

STRUCTURAL CALCULATIONS

FOR

**SWEET HOME CITY HALL
REMODEL**

**3225 MAIN STREET
SWEET HOME, OREGON**

JULY 30, 2018

WDY Project Number: 17095



RENEWS: 06-30-2020

DESIGN PARAMETERS: 2014 Oregon Structural Specialty Code (OSSC)

Table 1604.5	Risk Category	II
Roofs	Dead load	15 psf (existing)
Floor	Dead load	15 psf (existing)
Seismic	Mapped spectral response, S_s and S_1	0.723 and 0.363
	Site class	D
	Seismic importance factor, I_E	1.00
	Spectral response coeff., S_{DS} and S_{D1}	0.589 and 0.405
	Seismic design category	D
	Basic seismic force resisting system	Bearing wall system
	Response modification factor, R	6 1/2
	Seismic response coefficient, C_s	0.091
	Analysis procedure used	Equivalent lateral force

CONTENTS:

Lateral Analysis L-1 to L-19
 Framing FR-1 to FR-24

Job Name: **Sweet Home City Hall Remodel**

Job No: **17095**

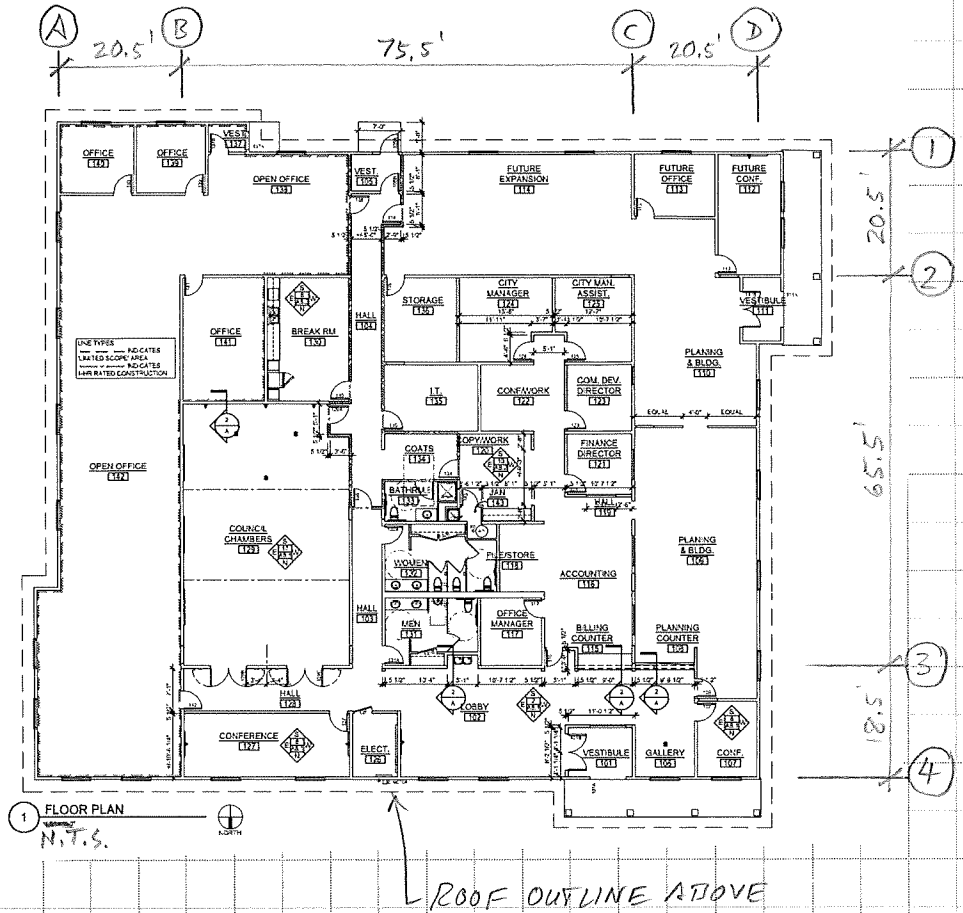
Sheet No: **L-1**

Client: **SEA**

Date: **07/2018**

By: **mw**

LATERAL ANALYSIS,





Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L- 2
Client:	SEA	Date:	07/2018	By:	mw

BUILDING WEIGHT:

Level	Element/Description	No. Req'd	Depth/ Height	Unit	Wt/Unit (plf, psf)	Tributary Wt. (lbs.)	
Center Roof		Roof Height =		13.00 ft.			
	Roofing	1	4,945	SF	2.0	9891	
	5/8" Plywood	1	4,945	SF	1.8	8901	
	Insulation	1	4,945	SF	1.5	7418	
	22" TJI at 24" o.c.	1	4,945	SF	4.0	19781	
	suspended Ceiling	1	4,945	SF	2.0	9891	
	Mechanical & Electrical	1	4,945	SF	2.0	9891	
	Miscellaneous	1	4,945	SF	1.7	8407	(15.0 psf DL)
	Parapet Walls	282	11.00	LF	10.0	31020	
	Partition Walls	1	4,945	SF	5.0	24726	
						129925	
Perimeter Roof		Roof Height =		10.00 ft.			
	Roofing	1	9,029	SF	2.0	18058	
	5/8" Plywood	1	9,029	SF	1.8	16252	
	Insulation	1	9,029	SF	1.5	13544	
	manuf. Wood Trusses at 24" o.c.	1	9,029	SF	4.0	36116	
	suspended Ceiling	1	9,029	SF	2.0	18058	
	Mechanical & Electrical	1	9,029	SF	2.0	18058	
	Miscellaneous	1	9,029	SF	1.7	15349	(15.0 psf DL)
	Perimeter Walls	468	4.50	LF	10.0	21060	
	Partition Walls	1	9,029	SF	5.0	45145	
						201640	
TOTAL						331.6 kips	



Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L- 3
Client:	SEA	Date:	07/2018	By:	mw

ROOF AREAS/WEIGHTS TRIBUTARY TO GRIDS [FT², LBS]:

Grids						
Level	Total	A	B	C	D	Check
Center Roof						
Area	4,945	0	2,473	2,473	0	4,945 ft ²
Weight	129,925	0	64,963	64,963	0	129,925 lbs
Perimeter Roof						
Area	9,029	1,421	2,968	2,992	1,648	9,029 ft ²
Weight	201,640	31,732	66,274	66,827	36,807	201,640 lbs
TOTALS	331,565	31,732	131,237	131,790	36,807	331,565 lbs

Level	Total	1	2	3	4	
Center Roof						
Area	4,945	0	2,473	2,473	0	4,945 ft ²
Weight	129,925	0	64,963	64,963	0	129,925 lbs
Perimeter Roof						
Area	9,029	1,648	3,077	2,812	1,492	9,029 ft ²
Weight	201,640	36,807	68,714	62,796	33,323	201,640 lbs
TOTALS	331,565	36,807	133,677	127,759	33,323	331,565 lbs

USGS Design Maps Summary Report

L-4

User-Specified Input

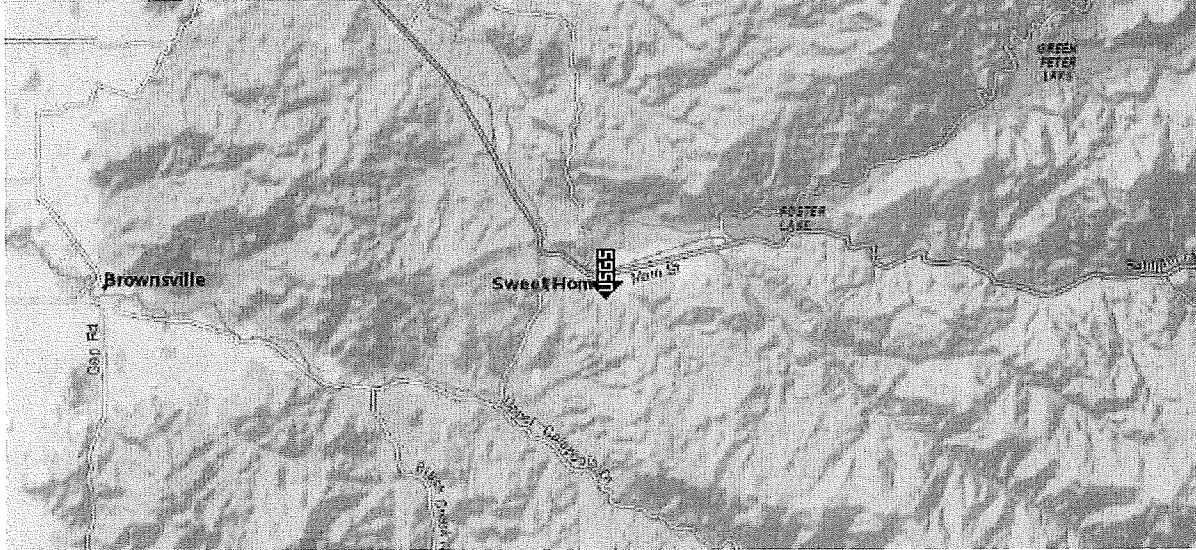
Report Title Sweet Home City Hall
Tue July 17, 2018 19:02:32 UTC

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 44.3978°N, 122.72981°W

Site Soil Classification Site Class D - "Stiff Soil"

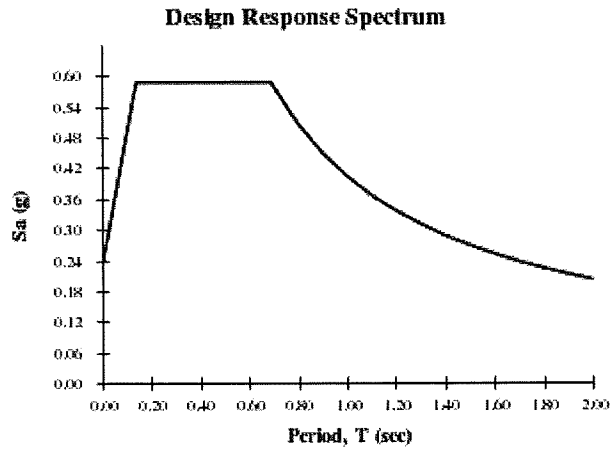
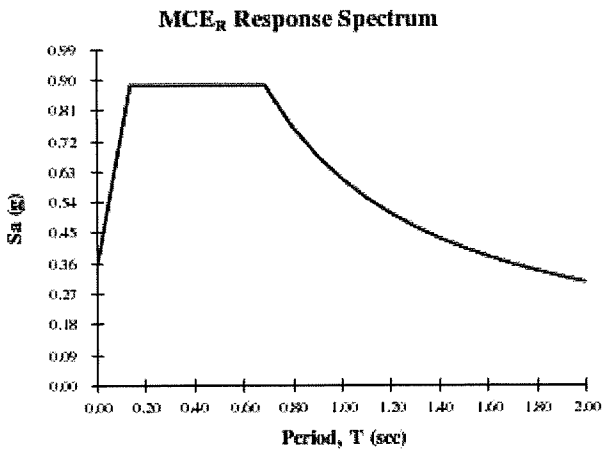
Risk Category I/II/III



USGS-Provided Output

$S_s = 0.723 \text{ g}$	$S_{MS} = 0.883 \text{ g}$	$S_{DS} = 0.589 \text{ g}$
$S_1 = 0.363 \text{ g}$	$S_{M1} = 0.608 \text{ g}$	$S_{D1} = 0.405 \text{ g}$

For information on how the S_s and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

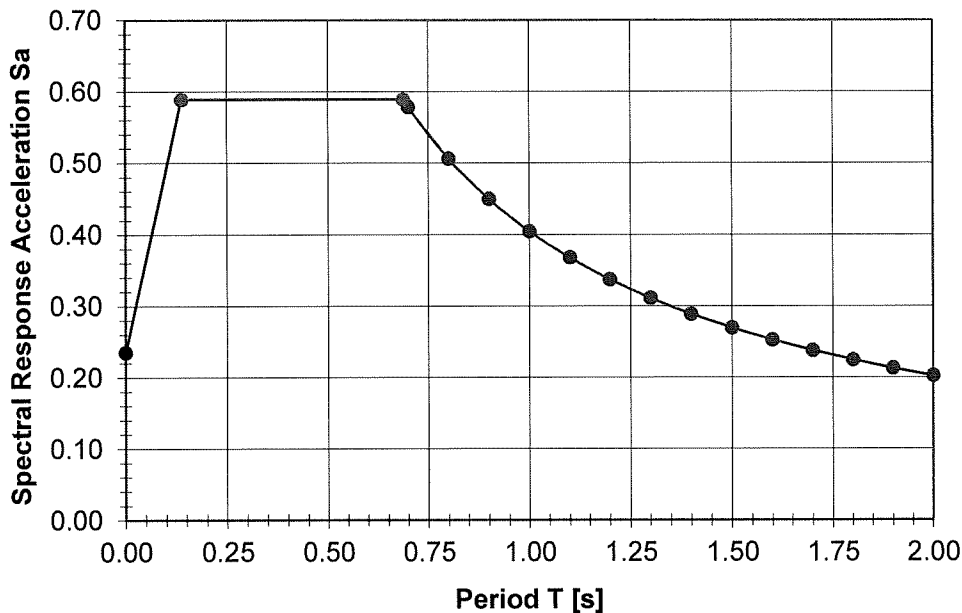
Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L- 5
Client:	SEA	Date:	07/2018	By:	mw

RESPONSE SPECTRUM PER ASCE 7-10, SECTION 11.4:

Input: $S_s =$ **0.723** (Obtained from USGS Lat and Long. Lookup)
 $S_1 =$ **0.363** (Obtained from USGS Lat and Long. Lookup)
Choose Site Class: D
 $C_t =$ **0.02**
 $x =$ **0.75**
 $h_n =$ **16 ft**, Height of Structure above base to highest level

Output: $S_{ds} = 2/3 * F_a * S_s =$ **0.589**
 $S_{d1} = 2/3 * F_v * S_1 =$ **0.405**
 $T_s = S_{d1} / S_{ds} =$ **0.688 sec**
 $T_0 = 0.2 * T_s =$ **0.138 sec**

Linear: Structure Period $T = C_t * h_n^{3/4} =$ **0.160 sec**
 $S_a = S_{d1} / T \leq S_{ds} =$ **0.589**

Response Spectrum


T [s]	Sa [g]
0.000	0.236
0.138	0.589
0.688	0.589
0.700	0.579
0.800	0.506
0.900	0.450
1.000	0.405
1.100	0.368
1.200	0.338
1.300	0.312
1.400	0.289
1.500	0.270
1.600	0.253
1.700	0.238
1.800	0.225
1.900	0.213
2.000	0.203
2.100	0.193
2.200	0.184
2.300	0.176
2.400	0.169



Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L- 6
Client:	SEA	Date:	07/2018	By:	mw

SEISMIC LOADING:

DESIGN PER ASCE 7-10, SECTION 12.8:

Choose Seismic Use Group: II - All Other Buildings (Importance Factor = 1.0) ▼

1 Seismic Use Group
 1.00 I_e (Seismic Factor)
 1.00 I_s (Snow Factor)

Seismic Design Category:
 D S_{ds} Case
 D S_{d1} Case
 D Worse Case

E-W **R = 6.5** Response Modification Factors (See Table 12.2-1)
 N-S **R = 6.5** Light-frame Walls with Wood Structural Panels

$$C_s = S_{ds}/(R/I_e) \quad [\text{SEC 12.8.1.1, Eq. 12.8-2}]$$

E-W C_s = 0.091
 N-S C_s = 0.091

$$C_{s,min} = 0.010 \quad [\text{Eq. 12.8-5}]$$

$$C_{s,max} = 0.389 \quad [\text{Eq. 12.8-3}]$$

$$C_s = 0.091$$



Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L- 7
Client:	SEA	Date:	07/2018	By:	mw

REDUNDANCY PER ASCE 7-10, SECTION 12.3.4.2:

Level	north-south ρ	east-west ρ
Roof	1.0	1.0



Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L- 8
Client:	SEA	Date:	07/2018	By:	mw

ROOF SEISMIC SHEAR TRIBUTARY TO GRIDS [LBS]:

C_s = 0.091

Grids

Level	Total	A	B	C	D	Check
Roof						
Weight	331,565	31,732	131,237	131,790	36,807	331,565 lbs
Shear	30,045	2,875	11,892	11,942	3,335	30,045
ρ		1.00	1.00	1.00	1.00	
F _{xi}		2,875	11,892	11,942	3,335	30,045 lbs
Level	Total	1	2	3	4	Check
Roof						
Weight	331,565	36,807	133,677	127,759	33,323	331,565 lbs
Shear	30,045	3,335	12,113	11,577	3,020	30,045
ρ		1.00	1.00	1.00	1.00	
F _{xi}		3,335	12,113	11,577	3,020	30,045 lbs

Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L-9
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WIND LOADING:
DESIGN PER ASCE 7-10, SECTION 28 Part 2:
WIND - OSSC 2014 120 mph ZONE, EXPOSURE B Roof Angle = 0.00 degrees

$$p_s = \lambda * K_{zt} * p_{s30} \quad [\text{Eq. 28.6-1}]$$

 FROM FIGURE 28.6-1: $\lambda = 1.00$ ($< 30'$)

 SECTION 26.8: $K_{zt} = 1.0$

 FROM FIGURE 28.6-1: p_{s30} :

Roof Angle	Zones								
	horizontal Pressures				vertical Pressures				
	A	B	C	D	E	F	G	H	
0.00	22.8	-11.9	15.1	-7.0	-27.4	-15.6	-19.1	-12.1	
25.00	28.6	4.6	20.7	4.7	-12.7	-17.3	-9.2	-13.9	
30.00	25.7	17.6	20.4	14.0	2.0	-15.6	0.7	-13.4	
interpolate	0.00	22.8	-11.9	15.1	-7.0	-27.4	-15.6	-19.1	-12.1
					-27.4	-15.6	-19.1	-12.1	

 Center Roof = 22.00 ft
 Perimeter Roof = 16.00 ft

$$h = 20.00 \text{ ft}$$

$$a = 0.1 * 115.50 = 11.55 \text{ ft}$$

$$> 0.4 * 20.00 = 8.00 \text{ ft}$$

$$a = 8.00 \text{ ft}$$

$$2a = 16.00 \text{ ft}$$
WIND IN EAST-WEST DIRECTION:

$$p_{sA} = 1.00 * 1.0 * 22.8 = \mathbf{22.8 \text{ psf}}$$

$$p_{sB} = 1.00 * 1.0 * -11.9 = \mathbf{-11.9 \text{ psf}}$$

$$p_{sC} = 1.00 * 1.0 * 15.1 = \mathbf{15.1 \text{ psf}}$$

$$p_{sD} = 1.00 * 1.0 * -7.0 = \mathbf{-7.0 \text{ psf}}$$
WIND IN NORTH-SOUTH DIRECTION:

$$p_{sA} = 1.00 * 1.0 * 22.8 = \mathbf{22.8 \text{ psf}}$$

$$p_{sB} = 1.00 * 1.0 * -11.9 = \mathbf{-11.9 \text{ psf}}$$

$$p_{sC} = 1.00 * 1.0 * 15.1 = \mathbf{15.1 \text{ psf}}$$

$$p_{sD} = 1.00 * 1.0 * -7.0 = \mathbf{-7.0 \text{ psf}}$$



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Client:	SEA	Date:	07/2018	By:	mw

ROOF WIND SHEAR TRIBUTARY TO GRIDS [LBS]:

a = 8.00 ft
 2a = 16.00 ft
 p_{sA} = 22.8 psf
 p_{sB} = -11.9 psf
 p_{sC} = 15.1 psf
 p_{sD} = -7.0 psf
 min p_s = 16.0 psf

	Grids				Totals
	A	B	C	D	
Roof					
Proj. Roof Height [ft]	7.00	9.50	9.50	7.00	
trib. Wall Height [ft]	4.50	5.50	5.50	4.50	
trib. Width [ft]	12.25	50.00	50.00	12.25	124.50
F _{xi}	2,836	11,325	11,325	2,836	28,321
min F _{xi}	2,254	12,000	12,000	2,254	28,508

p_{sA} = 22.8 psf
 p_{sB} = -11.9 psf
 p_{sC} = 15.1 psf
 p_{sD} = -7.0 psf
 min p_s = 16.0 psf

	Grids				Totals
	1	2	3	4	
Roof					
Proj. Roof Height [ft]	7.00	9.50	9.50	7.00	
trib. Wall Height [ft]	4.50	5.50	5.50	4.50	
trib. Width [ft]	12.75	45.50	42.00	9.25	109.50
F _{xi}	2,922	10,306	9,513	2,315	25,056
min F _{xi}	2,346	10,920	10,080	1,702	25,048



Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L- 11
Client:	SEA	Date:	07/2018	By:	mw

GRID SHEAR COMPARISON (LBS.):

Grids

	A	B	C	D	Totals
Roof					
Seismic	2,875	11,892	11,942	3,335	30,045
0.7*Seismic	2,013	8,324	8,360	2,335	21,031
Wind	2,836	12,000	12,000	2,836	29,671
0.6*Wind	1,701	7,200	7,200	1,701	17,803

	1	2	3	4	Totals
Roof					
Seismic	3,335	12,113	11,577	3,020	30,045
0.7*Seismic	2,335	8,479	8,104	2,114	21,031
Wind	2,922	10,920	10,080	2,315	26,237
0.6*Wind	1,753	6,552	6,048	1,389	15,742

SEISMIC GOVERNS LONGITUDINAL AND TRANSVERSE DIRECTIONS!

Job Name:	Sweet Home City Hall Remodel	Job No:	17095	Sheet No:	L-12
Client:	SEA	Date:	07/2018	By:	mw

SHEARWALLS:

Grid	A	B	C	D	1	2	3	4	
1st Floor									
Shear [lbs]									
Seismic									
Story Shear	2,875	11,892	11,942	3,335	3,335	12,113	11,577	3,020	
0.7*Seismic	2,013	8,324	8,360	2,335	2,335	8,480	8,105	2,116	
Wind									
Story Shear	2,836	12,000	12,000	2,836	2,922	10,920	10,080	2,315	
0.6*Wind	1,701	7,200	7,200	1,701	1,753	6,553	6,049	1,391	
Wall Lengths [ft]									
	15.00	27.00	15.25	6.00	4.50	34.33	4.90	4.50	
	11.00		10.75	10.00	12.25		6.67	5.00	
	11.00		3.58	10.00	11.50		4.90	10.00	
	11.00		6.50	10.00	11.00		10.79	9.00	
	9.50		6.00	16.50	11.00		11.08	15.50	
					15.00			5.00	
								13.50	
								3.75	
								5.00	
								3.00	
Total of Wall Lengths [ft]	57.50	27.00	38.50	52.50	65.25	34.33	38.33	74.25	
min. Wall Length [ft]	9.50	27.00	6.00	6.00	4.50	34.33	4.90	3.00	
FTAO/Perforated Shear Wall?	n	n	n	n	n	n	n	n	
FTAO/Perf. Shear Wall Length [ft]									
Shear Height [ft]	10.00	13.00	13.00	10.00	10.00	13.00	13.00	10.00	
Wall Height [ft]	9.00	20.00	20.00	9.00	9.00	20.00	20.00	9.00	
Wall Aspect Ratio	0.9	0.7	3.3	1.5	2.0	0.6	4.1	3.0	
Wall uniform Shear [plf]									
Seismic (ASD)	35	308	217	44	36	247	211	28	
Wind (ASD)	30	267	187	32	27	191	158	19	
super Wall uniform DL [plf]	275	620	680	275	275	384	354	260	
super Wall concentrated DL: [lbs]							709		
Overtuning M_{OT} [ft-#]									
Seismic	3325	108218	16936	2668	1610	110239	13457	855	
Wind	2811	93600	14587	1944	1209	85184	10044	562	
Resisting M_R [ft-#]									
max. Holdown Force [lbs]	12419	225990	12240	4954	2787	226134	7713	1172	
USE:							1901	61	
1/2" Plywood "x" Faces w/ 10d Nails @ "y" o.c.	1	1	1	1	1	1	1	1	
	6	6	6	6	6	6	6	6	
Allowable Shear [plf]									
Seismic	310	310	186	310	310	310	152	207	
Wind	435	435	435	435	435	435	435	435	
Simpson "z" Holdown Allowable Force [lbs]	Grids A - D and 1, 2 and 4 are unchanged						MST72		
							6730		
Grid % of Story Shear	10%	40%	40%	11%	11%	40%	39%	10%	
Wall uniform Shear [plf]									
Seismic (ultimate)	50	440	310	64	51	353	302	41	
Wind (ultimate)	49	444	312	54	45	318	263	31	
Shear Capacity [plf]									
Seismic	496	496	298	496	496	496	243	331	
Wind	696	696	696	696	696	696	696	696	

SEE SHEETS
L-14 TO L-19
FOR
ANCHORAGE
CALCULATIONS

L-14

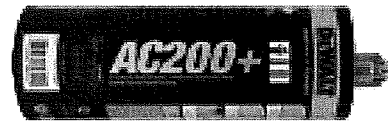
1. Project Information

Company: WDY, Inc.
Project Engineer: Meiko Winnig
Address: 6443 SW Beaverton-Hillsdale Hwy. Suite 210 Portland OR 97221
Phone: M: 503.203.8111
Email: meiko@wdyi.com
Project Name: Sweet Home City Hall Remodel
Project Address: 3225 Main Street, Sweet Home, OR
Notes:

Simpson MST72 strap

2. Selected Anchor Information

Selected Anchor: AC200+
Brand: DEWALT
Material: 1/2" Ø Threaded Rod ASTM F1554 GR 36
Embedment: h_{ef} 4.875 in h_{nom} 4.875 in
Approval: ICC ESR-4027
Issued | Revision: 01/01/2018 01/31/2020
Drill Method: Hammer Drilled



3. Design Principles

Design Method: ACI 318-11
Load Combinations: Section 5.3 User Defined Loads

4. Base Material Information

Concrete:
 Type Cracked Normal Weight Concrete
 Strength 3000 psi

Reinforcement:
 Edge >= #4 Rebar
 Spacing Tension No (Condition B) Shear No (Condition B)
 Controls Breakout Tension False Shear False

Base Plate:
 Sizing Thickness 0.125 in Length 13 in Width 2 in
 Standoff None Height 0 in
 Strength 36000 psi

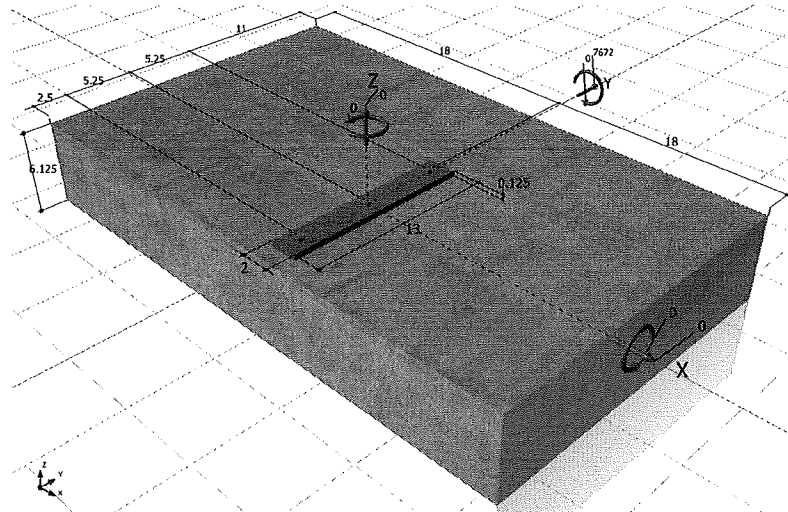
Profile: None
Hole Condition: Dry Hole
Max. Service Temperature: Long Term: 110 °F Short Term: 176 °F

L-15



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5. Geometric Conditions



h_{min} 6.125 in c_{min} 1.75 in c_{ac} 13.041 in s_{min} 2.5 in

6. Summary Results

Tension Loading

Design Proof	Demand (lb)	Capacity (lb)	Utilization	Status	Critical
Steel Strength	0	0	0.000	OK	Controls
Concrete Breakout Strength	0	0	0.000	OK	
Bond Strength	0	0	0.000	OK	
Sustained Load Bond Strength	0	0	0.000	OK	

Shear Loading

Design Proof	Demand (lb)	Capacity (lb)	Utilization	Status	Critical
Steel Strength	2557	3210	0.797	OK	
Concrete Breakout Strength	7672	7673	1.000	OK	Controls
Pryout Strength	7672	12456	0.616	OK	

7. Warnings and Remarks

ANCHOR DESIGN CRITERIA IS SATISFIED

- The results of the calculations carried out by means of the DDA Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by a design professional/engineer, particularly with regard to compliance with applicable standards, norms and permits, prior to using them for your specific project. The DDA Software serves only as an aid to interpret standards, norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.

⇒ USE: SIMPSON MST 72 W/
(3) 1/2" Ø EPOXY ANCHORS

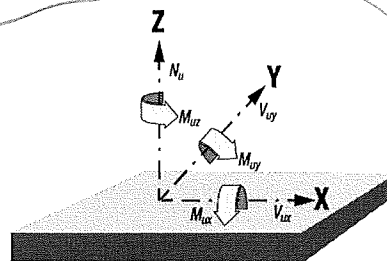


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8. Load Conditions

Design Loads / Actions

Nu	0	lb	Vux	0	lb	Vuy	7672	lb
Muz	0	in-lb	Mux	0	in-lb	Muy	0	in-lb
Consider Load Reversal			X Direction	0%		Y Direction	0%	



9. Load Distribution

Max. concrete compressive strain:	0.000	%	<u>Anchor Eccentricity</u>					
Max. concrete compressive stress:	0.000	psi	ex	0	in	ey	0	in

Resulting anchor forces / Load distribution

Anchor	Tension Load	Shear Load	Componet Shear Load		Anchor Coordinates	
			Shear X	Shear Y	X	Y
1	0.0	2557.3	0.0	2557.3	0.000	0.000
2	0.0	2557.3	0.0	2557.3	0.000	5.250
3	0.0	2557.3	0.0	2557.3	0.000	-5.250

$\rightarrow (ASD)$
 $7,672 \# \left(\frac{1.7}{2.5} \right) = 2,148 \# > 1,901 \#$ OK
 $\leftarrow (\Omega_o)$

SEE SHEET L-12

11. Design Proof Shear Loading

Reference

Steel Strength:

ACI 318-14 17.5.1

Variables

V_{sa}	(lb)	ϕ
4938.1		0.65

Results

ϕV_{sa}	=	3209.8	lb
V_{ua}	=	2557.3	lb
Utilization	=	79.7%	

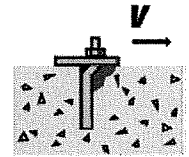


Table 17.3.1.1

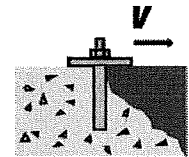
Concrete Breakout Strength:

ACI 318-14 17.5.2

Equations

$$V_{cbg} = \frac{A_{Vc}}{A_{Vc0}} \cdot \Psi_{ec,V} \cdot \Psi_{ed,V} \cdot \Psi_{c,V} \cdot \Psi_{h,V} \cdot V_b$$

$$V_b = \left(B \cdot \left(\frac{l_e}{d_a} \right)^{0.2} \cdot \sqrt{d_a} \right) \cdot \lambda_a \cdot \sqrt{f'_c} \cdot (c_{al})^{1.5}$$



Eqn. 17.5.2.1b

Eqn. 17.5.2.3

Variables

A_{Vc} (in2)	A_{Vc0} (in2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$
202.125	544.500	1.000	1.000	1.200	1.641
l_e	d_a (in)	λ_a	f'_c (psi)	c_{al} (in)	V_b (lb)
4.000	0.500	1.000	3000	11.000	14991.7
ϕ					
0.70					

Results

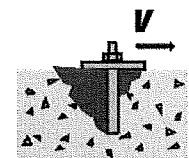
ϕV_{cbg}	=	7672.6	lb
Direction	=	Y+	
V_{ua}	=	7672.0	lb
Utilization	=	100.0%	

Table 17.3.1.1

Pryout Strength:

ACI 318-14 17.5.3

Equations





$$V_{cp} = k_{cp} \cdot N_{cp} \tag{Eqn. 17.5.3.1b}$$

$$N_{ag} = \frac{A_{Na}}{A_{N_{ba}}} \cdot \Psi_{ec,Na} \cdot \Psi_{ed,Na} \cdot \Psi_{cp,Na} \cdot N_{ba} \tag{Eqn. 17.4.5.1b}$$

$$N_{ba} = \lambda_a \cdot \tau_{K,cr} \cdot \pi \cdot d_a \cdot h'_{ef} \tag{Eqn. 17.4.5.2}$$

Variables

A_{Na} (in ²)	A_{Na0} (in ²)	$\Psi_{ec,Na}$	$\Psi_{ed,Na}$	$\Psi_{cp,Na}$	λ_a
306.178	223.585	1.000	0.800	1.000	1.000
$\tau_{K,cr}$	c_{ac} (in)	ϕc_{Na} (in)	h'_{ef} (in)	$\Psi_{g,Na}$	C_{amin} (in)
1060.154	13.041	7.476		1.000	2.500
N_{ba} (lb)	k_{cp}	ϕ			
8118.3	2.000	0.70			

Results

ϕN_{ag} = 12456.2 lb
 N_{ua} = 7672.0 lb
 Utilization = 61.6%

Table 17.3.1.1



ENGINEERED BY Powers

12. Interaction of Tension and Shear Loads

Reference

ACI 318-14 17.6

Equations

$$\frac{\left(\frac{N_{ua}}{\phi \cdot N_n} + \frac{V_{ua}}{\phi \cdot V_n} \right)}{1.2} \leq 1.0$$

Eqn. 17.6.3

Variables

$\frac{N_{ua}}{\phi \cdot N_n}$	$\frac{V_{ua}}{\phi \cdot V_n}$
0.000	1.000

Results

1.000 ≤ 1.0
 Status : OK

ANCHOR DESIGN CRITERIA IS SATISFIED





Job Name: Sweet Home City Hall Remodel

Job No: 17095

Sheet No: FR-1

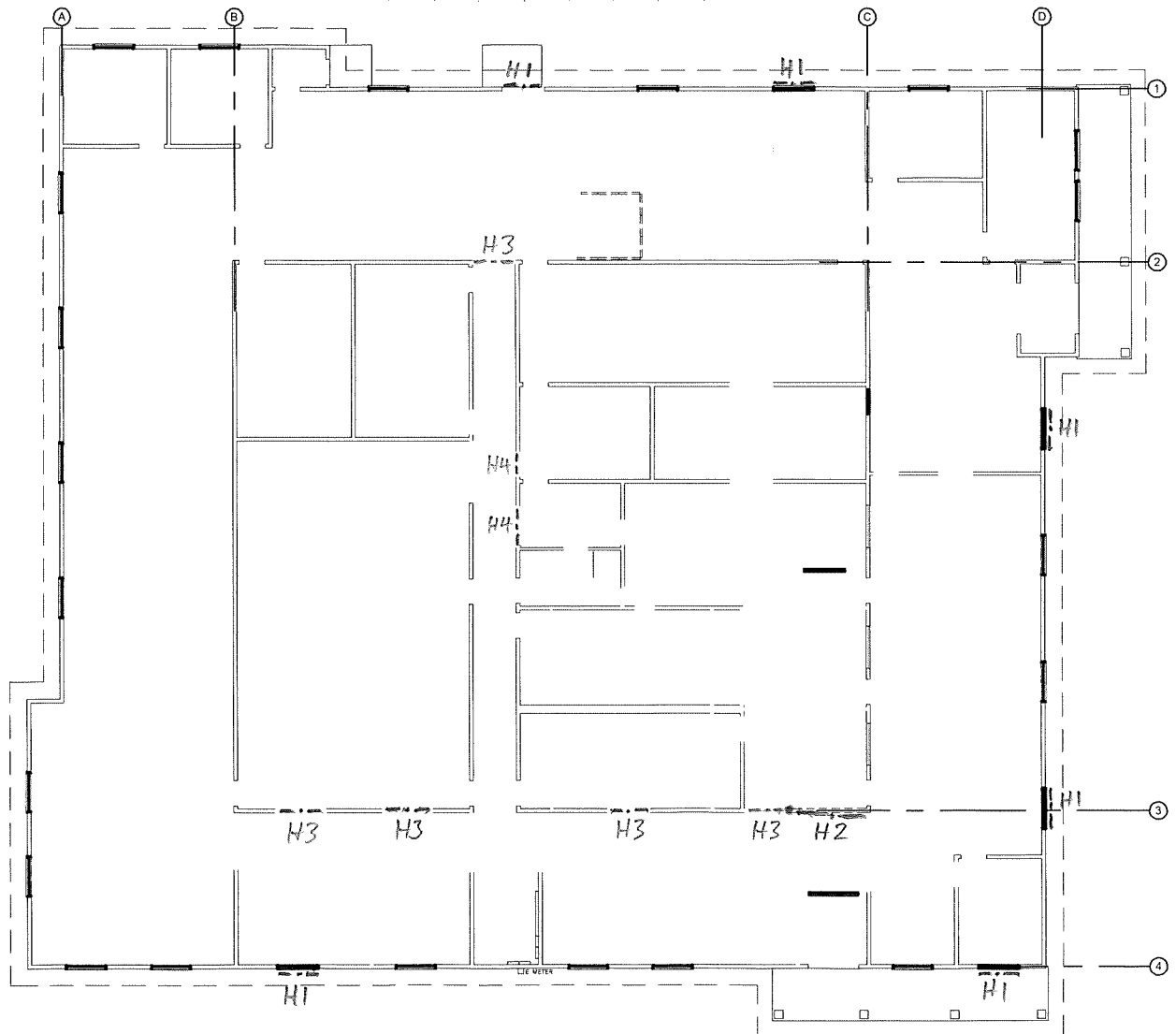
Client: SEA

Date: 07/2018

By: mw

(N) WALL OPENINGS,

- ROOF DL = 15 PSF
SNOW = 25 PSF



LAYOUT - (N) WALL OPENINGS, N.T.S.

Job Name: **Sweet Home City Hall Remodel**

 Job No: **17095**

 Sheet No: **FR-2**

 Client: **SEA**

 Date: **07/2018**

 By: **mw**

(N) WALL OPENINGS, CONT.)

1.) EXTERIOR WALL HEADERS H1,
MAX. SPAN = 5'

$$\text{MAX. } W = \underbrace{(15+25)}_{DL \quad SN} \left(\underbrace{\frac{22.5^2}{2 \times 20.5}}_{12.35'} \right) = 185 + 309 \text{ PLF}$$

⇒ USE: MIN. (2) $1\frac{3}{4} \times 5\frac{1}{2}$ LVL, $R = 482 + 804 \#$

W/ (1) 2x6 TRIMMER STUD

& (1) 2x6 KING STUD

(SEE SHEETS FR-4 - FR-9)

NOT USED

2.) INTERIOR WALL HEADER H2,
SPAN = 9.5'

$$W = \underbrace{(15+25)}_{DL \quad SN} \left(\frac{18.5}{2} + \frac{2}{2} \right) + \underbrace{(10)(\sim 14')}_{WALL} = 294 + 256 \text{ PLF}$$

⇒ USE: MIN. (2) $1\frac{3}{4} \times 9\frac{1}{4}$ LVL, $R = 1,420 + 1,238 \#$

W/ (1) 2x6 TRIMMER STUD

& (1) 2x6 KING STUD

(SEE SHEETS FR-10 - FR-13)

3.) INTERIOR WALL HEADERS H3,
MAX. SPAN = 6'

$$\text{MAX. } W = \underbrace{(15+25)}_{DL \quad SN} \left(\frac{20.5}{2} + \frac{2}{2} \right) + \underbrace{(10)(\sim 14')}_{WALL} = 309 + 281 \text{ PLF}$$

⇒ USE: MIN. (2) $1\frac{3}{4} \times 5\frac{1}{2}$ LVL, $R = 965 + 879 \#$

W/ (1) 2x6 TRIMMER STUD

& (1) 2x6 KING STUD

(SEE SHEETS FR-14 - FR-15)



Job Name: Sweet Home City Hall Remodel

Job No: 17095

Sheet No: FR-3

Client: SEA

Date: 07/2018

By: mw

(N) WALL OPENINGS, CONT.

4.) INTERIOR WALL HEADERS H4,
MAX. SPAN = 5'

$$W = \underbrace{(15+25)}_{DL} \left(\frac{75}{2} \right) + \underbrace{(10)(\sim 5)}_{WALL} = \underbrace{613}_{DL} + \underbrace{837}_{SN} \text{ PCF}$$

$$\Rightarrow \underline{\text{USE: MIN. (2) } 1\frac{3}{4} \times 7\frac{1}{4} \text{ LVL}} \quad R = \underbrace{1,608}_{DL} + \underbrace{2,461}_{SN} \#$$

W/ (2) 2x6 TRIMMER STUDS

& (1) 2x6 KING STUD

(SEE SHEETS FR-16 - FR-19)



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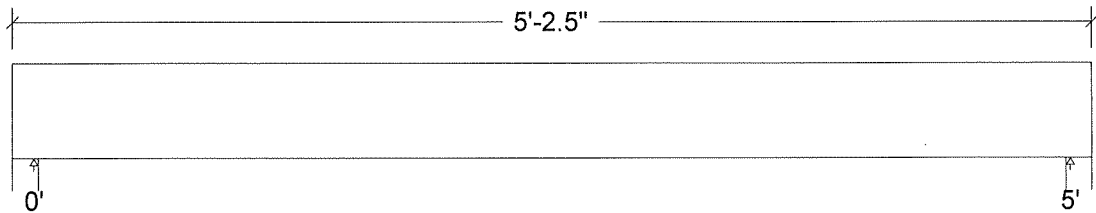
Design Check Calculation Sheet
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Full Area				15.00	(12.35')	psf
Load2	Snow	Full Area				25.00	(12.35')	psf

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	482		482
Snow	804		804
Factored:			
Total	1286		1286
Bearing:			
Capacity			
Beam	3938		3938
Support	5388		5388
Anal/Des			
Beam	0.33		0.33
Support	0.24		0.24
Load comb	#2		#2
Length	1.50		1.50
Min req'd	0.50*		0.50*
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fc sup	850		850

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

LVL n-ply, 1.9E, 2600Fb, 1-3/4"x5-1/2", 2-ply (3-1/2"x5-1/2")

Supports: All - Lumber n-ply Column, D.Fir-L Stud

Total length: 5'-2.5"; volume = 0.7 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	$f_v = 78$	$F_v' = 328$	psi	$f_v/F_v' = 0.24$
Bending(+)	$f_b = 1050$	$F_b' = 3297$	psi	$f_b/F_b' = 0.32$
Live Defl'n	$0.05 = <L/999$	$0.17 = L/360$	in	0.28
Total Defl'n	$0.09 = L/670$	$0.25 = L/240$	in	0.36

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	285	1.15	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2600	1.15	-	1.00	0.992	1.11	-	1.00	1.00	-	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	1.9 million	-	-	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.98 million	-	-	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 1235, V design = 998 lbs

Bending(+): LC #2 = D+S, M = 1544 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 = 46.1e06 lb-in²/ply

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

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

Lateral stability (+): Lu = 5' Le = 9'-6.31" RB = 7.16

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. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final member design contact your local SCL manufacturer.
4. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database editor.
5. BUILT-UP SCL-BEAMS: contact manufacturer for connection details when loads are not applied equally to all plies.
6. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.



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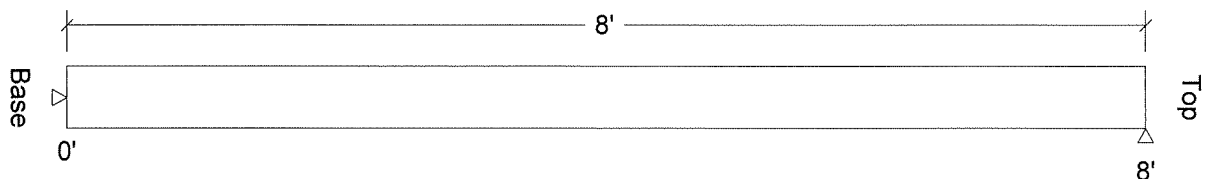
Design Check Calculation Sheet
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Axial		(Ecc. = 0.92")		482		lbs
Load2	Snow	Axial		(Ecc. = 0.92")		804		lbs

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

Lateral Reactions (lbs):



Unfactored:			
Dead	5		-5
Snow	8		-8
Factored:			
R->L			12
Load comb			#2
L->R	12		
Load comb	#2		#1

Lumber n-ply, D.Fir-L, Stud, 2x6, 1-ply (1-1/2"x5-1/2")

Support: Non-wood

Total length: 8'; volume = 0.5 cu.ft.;

Pinned base; Load face = width(b); $K_e \times L_b: 1.0 \times 0.0 = 0.0$ [ft]; $K_e \times L_d: 1.0 \times 8.0 = 8.0$ [ft]; 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	$f_v = 2$	$F_v' = 207$	psi	$f_v/F_v' = 0.01$
Bending(+)	$f_b = 156$	$F_b' = 805$	psi	$f_b/F_b' = 0.19$
Axial	$f_c = 156$	$F_c' = 776$	psi	$f_c/F_c' = 0.20$
Combined (axial + eccentric moment)				Eq. 15.4-3 = 0.26
Axial Bearing	$f_c = 156$	$F_c^* = 977$	psi	$f_c/F_c^* = 0.16$
Live Defl'n	$0.01 = <L/999$	$0.53 = L/180$	in	0.03
Total Defl'n	$0.03 = <L/999$	$0.53 = L/180$	in	0.05

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL/CP	CF	Cfu	Cr	Cfirt	Ci	LC#
Fv'	180	1.15	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	700	1.15	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	2
Fc'	850	1.15	1.00	1.00	0.794	1.000	-	-	1.00	1.00	2
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
Fc*	850	1.15	1.00	1.00	-	1.000	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 12, V design = 12 lbs

Bending(+): LC #2 = D+S, M = 98 lbs-ft

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

LC #2 = D+S (total)

Axial : LC #2 = D+S, P = 1286 lbs

Eq.15.4-3 : LC #2 = D+S Fb'= 805

FcE= 1376 Pxe/S=fc(6xe/d)= 156

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 = 29.1e06 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. BUILT-UP COLUMNS: nailed or bolted built-up columns shall conform to the provisions of NDS Clause 15.3.
4. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.
5. Axial load eccentricity applied in direction of load face only. It is the designers responsibility to check for effect of eccentricity in the other direction.



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Design Check Calculation Sheet
 WoodWorks Sizer 10.4

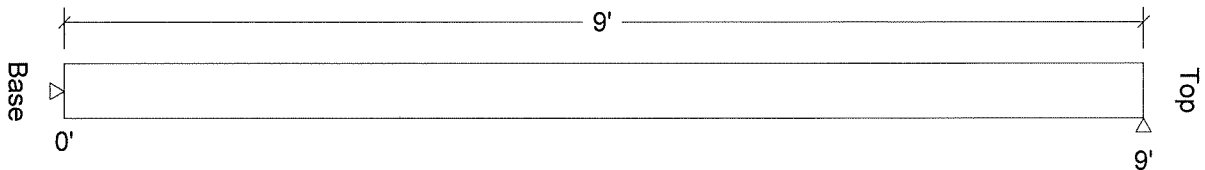
*ASCE 7-10, FIG. 30.5-1
 WALL ZONES, 30 psf, 120 mph, "B"*

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Wind C&C	Full Area				31.37	(3.25')	psf

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

Lateral Reactions (lbs):



Unfactored:			
Dead			
Wind	459		459
Factored:			
L->R	275		275
Load comb	#2		#2

Lumber n-ply, D.Fir-L, Stud, 2x6, 1-ply (1-1/2"x5-1/2")

Support: Non-wood

Total length: 9'; volume = 0.5 cu.ft.;

Pinned base; Load face = width(b); $K_e \times L_b: 1.0 \times 0.0 = 0.0$ [ft]; $K_e \times L_d: 1.0 \times 9.0 = 9.0$ [ft]; 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	$f_v = 50$	$F_v' = 288$	psi	$f_v/F_v' = 0.17$
Bending(+)	$f_b = 983$	$F_b' = 1120$	psi	$f_b/F_b' = 0.88$
Live Defl'n	$0.22 = L/497$	$0.60 = L/180$	in	0.36
Total Defl'n	$0.22 = L/497$	$0.60 = L/180$	in	0.36

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL/CP	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	180	1.60	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	700	1.60	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	2
Fc'	850	0.00	1.00	1.00	0.000	1.000	-	-	1.00	1.00	0
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 = .6D+.6W, V = 275, V design = 275 lbs

Bending(+): LC #2 = .6D+.6W, M = 619 lbs-ft

Deflection: LC #2 = .6D+.42W (live)

LC #2 = .6D+.42W (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 = 29.1e06 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. BUILT-UP COLUMNS: nailed or bolted built-up columns shall conform to the provisions of NDS Clause 15.3.
4. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.
5. Axial load eccentricity applied in direction of load face only. It is the designers responsibility to check for effect of eccentricity in the other direction.



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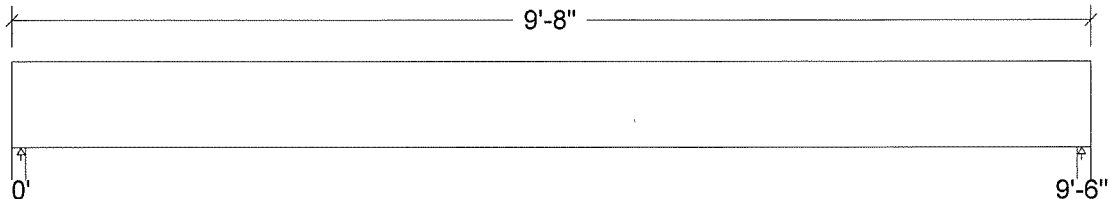
Design Check Calculation Sheet
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Full Area				15.00	(10.25')	psf
Load2	Snow	Full Area				25.00	(10.25')	psf
Load3	Dead	Full UDL				140.0		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	1420		1420
Snow	1238		1238
Factored:			
Total	2658		2658
Bearing:			
Capacity			
Beam	3938		3938
Support	5388		5388
Anal/Des			
Beam	0.68		0.68
Support	0.49		0.49
Load comb	#2		#2
Length	1.50		1.50
Min req'd	1.01		1.01
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fc sup	850		850

LVL n-ply, 1.9E, 2600Fb, 1-3/4"x9-1/4", 2-ply (3-1/2"x9-1/4")

Supports: All - Lumber n-ply Column, D.Fir-L Stud

Total length: 9'-8.0"; volume = 2.2 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	$f_v = 100$	$F_v' = 328$	psi	$f_v/F_v' = 0.31$
Bending (+)	$f_b = 1492$	$F_b' = 2994$	psi	$f_b/F_b' = 0.50$
Live Defl'n	$0.11 = <L/999$	$0.32 = L/360$	in	0.34
Total Defl'n	$0.29 = L/391$	$0.47 = L/240$	in	0.61

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	285	1.15	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2600	1.15	-	1.00	0.967	1.04	-	1.00	1.00	-	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	1.9 million	-	-	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.98 million	-	-	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 2613, V design = 2165 lbs

Bending(+): LC #2 = D+S, M = 6205 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 = 219e06 lb-in²/ply

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

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

Lateral stability (+): Lu = 9'-6.00" Le = 17'-9.56" RB = 12.70

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. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final member design contact your local SCL manufacturer.
4. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database editor.
5. BUILT-UP SCL-BEAMS: contact manufacturer for connection details when loads are not applied equally to all plies.
6. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.



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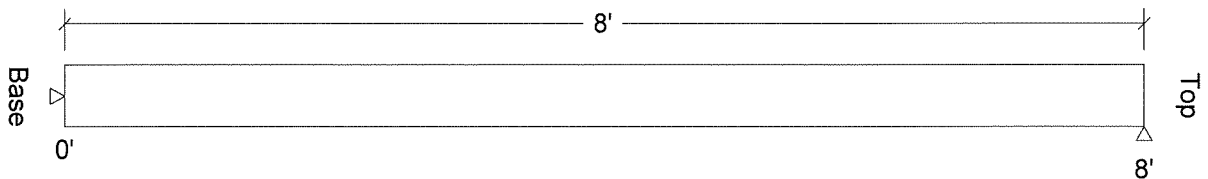
Design Check Calculation Sheet
 WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Axial		(Ecc. = 0.92")		1420		lbs
Load2	Snow	Axial		(Ecc. = 0.92")		1238		lbs

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

Lateral Reactions (lbs):



Unfactored:			
Dead	14		-14
Snow	12		-12
Factored:			
R->L			25
Load comb			#2
L->R	25		
Load comb	#2		#1

Lumber n-ply, D.Fir-L, Stud, 2x6, 1-ply (1-1/2"x5-1/2")

Support: Lumber-soft Sill plate, Hem-Fir No.2; Bearing length = column width; continuous lower support

Total length: 8'; volume = 0.5 cu.ft.;

Pinned base; Load face = width(b); $K_e \times L_b: 1.0 \times 0.0 = 0.0$ [ft]; $K_e \times L_d: 1.0 \times 8.0 = 8.0$ [ft]; 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	$f_v = 5$	$F_v' = 207$	psi	$f_v/F_v' = 0.02$
Bending(+)	$f_b = 323$	$F_b' = 805$	psi	$f_b/F_b' = 0.40$
Axial	$f_c = 322$	$F_c' = 776$	psi	$f_c/F_c' = 0.41$
Combined (axial + eccentric moment)				Eq.15.4-3 = 0.72
Axial Bearing	$f_c = 322$	$F_c^* = 977$	psi	$f_c/F_c^* = 0.33$
Support Bearing	$f_{cp} = 322$	$F_{cp} = 506$	kips	$f_{cp}/F_{cp} = 0.64$
Live Defl'n	$0.02 = <L/999$	$0.53 = L/180$	in	0.04
Total Defl'n	$0.06 = <L/999$	$0.53 = L/180$	in	0.12

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL/CP	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	180	1.15	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	700	1.15	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	2
Fc'	850	1.15	1.00	1.00	0.794	1.000	-	-	1.00	1.00	2
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
Fc*	850	1.15	1.00	1.00	-	1.000	-	-	1.00	1.00	2
Fcp sup	405	-	1.00	1.00	-	-	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 25, V design = 25 lbs
 Bending(+): LC #2 = D+S, M = 203 lbs-ft
 Deflection: LC #2 = D+S (live)
 LC #2 = D+S (total)
 Axial : LC #2 = D+S, P = 2658 lbs
 Eq.15.4-3 : LC #2 = D+S Fb' = 805
 FcE = 1376 Pxe/S = fc(6xe/d) = 323
 Support : LC #2 = D+S; R = 2658 lbs, Cap = 4176, Lb = 1.50", Cb = 1.25
 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 = 29.1e06 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. BUILT-UP COLUMNS: nailed or bolted built-up columns shall conform to the provisions of NDS Clause 15.3.
4. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.
5. Axial load eccentricity applied in direction of load face only. It is the designers responsibility to check for effect of eccentricity in the other direction.



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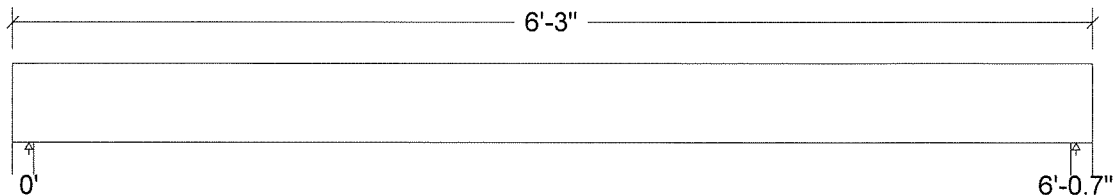
Design Check Calculation Sheet
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Full Area				15.00	(11.25')	psf
Load2	Snow	Full Area				25.00	(11.25')	psf
Load3	Dead	Full UDL				140.0		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	965		965
Snow	879		879
Factored:			
Total	1844		1844
Bearing:			
Capacity			
Beam	3938		3938
Support	5388		5388
Anal/Des			
Beam	0.47		0.47
Support	0.34		0.34
Load comb	#2		#2
Length	1.50		1.50
Min req'd	0.70		0.70
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fc sup	850		850

LVL n-ply, 1.9E, 2600Fb, 1-3/4"x5-1/2", 2-ply (3-1/2"x5-1/2")

Supports: All - Lumber n-ply Column, D.Fir-L Stud

Total length: 6'-3.0"; volume = 0.8 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	$f_v = 117$	$F_v' = 328$	psi	$f_v/F_v' = 0.36$
Bending(+)	$f_b = 1841$	$F_b' = 3291$	psi	$f_b/F_b' = 0.56$
Live Defl'n	$0.09 = L/786$	$0.20 = L/360$	in	0.46
Total Defl'n	$0.24 = L/297$	$0.30 = L/240$	in	0.81

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	285	1.15	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2600	1.15	-	1.00	0.990	1.11	-	1.00	1.00	-	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	1.9 million	-	-	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.98 million	-	-	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 1787, V design = 1500 lbs

Bending(+): LC #2 = D+S, M = 2707 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 = 46.1e06 lb-in²/ply

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

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

Lateral stability (+): Lu = 6'-0.69" Le = 11'-3.00" RB = 7.79

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. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final member design contact your local SCL manufacturer.
4. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database editor.
5. BUILT-UP SCL-BEAMS: contact manufacturer for connection details when loads are not applied equally to all plys.
6. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.



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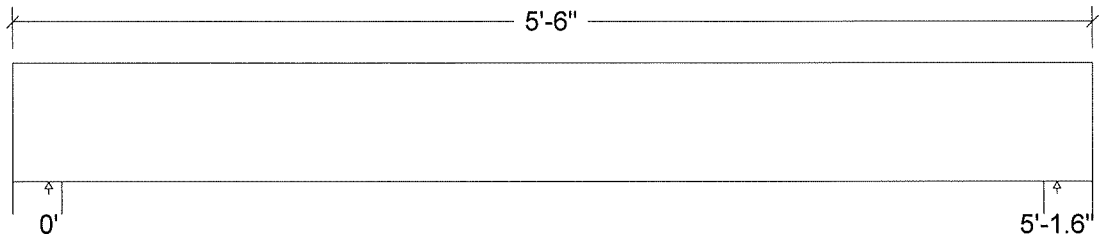
Design Check Calculation Sheet
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Full Area				15.00	(37.50')	psf
Load2	Snow	Full Area				25.00	(37.50')	psf
Load3	Dead	Full UDL				50.0		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	1684		1684
Snow	2578		2578
Factored:			
Total	4263		4263
Bearing:			
Capacity			
Beam	7875		7875
Support	10777		10777
Anal/Des			
Beam	0.54		0.54
Support	0.40		0.40
Load comb	#2		#2
Length	3.00		3.00
Min req'd	1.62		1.62
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fc sup	850		850

LVL n-ply, 1.9E, 2600Fb, 1-3/4"x7-1/4", 2-ply (3-1/2"x7-1/4")

Supports: All - Lumber n-ply Column, D.Fir-L Stud

Total length: 5'-6.0"; volume = 1.0 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	$f_v = 174$	$F_v' = 328$	psi	$f_v/F_v' = 0.53$
Bending(+)	$f_b = 2000$	$F_b' = 3164$	psi	$f_b/F_b' = 0.63$
Live Defl'n	$0.07 = L/887$	$0.17 = L/360$	in	0.41
Total Defl'n	$0.14 = L/448$	$0.26 = L/240$	in	0.54

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	285	1.15	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2600	1.15	-	1.00	0.988	1.07	-	1.00	1.00	-	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	1.9 million	-	-	1.00	-	-	-	-	1.00	-	-	2
Eminy'	0.98 million	-	-	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 3980, V design = 2939 lbs

Bending(+): LC #2 = D+S, M = 5109 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 = 106e06 lb-in²/ply

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

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

Lateral stability (+): Lu = 5'-1.63" Le = 10'-2.19" RB = 8.50

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. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final member design contact your local SCL manufacturer.
4. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database editor.
5. BUILT-UP SCL-BEAMS: contact manufacturer for connection details when loads are not applied equally to all plies.
6. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.



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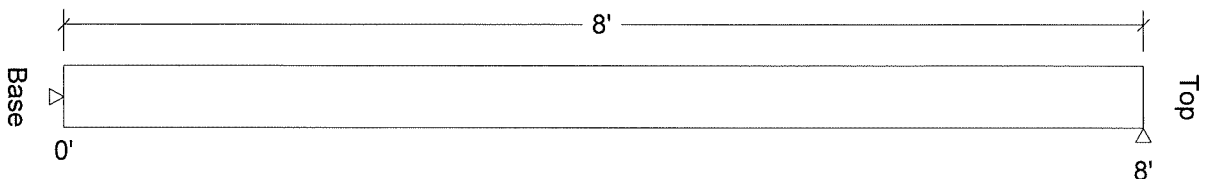
Design Check Calculation Sheet
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Axial		(Ecc. = 0.92")		1608		lbs
Load2	Snow	Axial		(Ecc. = 0.92")		2461		lbs

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

Lateral Reactions (lbs):



Unfactored:			
Dead	15		-15
Snow	24		-24
Factored:			
R->L			39
Load comb			#2
L->R	39		
Load comb	#2		#1

Lumber n-ply, D.Fir-L, Stud, 2x6, 2-ply (3"x5-1/2")

Support: Lumber-soft Sill plate, Hem-Fir No.3; Bearing length = column width; continuous lower support
Total length: 8'; volume = 0.9 cu.ft.;

Pinned base; Load face = width(b); Built-up fastener: nails; $K_e \times L_b: 1.0 \times 0.0 = 0.0$ [ft]; $K_e \times L_d: 1.0 \times 8.0 = 8.0$ [ft];
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	$f_v = 4$	$F_v' = 207$	psi	$f_v/F_v' = 0.02$
Bending(+)	$f_b = 247$	$F_b' = 805$	psi	$f_b/F_b' = 0.31$
Axial	$f_c = 247$	$F_c' = 776$	psi	$f_c/F_c' = 0.32$
Combined (axial + eccentric moment)				Eq. 15.4-3 = 0.49
Axial Bearing	$f_c = 247$	$F_c^* = 977$	psi	$f_c/F_c^* = 0.25$
Support Bearing	$f_{cp} = 247$	$F_{cp} = 456$	kips	$f_{cp}/F_{cp} = 0.54$
Live Defl'n	$0.02 = <L/999$	$0.53 = L/180$	in	0.04
Total Defl'n	$0.05 = <L/999$	$0.53 = L/180$	in	0.09

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL/CP	CF	Cfu	Cr	Cfrt	Ci	LC#
Fv'	180	1.15	1.00	1.00	-	-	-	-	1.00	1.00	2
Fb'+	700	1.15	1.00	1.00	1.000	1.000	1.00	1.00	1.00	1.00	2
Fc'	850	1.15	1.00	1.00	0.794	1.000	-	-	1.00	1.00	2
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
Fc*	850	1.15	1.00	1.00	-	1.000	-	-	1.00	1.00	2
Fcp sup	405	-	1.00	1.00	-	-	-	-	1.00	1.00	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 39, V design = 39 lbs

Bending(+): LC #2 = D+S, M = 311 lbs-ft

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

LC #2 = D+S (total)

Axial : LC #2 = D+S, P = 4069 lbs Kf = 1.00

Eq.15.4-3 : LC #2 = D+S Fb' = 805

FcE = 1376 Pxe/S = fc(6xe/d) = 247

Support : LC #2 = D+S; R = 4069 lbs, Cap = 7518, Lb = 3.00", Cb = 1.13

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 = 29.1e06 lb-in²/ply

"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. BUILT-UP COLUMNS: nailed or bolted built-up columns shall conform to the provisions of NDS Clause 15.3.
4. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.
5. Axial load eccentricity applied in direction of load face only. It is the designers responsibility to check for effect of eccentricity in the other direction.

Job Name: Sweet Home City Hall Remodel

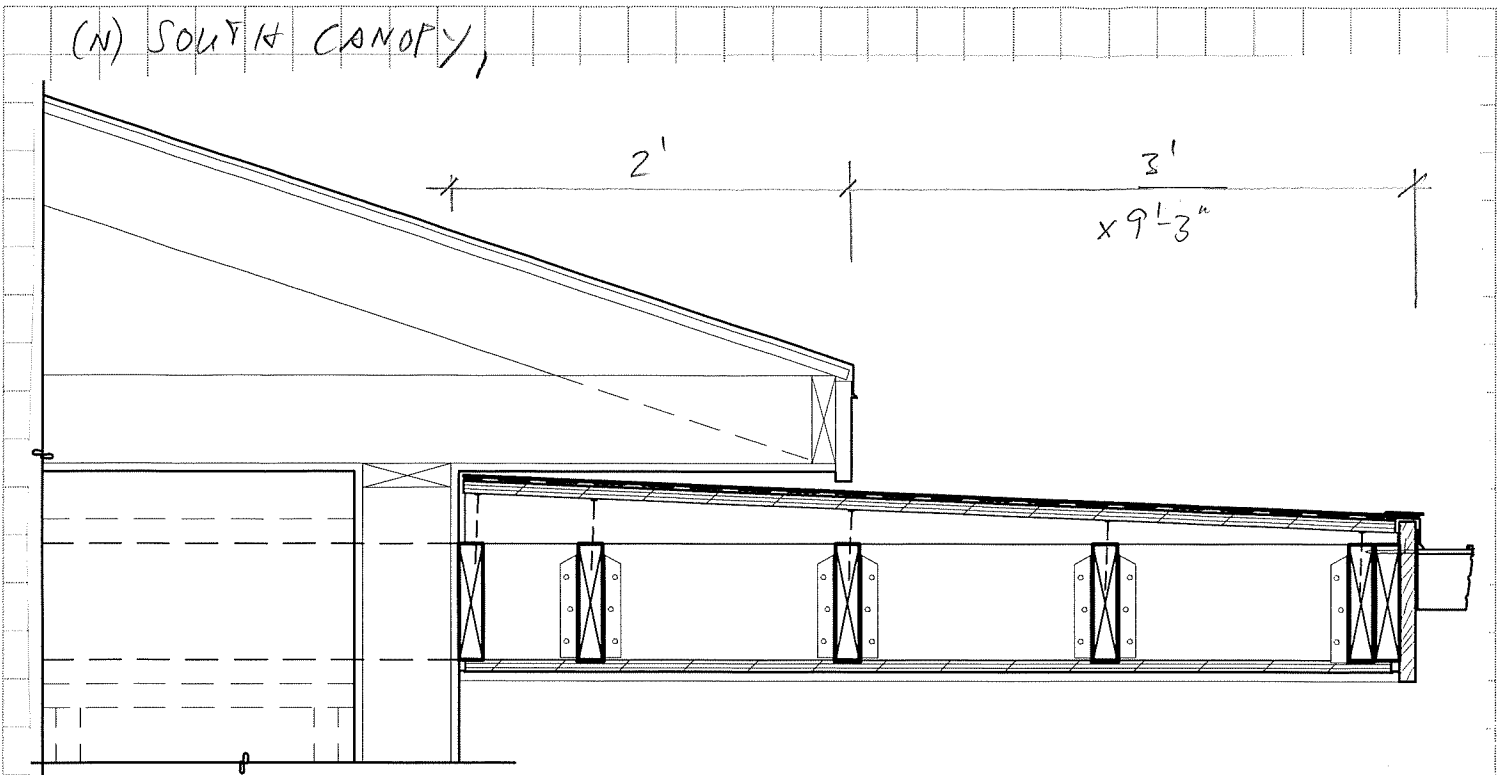
Job No: 17095

Sheet No: FR-20

Client: SEA

Date: 07/2018

By: mw

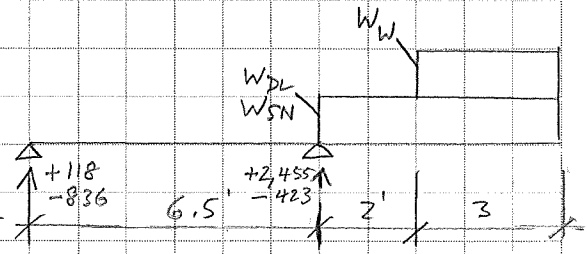


1.) DESIGN CANOPY OUTRIGGER BEAMS,

$$W_{DL} = (10 \text{ PSF}) \left(\frac{9.25}{2} \right) = 46 \text{ PLF}$$

$$W_{SN} = \left[25 \text{ PSF} + \frac{.4 \times 25 \times 22.5}{3} \right] \left(\frac{9.25}{2} \right) = 462 \text{ PLF}$$

\uparrow P
 \uparrow SLIDING


 $W_w \hat{=} \text{WIND UPLIFT PER ASCE 7-10, 30.7.1.3 : 120mph, EXP "B", 23 FT}^2, Z2$

$$\Rightarrow P = (-47.3 \text{ PSF}) \left(\frac{.677}{P_{table}} \right) (1.0) (1.0) = -32.02 \text{ PSF} \Rightarrow W_w = -148 \text{ PLF}$$

\uparrow EAF
 \uparrow RE K_{zt}

 $\Rightarrow \text{USE: MIN. (2) } 1\frac{3}{4} \times 7\frac{1}{4} \text{ LVL (SEE SHEETS FR-21 - FR-22)}$

2.) CANOPY JOISTS, 9' SPAN, 18" SPACING

$$\Rightarrow W = (10 + 100 - 32.02) \left(\frac{18}{12} \right) = 15 + 150 - 48 \text{ PLF}$$

\uparrow DL
 \uparrow SN
 \uparrow WI

 $\Rightarrow \text{USE: MIN. } 2 \times 8 @ 18" \text{ O.C. (SEE SHEETS FR-23 - FR-24)}$



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17095canopy-beam05-65.wwb

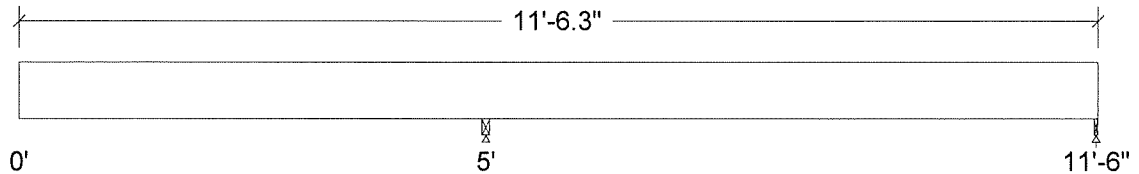
Design Check Calculation Sheet
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Partial Area	No	0.00	5.00	10.00	(4.63')	psf
Load2	Snow	Partial Area	Yes	0.00	3.00	100.00	(4.63')	psf
Load3	Wind	Partial Area	No	0.00	5.00	-32.02	(4.63')	psf

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			320	-89
Snow			2135	-747
Wind			-1025	285
Factored:				
Uplift			423	836
Total			2455	118
Bearing:				
Capacity				
Beam			3645	1313
Support			2455	1211
Anal/Des				
Beam			0.67	0.09
Support			1.00	0.10
Load comb			#2	#4
Length			1.01	0.50*
Min req'd			1.01**	0.50*
Cb			1.37	1.00
Cb min			1.37	1.00
Cb support			1.11	1.11
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.

LVL n-ply, 1.9E, 2600Fb, 1-3/4"x7-1/4", 2-ply (3-1/2"x7-1/4")

Supports: All - Lumber n-ply Beam, D.Fir-L No.2

Total length: 11'-6.3"; volume = 2.0 cu.ft.;

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

This section FAILS the design check

WARNING: This section violates the following design criteria: Deflection

L @ CANTILEVER → (OK)

Analysis vs. Allowable Stress and Deflection using NDS 2012 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	$f_v = 94$	$F_v' = 328$	psi	$f_v/F_v' = 0.29$
Bending(+)	$f_b = 299$	$F_b' = 4387$	psi	$f_b/F_b' = 0.07$
Bending(-)	$f_b = 2127$	$F_b' = 3160$	psi	$f_b/F_b' = 0.67$
Deflection:				
Interior Live	$-0.11 = L/724$	$0.33 = L/240$	in	0.33
Total	$-0.13 = L/614$	$0.43 = L/180$	in	0.29
Cantil. Live	$0.70 = L/85$	$0.50 = L/120$	in	1.41
Total	$0.82 = L/72$	$0.67 = L/90$	in	1.24

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CV	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	285	1.15	-	1.00	-	-	-	-	1.00	-	1.00	2
Fb'+	2600	1.60	-	1.00	0.985	1.07	-	1.00	1.00	-	-	4
Fb'-	2600	1.15	-	1.00	0.987	1.07	-	1.00	1.00	-	-	2
Fcp'	750	-	-	1.00	-	-	-	-	1.00	-	-	-
E'	1.9 million	-	-	1.00	-	-	-	-	1.00	-	-	2
E _{miny} '	0.98 million	-	-	1.00	-	-	-	-	1.00	-	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 1619, V design = 1591 lbs

Bending(+): LC #4 = .6D+.6W, M = 764 lbs-ft

Bending(-): LC #2 = D+S, M = 5434 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 = 106e06 lb-in²/ply

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

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

Lateral stability (+): Lu = 5' Le = 9'-0.13" RB = 8.00

Lateral stability (-): Lu = 6'-6.00" Le = 11'-2.06" RB = 8.91

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. SCL-BEAMS (Structural Composite Lumber): the attached SCL selection is for preliminary design only. For final member design contact your local SCL manufacturer.
4. Size factors vary from one manufacturer to another for SCL materials. They can be changed in the database editor.
5. BUILT-UP SCL-BEAMS: contact manufacturer for connection details when loads are not applied equally to all plys.
6. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.



WoodWorks[®]
SOFTWARE FOR WOOD DESIGN

COMPANY
WDY, Inc.
503.203.8111
July 18, 2018 09:01

PROJECT
Sweet Home City Hall
Remodel
Sweet Home, OR
17095canopy-joists01.wwb

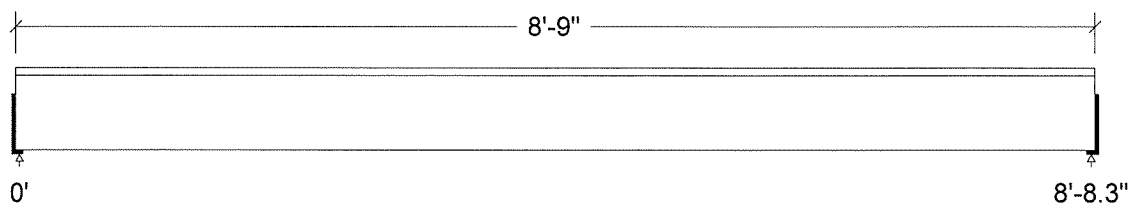
Design Check Calculation Sheet
WoodWorks Sizer 10.4

Loads:

Load	Type	Distribution	Pat-tern	Location [ft]		Magnitude		Unit
				Start	End	Start	End	
Load1	Dead	Full Area				10.00	(18.0")	psf
Load2	Snow	Full Area				100.00	(18.0")	psf
Load3	Wind	Full Area				-32.02	(18.0")	psf

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	66		66
Snow	657		657
Wind	-210		-210
Factored:			
Uplift	87		87
Total	722		722
Bearing:			
Capacity			
Joist	722		722
Anal/Des			
Joist	1.00		1.00
Load comb	#2		#2
Length	0.77		0.77
Min req'd	0.77		0.77
Cb	1.00		1.00
Cb min	1.00		1.00

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

Supports: All - Hanger

Roof joist spaced at 18.0" c/c; Total length: 8'-9.0"; volume = 0.7 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	$f_v = 84$	$F_v' = 207$	psi	$f_v/F_v' = 0.41$
Bending(+)	$f_b = 1422$	$F_b' = 1428$	psi	$f_b/F_b' = 1.00$
Bending(-)	$f_b = 171$	$F_b' = 1064$	psi	$f_b/F_b' = 0.16$
Live Defl'n	$0.25 = L/413$	$0.43 = L/240$	in	0.58
Total Defl'n	$0.29 = L/359$	$0.58 = L/180$	in	0.50

Additional Data:

FACTORS:	F/E (psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fv'	180	1.15	1.00	1.00	-	-	-	-	1.00	1.00	1.00	2
Fb'+	900	1.15	1.00	1.00	1.000	1.200	1.00	1.15	1.00	1.00	-	2
Fb'-	900	1.60	1.00	1.00	0.536	1.200	1.00	1.15	1.00	1.00	-	4
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2
Emin'	0.58 million		1.00	1.00	-	-	-	-	1.00	1.00	-	2

CRITICAL LOAD COMBINATIONS:

Shear : LC #2 = D+S, V = 717, V design = 612 lbs

Bending(+): LC #2 = D+S, M = 1557 lbs-ft

Bending(-): LC #4 = .6D+.6W, M = 187 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 = 76.2e06 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 = 8'-8.25" Le = 15'-11.88" RB = 24.86

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.