASCE TBL 7-3]
Cold C_t	1.2		[ASCE TBL 7-3]
I_s	1.1		[ASCE TBL 1.5-2]
Heated Flat Roof Snow Load, p_{fh}	52.7 psf		
Unheated Flat Roof Snow Load, p_{fc}	63.2 psf		
$P_s=C_s*p_f$			[ASCE 7.4-1]
heated C_s	1.00		[ASCE FIG 7-2]
Cold C_s	1.00		[ASCE FIG 7-2]
Heated sloped Roof Snow Load, p_{sh}	52.7 psf	Min use 25 psf	
Unheated sloped Roof Snow Load, p_{sc}	63.2 psf	Min use 25 psf	

Shear Walls

Job #20210310BE

Shear Wall Line U1-Upper South Wall Nailing Schedule

Shearwall Force From Wind 3034.5 lbs "A" nailing schedule
Shearwall Force from Seismic 1852.2 lbs

Wall Layout

Shear Length Wind	19.3 ft	$Shear_W$	157.0 plf	**A**	Nailing
Shear Length Seismic	17.7 ft	$Shear_S$	104.6 plf	**A**	Nailing
Wall Length	38.6 ft	Btm Plt	50.6 plf		
Bottom Plate Length	38.6 ft				

#	w	h	Ratio	w_{eff}	inc?	M_{ot}	$M_{restore}$	M_{net}	Uplift	Nailing	other
1	2.3	8	3.4	1.4	yes	2930	946	1984	850	539	n/a
1	3.2	8	2.5	2.5	yes	3976	1742	2234	706	732	n/a
2	6.9	8	1.2	6.9	yes	8685	8310	375	54	1598	n/a

Wind Loading

Shear Wall Area		
Roofs	65.3	ft^2
Walls	112.0	ft^2
other	0.0	ft^2
misc	0.0	ft^2
Shearwall Area	177.3	ft^2
$Shearwall\ Force_w$	3,034.5	lbs

Weight for Seismic Loading

Shearwall Seismic Wt	20,420 lbs	Btm Pt Wt	21,540 lbs
$Shearwall\ Force_s$	1,852 lbs	Btm Pt Force	1,954 lbs
Restoring Wt	11,194 lbs		

seis wt	a	b	Area	DL	Wt (lbs)	restore	shape	notes
yes	38.6	14.0	540.4	15.0	8106	yes	rect	restore roof
yes	38.6	14.0	540.4	15.0	8106	no	rect	roof no restore
yes	38.6	8.0	308.8	10.0	3088	yes	rect	shear wall
yes	28.0	4.0	112.0	10.0	1120	no	rect	upper 1/2 perp walls
no	28.0	4.0	112.0	10.0	1120	no	rect	lower 1/2 wall perp
yes	0.0	0.0	0.0	12.0	0	yes	rect	upper floor restore
yes	0.0	0.0	0.0	12.0	0	no	rect	upper floor no restore

Shear Walls

Job #20210310BE

Shear Wall Line

Ua&Ub-Upper West and East Wall

Shearwall Force From Wind 2113.3 lbs

Shearwall Force from Seismic 1081.4 lbs

Nailing Schedule

"A" nailing schedule

Wall Layout

Shear Length Wind	17.8 ft	$Shear_W$	118.5 plf	**A**	Nailing
Shear Length Seismic	17.0 ft	$Shear_S$	63.6 plf	**A**	Nailing
Wall Length	38.6 ft	Btm Plt	31.7 plf		
Bottom Plate Length	38.6 ft				

#	w	h	Ratio	w_{eff}	inc?	M_{ot}	$M_{restore}$	M_{net}	Uplift	Nailing	other
1	2.8	8	2.8	2.0	yes	2686	529	2157	761	655	n/a
1	6.3	8	1.3	6.3	yes	5925	2576	3349	536	1444	n/a
1	8.8	8	0.9	8.8	yes	8295	5049	3246	371	2021	n/a

Wind Loading

Shear Wall Area	
Roofs	45.5 ft^2
Walls	78.0 ft^2
other	0.0 ft^2
misc	0.0 ft^2
Shearwall Area	123.5 ft^2
$Shearwall\ Force_w$	2,113.3 lbs

Weight for Seismic Loading

Shearwall Seismic Wt	11,923 lbs	Btm Pt Wt	13,479 lbs
$Shearwall\ Force_s$	1,081 lbs	Btm Pt Force	1,223 lbs
Restoring Wt	3,920 lbs		

seis wt	a	b	Area	DL	Wt (lbs)	restore	shape	notes
yes	28.0	4.0	112.0	15.0	1680	yes	rect	restore roof
yes	28.0	15.4	429.8	15.0	6447	no	rect	roof no restore
yes	28.0	8.0	224.0	10.0	2240	yes	rect	shear wall
yes	38.9	4.0	155.6	10.0	1556	no	rect	upper 1/2 perp walls
no	38.9	4.0	155.6	10.0	1556	no	rect	lower 1/2 wall perp
yes	0.0	0.0	0.0	12.0	0	yes	rect	upper floor restore
yes	0.0	0.0	0.0	12.0	0	no	rect	upper floor no restore

Shear Walls

Job #20210310BE

Shear Wall Line M1-Main South Wall **Nailing Schedule**

Shearwall Force From Wind 2113.3 lbs "A" nailing schedule

Shearwall Force from Seismic 1081.4 lbs

Wall Layout

Shear Length Wind	17.8 ft	$Shear_W$	118.5 plf	**A**	Nailing
Shear Length Seismic	17.0 ft	$Shear_S$	63.6 plf	**A**	Nailing
Wall Length	38.6 ft	Btm Plt	31.7 plf		
Bottom Plate Length	38.6 ft				

#	w	h	Ratio	w_{eff}	inc?	M_{ot}	$M_{restore}$	M_{net}	Uplift	Nailing	other
1	2.8	8	2.8	2.0	yes	2686	529	2157	761	655	n/a
1	6.3	8	1.3	6.3	yes	5925	2576	3349	536	1444	n/a
1	8.8	8	0.9	8.8	yes	8295	5049	3246	371	2021	n/a

Wind Loading

Shear Wall Area

Roofs	45.5	ft^2
Walls	78.0	ft^2
other	0.0	ft^2
misc	0.0	ft^2
Shearwall Area	123.5	ft^2
$Shearwall\ Force_w$	2,113.3	lbs

Weight for Seismic Loading

Shearwall Seismic Wt	11,923 lbs	Btm Pt Wt	13,479 lbs
$Shearwall\ Force_s$	1,081 lbs	Btm Pt Force	1,223 lbs
Restoring Wt	3,920 lbs		

seis wt	a	b	Area	DL	Wt (lbs)	restore	shape	notes
yes	28.0	4.0	112.0	15.0	1680	yes	rect	restore roof
yes	28.0	15.4	429.8	15.0	6447	no	rect	roof no restore
yes	28.0	8.0	224.0	10.0	2240	yes	rect	shear wall
yes	38.9	4.0	155.6	10.0	1556	no	rect	upper 1/2 perp walls
no	38.9	4.0	155.6	10.0	1556	no	rect	lower 1/2 wall perp
yes	0.0	0.0	0.0	12.0	0	yes	rect	upper floor restore
yes	0.0	0.0	0.0	12.0	0	no	rect	upper floor no restore

Shear Wall Schedule

Mark#	Wall Type	Nails	Pattern	NOTES
A	7/16" MIN. APA SHEATHING ONE FACE	8d	6" O.C. EDGE/12" O.C FIELD	1,2,3,4,8,11,12,13
B	7/16" MIN. APA SHEATHING ONE FACE	8d	4" O.C. EDGE/12" O.C FIELD	1,2,3,5,8,11,12,13
C	7/16" MIN. APA SHEATHING ONE FACE	8d	3" O.C. EDGE/12" O.C FIELD	1,2,3,6,8,9,10,11,12,13
D	7/16" MIN. APA SHEATHING ONE FACE	8d	2" O.C. EDGE/12" O.C FIELD	1,2,3,7,8,9,10,11,12,13
P	PORTAL FRAME W/ HOLD-DOWNS	8d	3" O.C. ALL FRAMING	14
G	5/8" GYPSUM WALL BOARD	6d	4" O.C. ALL FRAMING	15,16

Shearwall Notes:

1) Wood Panel nailing criteria and capacities based on SDPWS table 4.3A.
2) All sheathing edges, blocking, and intermediate framing shall be 2x or wider framing U.N.O.
3) All studs and blocking shall be HF#2 U.N.O., all top and bottom plates shall be HF#2 U.N.O.
4) Anchor bolts shall be 5/8" ø, 7" embedment, and 3"x3"x1/4" square washer at 6'-0" o.c.
5) Anchor bolts shall be 5/8" ø, 7" embedment, and 3"x3"x1/4" square washer at 4'-0" o.c.
6) Anchor bolts shall be 5/8" ø, 7" embedment, and 3"x3"x1/4" square washer at 2'-0" o.c.
7) Anchor bolts shall be 5/8" ø, 7" embedment, and 3"x3"x1/4" square washer at 1'-0" o.c.
8) One anchor bolt shall be provided within 12" of the end of each sill plate.
9) Provide nominal 3x for common members.
10) in lieu of 3x framing member, built up member with 16d nails at 4" o.c. staggered can be used.
11) Studs shall not be spaced more than 16" o.c.
12) 10d box nails may be used in lieu of 8d common nails. All nails shall have full size heads.
13) Hold downs and other connections may be required at the ends of any shearwall. Size and locations of these connections are indicated on the plans.
14) Portal Frame w/ hold-downs based on Section and Figure 2308.6.5.2 IBC.
15) Gypsum panel nailing criteria and capacities based on SDPWS table 4.3C.
16) All edges of gypsum wall board to be blocked.

Mark#	Seismic Capacity	Wind Capacity
A	255 plf	357 plf
B	395 plf	553 plf
C	505 plf	707 plf
D	670 plf	938 plf
G	110 plf	110 plf

Gravity Analysis

(A) Roof System

A1-Trusses and Attic trusses

Standard trusses in structure. Typical H2.5a hold down at each truss bearing location. Have manufacture specifications on site during construction.

Gravity Analysis

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A2-Main Roof Mid Beam

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
GLB	**1**	**5½ x 21**	**24F-V4**	**Floor**	**15.0**	**<19%**

b	5.50	in	Wt factor	0.233	lb/(in^2-ft)
h	21.00	in	WtInc factor	1.000	factor
A_x	115.50	in^2	E	1,800,000	psi
S_x	404.3	in^3	F_b	2,400	psi
I_x	4,244.6	in^4	F_v	240	psi

Adjustment Factors

	M	V	E
C_F =	1	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,800,000	psi
F'_b	2,400	psi
F'_v	240	psi
V_{xall}	18,480	lbs
M_{xall}	80,850	ft-lbs
$ù_{LLMax}$	0.500	in
$ù_{TotMax}$	0.750	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	34.3	0.0	0.0	0.0		
Total Loads	2317.6	0.0	0.0	0.0	26.91	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	17,584.1	lbs
R_b	17,584.1	lbs
V_{xmax}	17,584.1	lbs
M_{xmax}	65,940.2	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	228	17,584	240	18,480	95%
Max fb (psi) & M (ft-lbs)	1,957	65,940	2,400	80,850	82%
Live Load Max Defl. (in)	0.269	L/669	0.500	L/360	54%
Total Load Max Defl. (in)	0.350	L/514	0.750	L/240	47%

Gravity Analysis

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(B) Headers

B1-Upper Windows Side Wall

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	1	4x8	DF#2	Floor	5	<19%

b	3.50	in	Wt factor	0.233	lb/(in^2-ft)
h	7.25	in	WtInc factor	1.000	factor
A_x	25.38	in^2	E	1,300,000	psi
S_x	30.7	in^3	F_b	900	psi
I_x	111.1	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.3	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'b	1,170	psi
F'v	180	psi
V_{xall}	3,045	lbs
M_{xall}	2,989	ft-lbs
$ù_{LLMax}$	0.167	in
$ù_{TotMax}$	0.250	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	4.0	0.0	0.0	0.0		
Total Loads	270.7	0.0	0.0	0.0	5.91	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	691.5	lbs
R_b	691.5	lbs
V_{xmax}	691.5	lbs
M_{xmax}	864.3	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	41	691	180	3,045	23%
Max fb (psi) & M (ft-lbs)	338	864	1,170	2,989	29%
Live Load Max Defl. (in)	0.021	L/2926	0.167	L/360	12%
Total Load Max Defl. (in)	0.027	L/2228	0.250	L/240	11%

Gravity Analysis

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B2-Upper Windows South Wall

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	1	4x10	DF#2	Roof	5	<19%

b	3.50	in	Wt factor	0.233	lb/(in^2-ft)
h	9.25	in	WtInc factor	1.000	factor
A_x	32.38	in^2	E	1,300,000	psi
S_x	49.9	in^3	F_b	900	psi
I_x	230.8	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.2	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'_b	1,080	psi
F'_v	180	psi
V_{xall}	3,885	lbs
M_{xall}	4,492	ft-lbs
$ù_{LLMax}$	0.250	in
$ù_{TotMax}$	0.333	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	16.0	0.0	0.0	0.0		
Total Loads	1082.7	0.0	0.0	0.0	7.54	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	2,725.6	lbs
R_b	2,725.6	lbs
V_{xmax}	2,725.6	lbs
M_{xmax}	3,407.0	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	126	2,726	180	3,885	70%
Max fb (psi) & M (ft-lbs)	819	3,407	1,080	4,492	76%
Live Load Max Defl. (in)	0.039	L/1519	0.250	L/240	16%
Total Load Max Defl. (in)	0.051	L/1174	0.333	L/180	15%

Gravity Analysis

Job #20210310BE

B3-Lower Long Wall Headers

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	1	4x8	DF#2	Floor	5	<19%

b	3.50	in	Wt factor	0.233	lb/(in^2-ft)
h	7.25	in	WtInc factor	1.000	factor
A_x	25.38	in^2	E	1,300,000	psi
S_x	30.7	in^3	F_b	900	psi
I_x	111.1	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.3	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'_b	1,170	psi
F'_v	180	psi
V_{xall}	3,045	lbs
M_{xall}	2,989	ft-lbs
$ù_{LLMax}$	0.167	in
$ù_{TotMax}$	0.250	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	4.0	0.0	0.0	0.0		
Total Loads	270.7	0.0	0.0	0.0	5.91	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	691.5	lbs
R_b	691.5	lbs
V_{xmax}	691.5	lbs
M_{xmax}	864.3	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	41	691	180	3,045	23%
Max fb (psi) & M (ft-lbs)	338	864	1,170	2,989	29%
Live Load Max Defl. (in)	0.021	L/2926	0.167	L/360	12%
Total Load Max Defl. (in)	0.027	L/2228	0.250	L/240	11%

Gravity Analysis

Job #20210310BE

B4-Lower long wall header

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	1	4x8	DF#2	Floor	3	<19%

b	3.50	in	Wt factor	0.233	lb/(in^2-ft)
h	7.25	in	WtInc factor	1.000	factor
A_x	25.38	in^2	E	1,300,000	psi
S_x	30.7	in^3	F_b	900	psi
I_x	111.1	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.3	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'_b	1,170	psi
F'_v	180	psi
V_{xall}	3,045	lbs
M_{xall}	2,989	ft-lbs
$ù_{LLMax}$	0.100	in
$ù_{TotMax}$	0.150	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	19.5	0.0	0.0	0.0		
Total Loads	1319.5	0.0	0.0	0.0	5.91	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	1,988.2	lbs
R_b	1,988.2	lbs
V_{xmax}	1,988.2	lbs
M_{xmax}	1,491.1	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	118	1,988	180	3,045	65%
Max fb (psi) & M (ft-lbs)	584	1,491	1,170	2,989	50%
Live Load Max Defl. (in)	0.013	L/2779	0.100	L/360	13%
Total Load Max Defl. (in)	0.017	L/2153	0.150	L/240	11%

Gravity Analysis

Job #20210310BE

B5-South Wall Door

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	1	4x12	DF#2	Floor	6	<19%

b	3.50	in	Wt factor	0.233	lb/(in^2-ft)
h	11.25	in	WtInc factor	1.000	factor
A_x	39.38	in^2	E	1,300,000	psi
S_x	73.8	in^3	F_b	900	psi
I_x	415.3	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.1	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'_b	990	psi
F'_v	180	psi
V_{xall}	4,725	lbs
M_{xall}	6,091	ft-lbs
$\grave{u}_{LLMax}$	0.200	in
$\grave{u}_{TotMax}$	0.300	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	15.9	0.0	0.0	0.0		
Total Loads	1074.2	0.0	0.0	0.0	9.17	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	3,250.2	lbs
R_b	3,250.2	lbs
V_{xmax}	3,250.2	lbs
M_{xmax}	4,875.3	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	124	3,250	180	4,725	69%
Max fb (psi) & M (ft-lbs)	792	4,875	990	6,091	80%
Live Load Max Defl. (in)	0.045	L/1594	0.200	L/360	23%
Total Load Max Defl. (in)	0.059	L/1230	0.300	L/240	20%

Gravity Analysis

Job #20210310BE

B6-South wall windows

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	1	4x12	DF#2	Floor	5	<19%

b	3.50	in	Wt factor	0.233	lb/(in^2-ft)
h	11.25	in	WtInc factor	1.000	factor
A_x	39.38	in^2	E	1,300,000	psi
S_x	73.8	in^3	F_b	900	psi
I_x	415.3	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.1	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'_b	990	psi
F'_v	180	psi
V_{xall}	4,725	lbs
M_{xall}	6,091	ft-lbs
$ù_{LLMax}$	0.167	in
$ù_{TotMax}$	0.250	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	16.0	8.9	0.0	0.0		
Total Loads	1082.7	463.7	0.0	0.0	9.17	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	3,888.8	lbs
R_b	3,888.8	lbs
V_{xmax}	3,888.8	lbs
M_{xmax}	4,861.0	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	148	3,889	180	4,725	82%
Max fb (psi) & M (ft-lbs)	790	4,861	990	6,091	80%
Live Load Max Defl. (in)	0.031	L/1920	0.167	L/360	19%
Total Load Max Defl. (in)	0.041	L/1480	0.250	L/240	16%

Gravity Analysis

Job #20210310BE

B7-East Wall Window Headers

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	**1**	**4x8**	**DF#2**	**Floor**	**6**	**<19%**

b	3.50	in	Wt factor	0.233	lb/(in^2-ft)
h	7.25	in	WtInc factor	1.000	factor
A_x	25.38	in^2	E	1,300,000	psi
S_x	30.7	in^3	F_b	900	psi
I_x	111.1	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.3	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'b	1,170	psi
F'v	180	psi
V_{xall}	3,045	lbs
M_{xall}	2,989	ft-lbs
$ù_{LLMax}$	0.200	in
$ù_{TotMax}$	0.300	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	4.0	0.7	0.0	0.0		
Total Loads	270.7	34.7	0.0	0.0	5.91	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	933.8	lbs
R_b	933.8	lbs
V_{xmax}	933.8	lbs
M_{xmax}	1,400.6	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	55	934	180	3,045	31%
Max fb (psi) & M (ft-lbs)	548	1,401	1,170	2,989	47%
Live Load Max Defl. (in)	0.048	L/1503	0.200	L/360	24%
Total Load Max Defl. (in)	0.063	L/1146	0.300	L/240	21%

Gravity Analysis

Job #20210310BE

B8-North Wall Door Header

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	**1**	**4x12**	**DF#2**	**Floor**	**6**	**<19%**

b	3.50	in	Wt factor	0.233	lb/(in^2-ft)
h	11.25	in	WtInc factor	1.000	factor
A_x	39.38	in^2	E	1,300,000	psi
S_x	73.8	in^3	F_b	900	psi
I_x	415.3	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.1	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'_b	990	psi
F'_v	180	psi
V_{xall}	4,725	lbs
M_{xall}	6,091	ft-lbs
$ù_{LLMax}$	0.200	in
$ù_{TotMax}$	0.300	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	16.0	5.0	0.0	0.0		
Total Loads	1082.7	260.0	0.0	0.0	9.17	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	4,055.6	lbs
R_b	4,055.6	lbs
V_{xmax}	4,055.6	lbs
M_{xmax}	6,083.4	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	154	4,056	180	4,725	86%
Max fb (psi) & M (ft-lbs)	989	6,083	990	6,091	100%
Live Load Max Defl. (in)	0.056	L/1278	0.200	L/360	28%
Total Load Max Defl. (in)	0.073	L/986	0.300	L/240	24%

Gravity Analysis

Job #20210310BE

(C) Upper Floorsystem

C1-Floorbeams

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	1	4x10	DF#2	Floor	6	<19%

b	3.50		Wt factor	0.233	lb/(in^2-ft)
h	9.25	in	WtInc factor	1.000	factor
A_x	32.38	in^2	E	1,300,000	psi
S_x	49.9	in^3	F_b	900	psi
I_x	230.8	in^4	F_v	180	psi

Adjustment Factors

	M	V	E
C_F =	1.2	N/A	N/A
C_r =	1	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'_b	1,080	psi
F'_v	180	psi
V_{xall}	3,885	lbs
M_{xall}	4,492	ft-lbs
$ù_{LLMax}$	0.200	in
$ù_{TotMax}$	0.300	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	0.0	14.0	0.0	0.0		
Total Loads	0.0	728.0	0.0	0.0	7.54	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	2,206.6	lbs
R_b	2,206.6	lbs
V_{xmax}	2,206.6	lbs
M_{xmax}	3,309.9	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	102	2,207	180	3,885	57%
Max fb (psi) & M (ft-lbs)	796	3,310	1,080	4,492	74%
Live Load Max Defl. (in)	0.054	L/1323	0.200	L/360	27%
Total Load Max Defl. (in)	0.071	L/1007	0.300	L/240	24%

Gravity Analysis

Job #20210310BE

C2-Floor Joists (use 11-7/8 BCI 60 2.0 at 16" o.c.)

Span and Member Properties

Type	No. of pieces	Section	Species	Δ Crit	Span (ft)	Moist Cont.
S4S	**1**	**2x12**	**HF#2**	**Floor**	**17.9**	**<19%**

b	1.50	in	Wt factor	0.213	lb/(in^2-ft)
h	11.25	in	WtInc factor	1.000	factor
A_x	16.88	in^2	E	1,300,000	psi
S_x	31.6	in^3	F_b	850	psi
I_x	178.0	in^4	F_v	150	psi

Adjustment Factors

	M	V	E
C_F =	1	N/A	N/A
C_r =	1.15	N/A	N/A
C_M =	1	1	1
C_{fu} =	1	N/A	N/A
C_i =	1	1	1
C_t =	1	1	1

Adjusted Design Values

E'	1,300,000	psi
F'_b	978	psi
F'_v	150	psi
V_{xall}	1,688	lbs
M_{xall}	2,577	ft-lbs
$ù_{LLMax}$	0.597	in
$ù_{TotMax}$	0.895	in

Uniform Loads

	Roof	Floor	Deck	Storage	Self-Weight	
Dead (psf)	15	12	12	12		
Live (psf)	52.668	40	60	100		
Trib (ft)	0.0	1.0	0.0	0.0		
Total Loads	0.0	52.0	0.0	0.0	3.59	plf

Point Loads

	Load 1	Load 2
Dead	0	0
Live	0	0
Location	0.0	0.0

Reactions/forces/stresses

R_a	497.6	lbs
R_b	497.6	lbs
V_{xmax}	497.6	lbs
M_{xmax}	2,226.6	ft-lbs

Design Check — Stress/Deflection/Load Check---------- OK

	Actual		Allowable		
Max fv (psi) & V (lbs)	44	498	150	1,688	29%
Max fb (psi) & M (ft-lbs)	844	2,227	978	2,577	86%
Live Load Max Defl. (in)	0.399	L/537	0.597	L/360	67%
Total Load Max Defl. (in)	0.555	L/387	0.895	L/240	62%

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Gravity Analysis

(F) Footings

F1-Roof Pier Pad

	Load 1	Load 2	Load 3	uplift	
trib length	7.0	14.0	14.0	0.0	ft
load	67.7	52.0	52.0	14.0	psf
spacing	34.3	0.0	0.0	0.0	ft
	16,223	0	0	0	lbs

16,223 lbs required

USE: 42"x42"x18" Footing-18375 lbs bearing & 2756 lbs weight