Lateral Calculations

New Townhouse
7614 SE Washington Street
Portland, Oregon

REGISTERED PROFESSIONAL ENGINEER
19301
OREGON
JULY 22, 1997
RICHARD D SILKETT
EXPIRES: 6/30/18

Engineer was retained in a limited capacity for this project. Design is based upon information provided by the client who is solely responsible for the accuracy of same. No responsibility and/or liability are assumed by, or are to be assigned to, the engineer for items beyond that shown on these sheets.

Job No 18-05
Contact: Rich Silkett, PE
Thursday, January 25, 2018

Revised 03/06/18

17-180413/96/97/98/500-PS

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CIVIL – STRUCTURAL

JOB: _____
CLIENT: _____ JOB NO. _____
DATE: _____ BY: _____ SHEET NO. _____

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

SCAN

Lateral Analysis 7614 SE Washington St
18-05

Design Criteria: Simplified Method

Seismic:

Site Class	D		Ridge = 32	feet
R = 6			Eave = 26	feet
Ss = 0.995		Sds = 0.731	h = 29	feet
S1 = 0.414		Sd1 = 0.438	F = 1.0	
			Wdl = 1.0	

V = ((FxSds)xWdl)/R

V = 0.122 Wdl

Design Dead Loads:

Roof =	17	psf
Wall =	12	psf
Floor =	15	psf

Seismic (Transverse) Front-Rear

Roof =	11968	lbs
Upper Floor =	7095	lbs
Main Floor =	7095	lbs
Wallperp =	10320	lbs

Base:

Vperp = 4444 lbs

Seismic (Longitudinal)Side-Side

Wallprl = 77400 lbs

Base:

Vprl = 11752 lbs

Note

This is a 3-story above grade wood-frame structure with a garage and living facility.
The Ground Level has full ht concrete foundation walls on all
exterior sides. The interior party wall and stairway walls are wood framed.

This calculation will be used for both 'A' & 'B' units.

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JOB: 7614 SE Washington St.
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 01/25/18 BY: Rich SHEET NO. L1

Wind: 3-Story Structure
Light-Frame Wood Construction
2014 OSSC
Exposure 'B'
I = 1.0
V3s = 120 mph

Edge Strip (Es)

Es =	3.0	ft	<- - - Use this
Es =	1.9	ft	
Es =	10.4	ft	
Ez =	6.0	ft	

Roof Angle = 39.8 degrees

Horizontal Loads

Basic Pressures (psf): ASCE 7-10, Figure 28.6-1

Zone =	A	B	C	D	
Ps =	17.8	12.2	14.2	9.8	Case 1
	17.8	12.2	14.2	9.8	Case 2

Wind Pressure: (Transverse) Front-Rear

Roof =	11808 lbs
Main =	12527 lbs
Lower =	12565 lbs
Windperp =	36901 lbs
	Wind Governs!
Vperp/1.4 =	2557 lbs

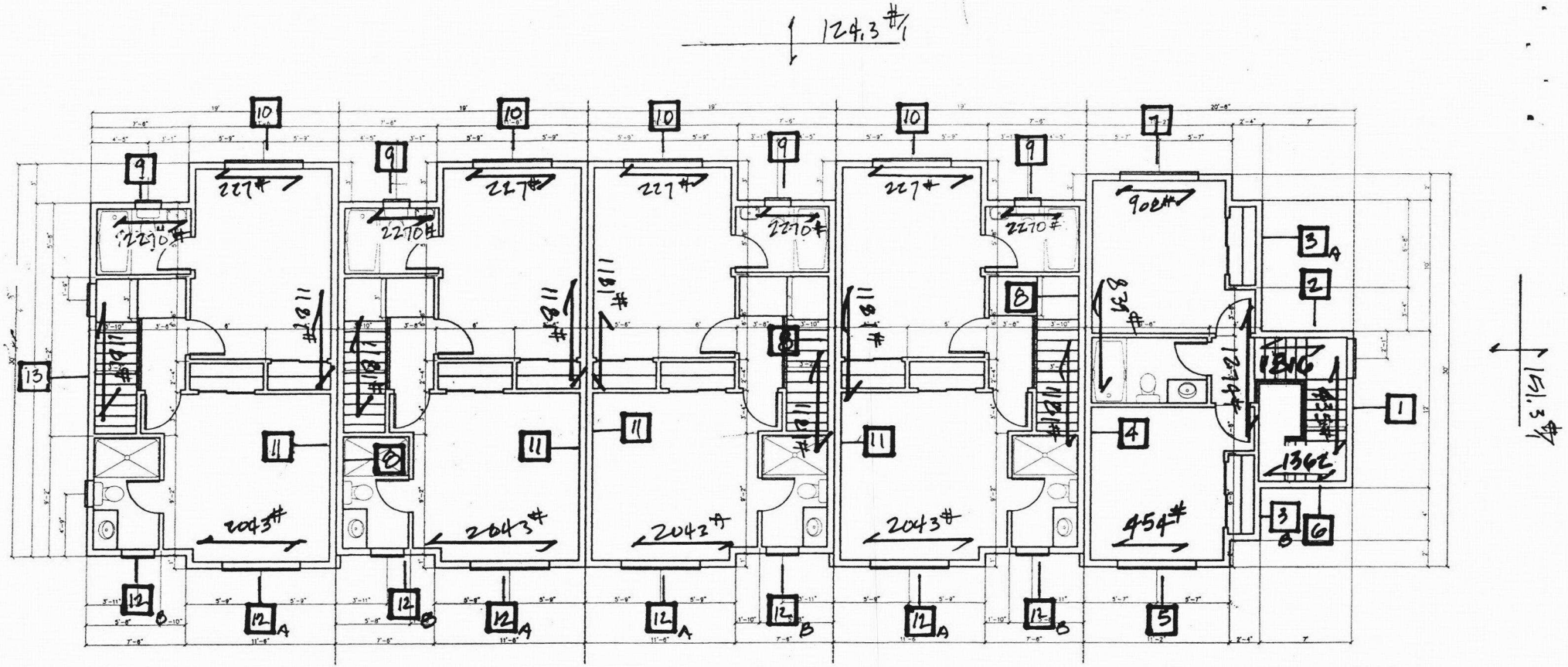
Wind Pressure: (Longintudinal) Side-Side

Roof =	2716 lbs
Main =	4028 lbs
Lower =	4028 lbs
Windprl =	10772 lbs
	Wind Governs!
Vprl/1.4 =	8395 lbs

Use Seismic force for Interior Units (all levels)

Seismic Distribution Parallel to Ridge Vprl = 8.39 kips

H	Wdl	HxWdl	%	Vstory	
29	11.64	337.56	54.07	4.54	kips
18	10.62	191.16	30.62	2.57	kips
9	10.62	95.58	15.31	1.29	kips
	Total =	624.3			



UPPER FLOOR SHEARWALLS

7614 SE Washington St.

Jesse Cereghino

01/25/18 Rich

18-05

L3

Roof Diaphragm:

Horizontal Forces and Shears - Wind (Transverse) Front-Rear

Shear = 210.9 plf

Horizontal Forces and Shears - Wind (Longitudinal) Side-Side

Shear = 14.3 plf

Roof Diaphragm
Use 1/2" CDX Plywood (Index 48/24)
W/8d @ 6" O.C. edges
8d @ 12" O.C. field

Upper Floor Shearwalls:

Wind Perpendicular to Ridge

Upper = 124.3 plf

Seismic Parallel to Ridge

Upper = 118.1 plf (Wind)
Upper = 151.3 plf (Seismic) < - - Governs

Wall	Len	Force(lbs)	Shear(plf)	Type
1	8.5	435	51.2	A
2	7	1816	259.4	A
3	14	1274	91.0	A
4	30	839	28.0	A
5	5	454	90.8	A
6	7	1362	194.6	A
7	5	908	181.6	A
8	27	1181	43.7	A
9	5.5	2270	412.7	C
10	5.5	227	41.3	A
11	31	1181	38.1	A
12	10.5	2043	194.6	A
13	22.5	1181	52.5	A

Upper Floor Diaphragm:

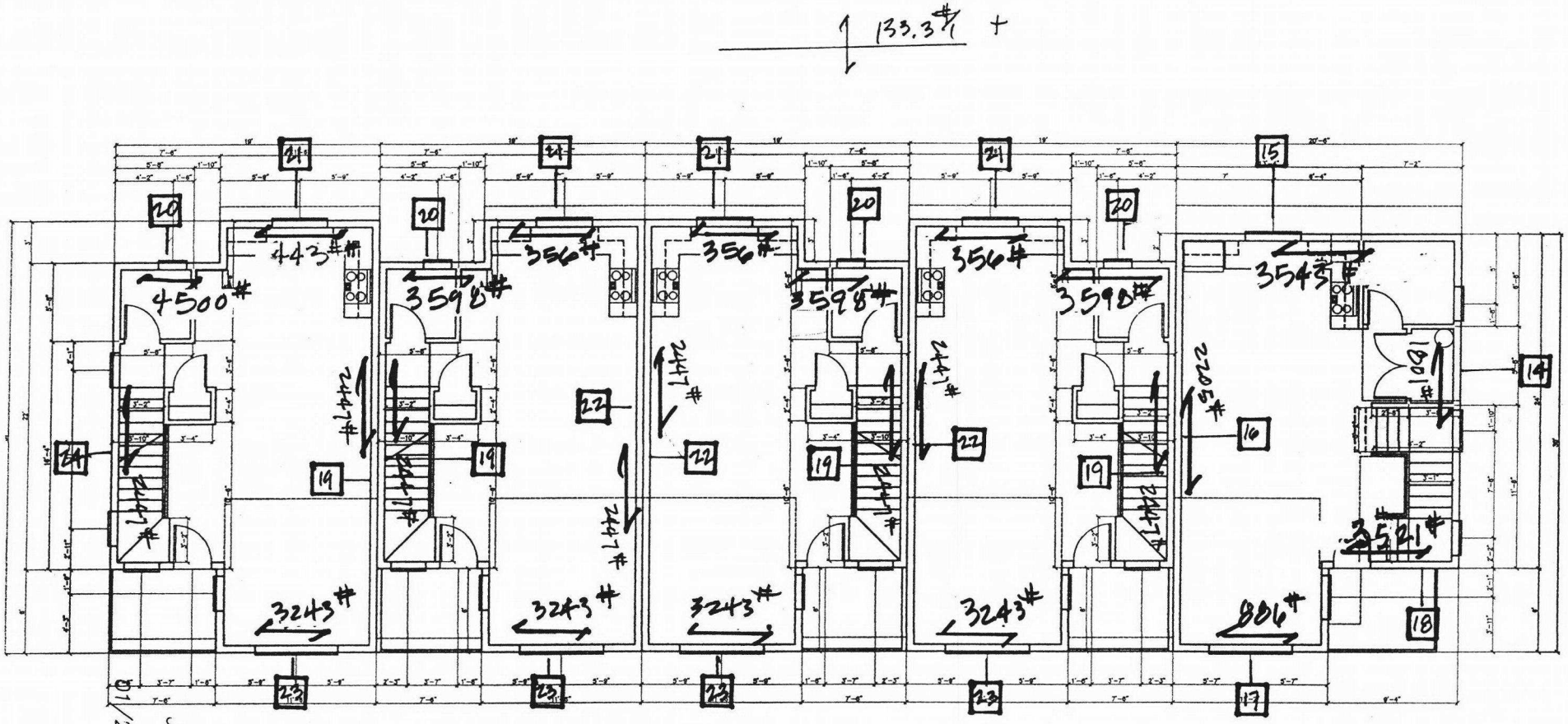
Horizontal Forces and Shears - Wind (Transverse) Front-Rear

Shear = 160.4 plf

Upper Floor Diaphragm
Use 3/4" CDX Plywood (Index 32/16)
W/10d @ 6" O.C. edges
10d @ 12" O.C. field

Horizontal Forces and Shears - Wind (Longitudinal) Side-Side

Shear = 5.7 plf



MAIN FLOOR SHEARWALLS

7614 SE Washington St.

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18-05

L5

Main Shearwalls:

Wind Perpendicular to Ridge
Main = 133.3 plf

Wind Parallel to Ridge
Main = 143.9 plf (Wind) < - - End Units
Main = 85.7 plf (Seismic) < - - Interior

Wall	Len	Force(lbs)	Shear(plf)	Type
14	15.5	1801	116.2	A
15	16.5	3543	214.7	A
16	30	2205	73.5	A
17	5	886	177.2	B
18	6.5	3521	541.7	C
19	22	2447	111.2	A
20	5.5	3598	654.2	C
21	7.5	356	47.5	A
22	31	2447	78.9	A
23	5.5	3243	589.6	C
24	15	2447	163.1	A

Main Floor Diaphragm:

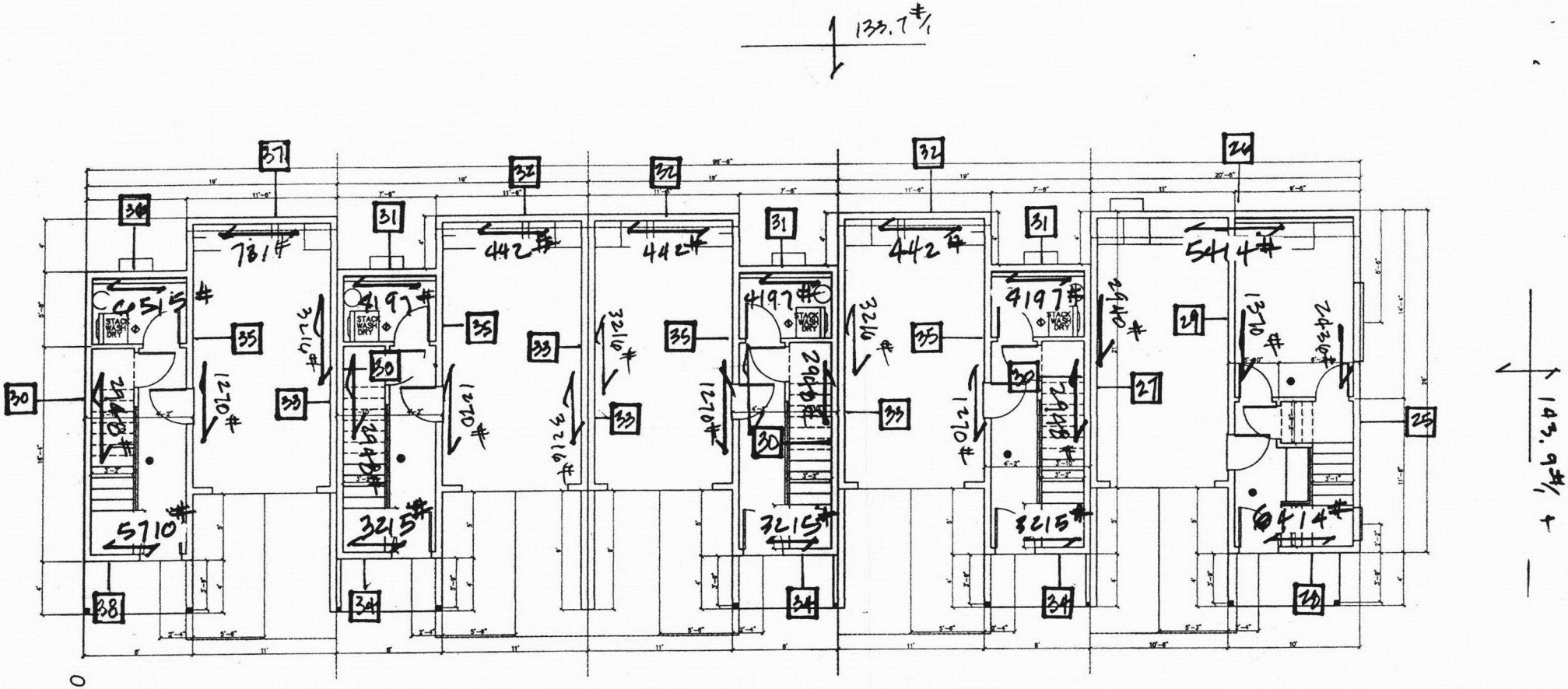
Horizontal Forces and Shears - Wind (Transverse) Front-Rear

Shear = 131.8 plf

Horizontal Forces and Shears - Wind (Longitudinal) Side-Side

Shear = 56.7 plf

Main Floor Diaphragm
Use 3/4" CDX Plywood (Index 32/16)
W/10d @ 6" O.C. edges
10d @ 12" O.C. field



LOWER FLOOR SHEARWALLS

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L7

Lower Shearwalls:

Wind Perpendicular to Ridge

Lower = 133.7 plf

Wind Parallel to Ridge

Lower = 143.9 plf (Wind) < - - End Units

Lower = 42.8 plf (Seismic) < - - Interior

Wall	Len	Force(lbs)	Shear(plf)	Type	
25	16.5	2436	147.6	A	
26	20.5	5141	250.8	C	
27	30	2940	98.0	A	
28	6	6414	1069.0	C	< - Ea. Face
29	23	1370	59.6	A	
30	22	2948	134.0	A	
31	7.5	4197	559.6	C	
32	11.5	442	38.4	A	
33	21	3216	153.1	A	
34	4	3215	803.8	C	
35	23	1270	55.2	A	
36	8	6515	814.4	C	
37	11.5	731	63.6	A	
38	4	5710	1427.5	C	< - Ea. Face

Component & Cladding - Roof

Roof Slope 4:12

L =	30	ft	Sp =	24	inches Truss Spacing
h =	29	ft	Wdl =	24	plf
λ = 1.0					

Effective Area

be =	10.0	ft
Area =	300.0	sq ft

Design Loads:

Wdl =	24	plf
Wll =	50	plf
Wtl =	74	plf

Zone 1

Negative Pressure p = -15.2 psf
w = -30.4 plf

Zone 2

Negative Pressure p = -23 psf
w = -46 plf

Zone 3

Negative Pressure p = -35.5 psf
w = -71 plf

Zone 1

Positive Pressure p = 8.1 psf
w = 16.2 plf

Zone 2

Positive Pressure p = 8.1 psf
w = 16.2 plf

Zone 3

Positive Pressure p = 8.1 psf
w = 16.2 plf

Number of nails per 4'x8' area = 48 Nails

Max Tension per Nail = -23.7 lbs per nail

Withdrawal capacity (8d) '05 NDS, Table 11.2C
Pn = 89.6 lbs per nail
Safety Factor = 3.8

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CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 01/25/18 BY: Rich SHEET NO. L9

Component & Cladding - Wall

L = 9 ft
Sp = 16 Stud Spacing

Effective Area
be = 3.0 ft
Area = 27.0 sq ft

Zone 4
Negative Pressure p = -22.6 psf
w = -30.1 plf

Zone 5
Negative Pressure p = -27.2 psf
w = -36.2 plf

Zone 4
Positive Pressure p = 20.8 psf
w = 27.7 plf

Zone 5
Positive Pressure p = 20.8 psf
w = 27.7 plf

Number of nails per 4'x8' area = 48 Nails

Max Tension per Nail = 18.1 lbs per nail

Withdrawal capacity (8d) '05 NDS, Table 11.2C
Pn = 89.6 lbs per nail
Safety Factor = 4.9

Wall 1

Len = 8.5 ft

Mot = 3480 ft-lbs

Resisting Moment (Mr)

Mr = -5925 ft-lbs

Uplift (T) T = -9 lbs

Dead Loads:

Roof =	68	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164	plf

No holdowns required

Wall 2

Len = 7 ft

Mot = 14528 ft-lbs

Resisting Moment (Mr)

Mr = -4851 ft-lbs

Uplift (T) T = 1660 lbs

Dead Loads:

Roof =	102	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-198	plf

Use Simpson MST60 straps

Wall 3a

Len = 10 ft

Mot = 7280 ft-lbs

Resisting Moment (Mr)

Mr = -9050 ft-lbs

Uplift (T) T = 185 lbs

Dead Loads:

Roof =	85	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-181	plf

Use Simpson MST60 straps

Wall 3b

Len = 4 ft

Mot = 2912 ft-lbs

Resisting Moment (Mr)

Mr = -1448 ft-lbs

Uplift (T) T = 511 lbs

Dead Loads:

Roof =	85	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-181	plf

Use Simpson MST60 straps

Wall 4

Len = 30 ft

Mot = 6712 ft-lbs

Resisting Moment (Mr)

Mr = -73800 ft-lbs

Uplift (T) T = -1252 lbs

Dead Loads:

Roof =	68	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164	plf

No holdowns required

PERFORATED WALL **Wall 5** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.17	ft
Total Full Ht Segments	(Sw) =	5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw) 44.8 percent

Opening Adjustment Factor (Co) 0.65 Try 15/32 CDX Sheathing

8d @ 6" O.C. v = 393

Capacity of Perforated Wall

Va = 2555 lbs OK Greater than 454 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1118 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 139.7 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 3632 ft-lbs

Resisting Moment (Mr)

Mr = -10231 ft-lbs

Dead Loads:

Roof =	68	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164	plf

Uplift (T) T = -224 lbs **No holdowns required**

Wall 6

Len = 7 ft

Mot = 10896 ft-lbs

Resisting Moment (Mr)

Mr = -4851 ft-lbs

Uplift (T) T = 1141 lbs

Dead Loads:

Roof =	102	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-198	plf

Use Simpson MST60 straps

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JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L15

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PERFORATED WALL **Wall 7** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.17	ft
Total Full Ht Segments	(Sw) =	5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw) = 44.8 percent

Opening Adjustment Factor (Co) = 0.65

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 2555 lbs OK Greater than 908 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 2235 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 279.4 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 8172 ft-lbs

Dead Loads:

Roof =	238.0	plf
Floor =	0	plf
Wall =	108	plf
Total DL =	-346.0	plf

Resisting Moment (Mr)

Mr = -21585 ft-lbs

Uplift (T) T = -428 lbs **No holdowns required**

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JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L16

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Wall 8

Len = 27 ft

Mot = 9448 ft-lbs

Resisting Moment (Mr)

Mr = -72171 ft-lbs

Uplift (T) T = -1254 lbs

Dead Loads:

Roof =	102	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-198	plf

No holdowns required

PERFORATED WALL **Wall 9** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	7.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw		73.3	percent
Opening Adjustment Factor	(Co)	0.79	

Try 15/32 CDX Sheathing
8d @ 3" O. v = 930

Capacity of Perforated Wall

Va = 8082 lbs OK Greater than 2270 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 4180 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 522.4 plf **Use (2)SDS25312 @ 12" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 20430 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	108	plf
Total DL =	-176.0	plf

Resisting Moment (Mr)

Mr = -4950 ft-lbs

Uplift (T) T = 2328 lbs **Use Simpson MST60 straps**

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JOB: 7614 SE Washington St
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DATE: 03/06/18 BY: Rich SHEET NO. L18

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PERFORATED WALL **Wall 10** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 47.8 percent

Opening Adjustment Factor (Co) 0.66

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 2853 lbs OK Greater than 227 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 500 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 62.5 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 2043 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	108	plf
Total DL =	-176.0	plf

Resisting Moment (Mr)

Mr = -11638 ft-lbs

Uplift (T) T = -430 lbs **No holdowns required**

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JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L19

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Wall 11

Len = 31 ft

Mot = 9448 ft-lbs

Resisting Moment (Mr)

Mr = -78802 ft-lbs

Uplift (T) T = -1220 lbs

Dead Loads:

Roof =	68	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164	plf

No holdowns required

PERFORATED WALL **Wall 12a** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 47.8 percent

Opening Adjustment Factor (Co) 0.78 Try 15/32 CDX Sheathing

8d @ 6" O. v = 393

Force in wall section 12a = 1070 lbs

Capacity of Perforated Wall

Va = 3372 lbs OK Greater than 1070 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1995 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 249.4 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 8560 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164.0	plf

Resisting Moment (Mr)

Mr = -10845 ft-lbs

Uplift (T) T = 179 lbs **Use Simpson MST60 straps**

PERFORATED WALL **Wall 12b** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	7.5	ft
Total Full Ht Segments	(Sw) =	5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 66.7 percent

Opening Adjustment Factor (Co) 0.78

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Force in wall section 12b = 973 lbs

Capacity of Perforated Wall

Va = 3065 lbs OK Greater than 973 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1996 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 249.5 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 7784 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164.0	plf

Resisting Moment (Mr)

Mr = -4613 ft-lbs

Uplift (T) T = 669 lbs **Use Simpson MST60 straps**

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JOB: 7614 SE Washington St
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DATE: 03/06/18 BY: Rich SHEET NO. L22

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PERFORATED WALL **Wall 13** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	27	ft
Total Full Ht Segments	(Sw) =	22.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 83.3 percent

Opening Adjustment Factor (Co) 0.85

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 15032 lbs OK Greater than 1181 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 494 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 61.8 plf **Use (SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 10629 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	108	plf
Total DL =	-176.0	plf

Resisting Moment (Mr)

Mr = -64152 ft-lbs

Uplift (T) T = -1032 lbs **No holdowns required**

PERFORATED WALL **Wall 14** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	21	ft
Total Full Ht Segments	(Sw) =	15.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw		73.8	percent
Opening Adjustment Factor	(Co)	0.79	

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 4812 lbs OK Greater than 1801 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1177 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 147.1 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 19689 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	150	plf
Wall =	204	plf
Total DL =	-422.0	plf

Resisting Moment (Mr)

Mr = -93051 ft-lbs

Uplift (T) T = -1721 lbs **No holdowns required**

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JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L24

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PERFORATED WALL **Wall 15** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	20.5	ft
Total Full Ht Segments	(Sw) =	16.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 80.5 percent

Opening Adjustment Factor (Co) 0.84 Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 5447 lbs OK Greater than 3543 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 2045 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 255.6 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 39151 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Resisting Moment (Mr)

Mr = -109055 ft-lbs

Uplift (T) T = -1282 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L25

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 16

Len = 30 ft

Mot = 26557 ft-lbs

Resisting Moment (Mr)

Mr = -189900 ft-lbs

Uplift (T) T = -2913 lbs

Dead Loads:

Roof =	68	plf
Floor =	150	plf
Wall =	204	plf
Total DL =	-422	plf

No holdowns required

PERFORATED WALL **Wall 17** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.17	ft
Total Full Ht Segments	(Sw) =	5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw		44.8	percent
Opening Adjustment Factor	(Co)	0.55	

Try 15/32 CDX Sheathing
8d @ 4" O. v = 710

Capacity of Perforated Wall

Va = 1953 lbs OK Greater than 886 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 2577 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 322.2 plf **Use (2)SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 11606 ft-lbs

Resisting Moment (Mr)

Mr = -32378 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Uplift (T) T = -700 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L27

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 18

Len = 6.5 ft

Mot = 42585 ft-lbs

Resisting Moment (Mr)

Mr = -7732 ft-lbs

Uplift (T) T = 5838 lbs

Dead Loads:

Roof =	102	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-366	plf

Use simpson MST60 straps

Wall 19

Len = 22 ft

Mot = 31471 ft-lbs

Resisting Moment (Mr)

Mr = -102124 ft-lbs

Uplift (T) T = -1355 lbs

Dead Loads:

Roof =	68	plf
Floor =	150	plf
Wall =	204	plf
Total DL =	-422	plf

No holdowns required

PERFORATED WALL **Wall 20** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	7.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed	(Sw/Lw	73.3	percent
Opening Adjustment Factor	(Co)	0.79	

Try 15/32 CDX Sheathing
8d @ 3" O. v = 930

Capacity of Perforated Wall

Va = 4041 lbs OK Greater than 886 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1631 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 203.9 plf **Use (2)SDS25312 @ 12" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 11606 ft-lbs

Resisting Moment (Mr)

Mr = -14597 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Uplift (T) T = 380 lbs **Use Simpson MST60 straps**

PERFORATED WALL **Wall 21** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.5	ft
Total Full Ht Segments	(Sw) =	7.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw		65.2	percent
Opening Adjustment Factor	(Co)	0.66	

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 1945 lbs OK Greater than 356 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 575 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 71.9 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 5020 ft-lbs

Resisting Moment (Mr)

Mr = -34319 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Uplift (T) T = -1354 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L30

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 22

Len = 30 ft

Mot = 28735 ft-lbs

Resisting Moment (Mr)

Mr = -189900 ft-lbs

Uplift (T) T = -2840 lbs

Dead Loads:

Roof =	68	plf
Floor =	150	plf
Wall =	204	plf
Total DL =	-422	plf

No holdowns required

Benchmark
Engineering
CIVIL – STRUCTURAL

JOB: 7614 SE Washington St

CLIENT: Jesse Cereghino JOB NO. 18-05

DATE: 03/06/18 BY: Rich SHEET NO. L31

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

PERFORATED WALL **Wall 23** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw		47.8	percent
Opening Adjustment Factor	(Co)	0.56	

Try 15/32 CDX Sheathing
8d @ 3" O. v = 930

Capacity of Perforated Wall

Va = 3581 lbs OK Greater than 3243 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 8423 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 1052.9 plf

Use (2)Simpson SDS25312 @ 12" O.C.

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 45531 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Resisting Moment (Mr)

Mr = -34319 ft-lbs

Uplift (T) T = 2169 lbs **Use Simpson MST60 straps**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L32

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

PERFORATED WALL **Wall 24** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	17.5	ft
Total Full Ht Segments	(Sw) =	15	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw		85.7	percent
Opening Adjustment Factor	(Co)	0.83	

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 4893 lbs OK Greater than 2447 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1572 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 196.5 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 31471 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Resisting Moment (Mr)

Mr = -79472 ft-lbs

Uplift (T) T = -926 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L33

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

PERFORATED WALL **Wall 25** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	22.5	ft
Total Full Ht Segments	(Sw) =	16.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 73.3 percent

Opening Adjustment Factor (Co) 0.71

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 9208 lbs OK Greater than 2436 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1664 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 207.9 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 39812 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	150	plf
Wall =	312	plf
Total DL =	-530.0	plf

Resisting Moment (Mr)

Mr = -134156 ft-lbs

Uplift (T) T = -1808 lbs **No holdowns required**

Wall 26

Len = 20.5 ft

Mot = 84334 ft-lbs

Resisting Moment (Mr)

Mr = -131748 ft-lbs

Uplift (T) T = 258 lbs

Dead Loads:

Roof =	255	plf
Floor =	60	plf
Wall =	312	plf
Total DL =	-627	plf

Use Simpson HDU4 holdowns

Wall 27

Len = 30 ft

Mot = 50812 ft-lbs

Resisting Moment (Mr)

Mr = -238500 ft-lbs

Uplift (T) T = -3076 lbs

Dead Loads:

Roof =	68	plf
Floor =	150	plf
Wall =	312	plf
Total DL =	-530	plf

No holdowns required

Wall 28

Len = 6 ft

Mot = 96790 ft-lbs

Resisting Moment (Mr)

Mr = -8532 ft-lbs

Uplift (T) T = 15278 lbs

Dead Loads:

Roof =	102	plf
Floor =	60	plf
Wall =	312	plf
Total DL =	-474	plf

Use (2)Simpson HDU8 holdowns
W/12" Vertical offset on 6x6 stud

Benchmark
Engineering
CIVIL - STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L36

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

PERFORATED WALL **Wall 29** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	26	ft
Total Full Ht Segments	(Sw) =	23	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 88.5 percent

Opening Adjustment Factor (Co) 0.88

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 15909 lbs OK Greater than 1370 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 542 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 67.7 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 10960 ft-lbs

Dead Loads:

Roof =	0.0	plf
Floor =	150	plf
Wall =	96	plf
Total DL =	-246.0	plf

Resisting Moment (Mr)

Mr = -83148 ft-lbs

Uplift (T) T = -1497 lbs **No holdowns required**

Benchmark
Engineering
CIVIL - STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L37

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 30

Len = 22 ft

Mot = 55556 ft-lbs

Resisting Moment (Mr)

Mr = -140844 ft-lbs

Uplift (T) T = -1316 lbs

Dead Loads:

Roof =	102	plf
Floor =	180	plf
Wall =	300	plf
Total DL =	-582	plf

No holdowns required

Wall 31

Len = 7.5 ft

Mot = 84717 ft-lbs

Resisting Moment (Mr)

Mr = -18506 ft-lbs

Uplift (T) T = 9815 lbs

Dead Loads:

Roof =	238	plf
Floor =	120	plf
Wall =	300	plf
Total DL =	-658	plf

Use Simpson HDU11 holdowns

Wall 32

Len = 11.5 ft

Mot = 8642 ft-lbs

Resisting Moment (Mr)

Mr = -44634 ft-lbs

Uplift (T) T = -1577 lbs

Dead Loads:

Roof =	255	plf
Floor =	120	plf
Wall =	300	plf
Total DL =	-675	plf

No holdowns required

Wall 33

Len = 21 ft

Mot = 57968 ft-lbs

Resisting Moment (Mr)

Mr = -143987 ft-lbs

Uplift (T) T = -1354 lbs

Dead Loads:

Roof =	68	plf
Floor =	285	plf
Wall =	300	plf
Total DL =	-653	plf

No holdowns required

Wall 34

Len = 4 ft

Mot = 28935 ft-lbs

Resisting Moment (Mr)

Mr = -3592 ft-lbs

Uplift (T) T = 6695 lbs

Dead Loads:

Roof =	221	plf
Floor =	120	plf
Wall =	108	plf
Total DL =	-449	plf

Use Simpson HDU8 holdown

PERFORATED WALL **Wall 35** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	26	ft
Total Full Ht Segments	(Sw) =	23	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 88.5 percent

Opening Adjustment Factor (Co) 0.86

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 15547 lbs OK Greater than 1270 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 514 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 64.2 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 19048 ft-lbs

Resisting Moment (Mr)

Mr = -66924 ft-lbs

Dead Loads:

Roof =	0.0	plf
Floor =	90	plf
Wall =	108	plf
Total DL =	-198.0	plf

Uplift (T) T = -812 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L41

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 36

Len = 8 ft

Mot = 58635 ft-lbs

Resisting Moment (Mr)

Mr = -12448 ft-lbs

Uplift (T) T = 6396 lbs

Dead Loads:

Roof =	221	plf
Floor =	60	plf
Wall =	108	plf
Total DL =	-389	plf

Use Simpson HDU8 holdown

Wall 37

Len = 11.5 ft

Mot = 11939 ft-lbs

Resisting Moment (Mr)

Mr = -42386 ft-lbs

Uplift (T) T = -1173 lbs

Dead Loads:

Roof =	221	plf
Floor =	120	plf
Wall =	300	plf
Total DL =	-641	plf

No holdowns required

Wall 38

Len = 4 ft

Mot = 51390 ft-lbs

Resisting Moment (Mr)

Mr = -3320 ft-lbs

Uplift (T) T = 12350 lbs

Dead Loads:

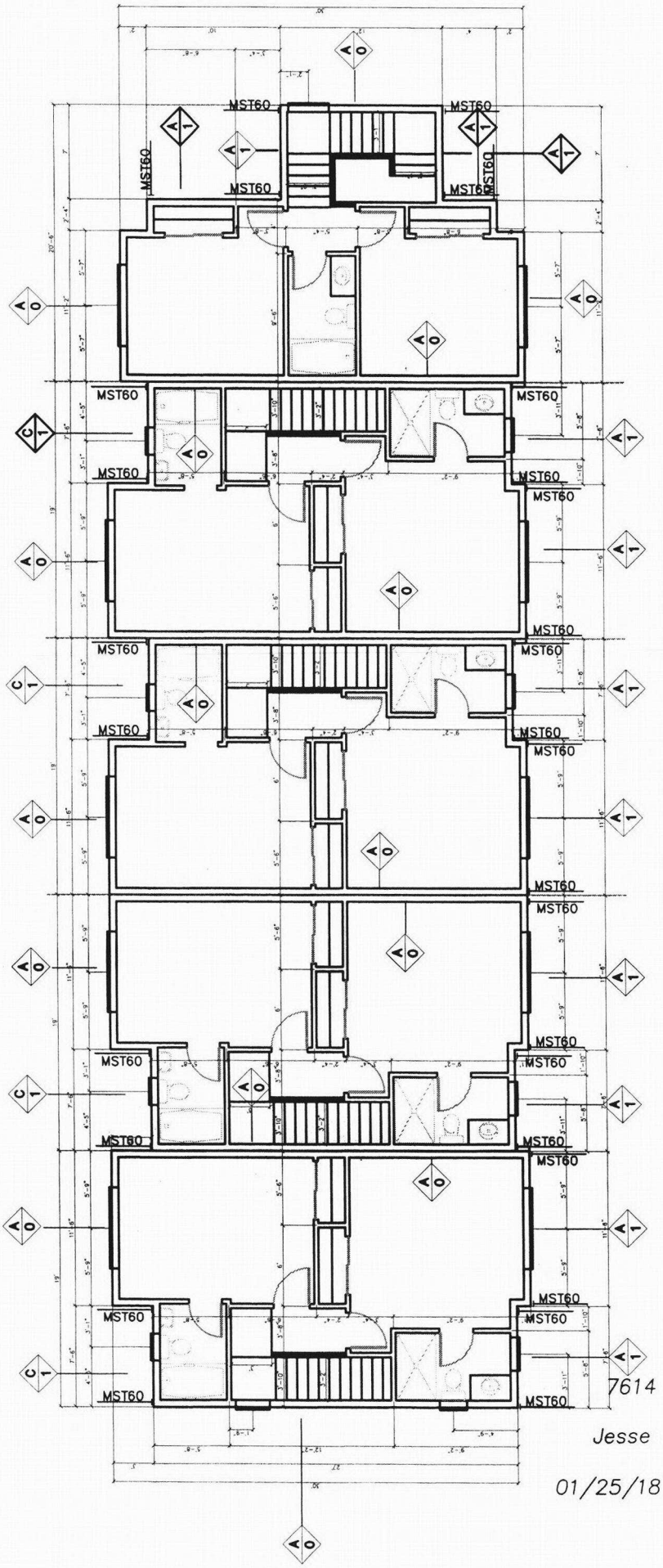
Roof =	187	plf
Floor =	120	plf
Wall =	108	plf
Total DL =	-415	plf

Use (2)Simpson HDU8 holdowns
W/12" Vertical Offset on 6x6 stud

Benchmark Engineering
CIVIL - STRUCTURAL

JOB: 7614 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 18-05
DATE: 03/06/18 BY: Rich SHEET NO. L43

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX



UPPER FLOOR SHEARWALLS

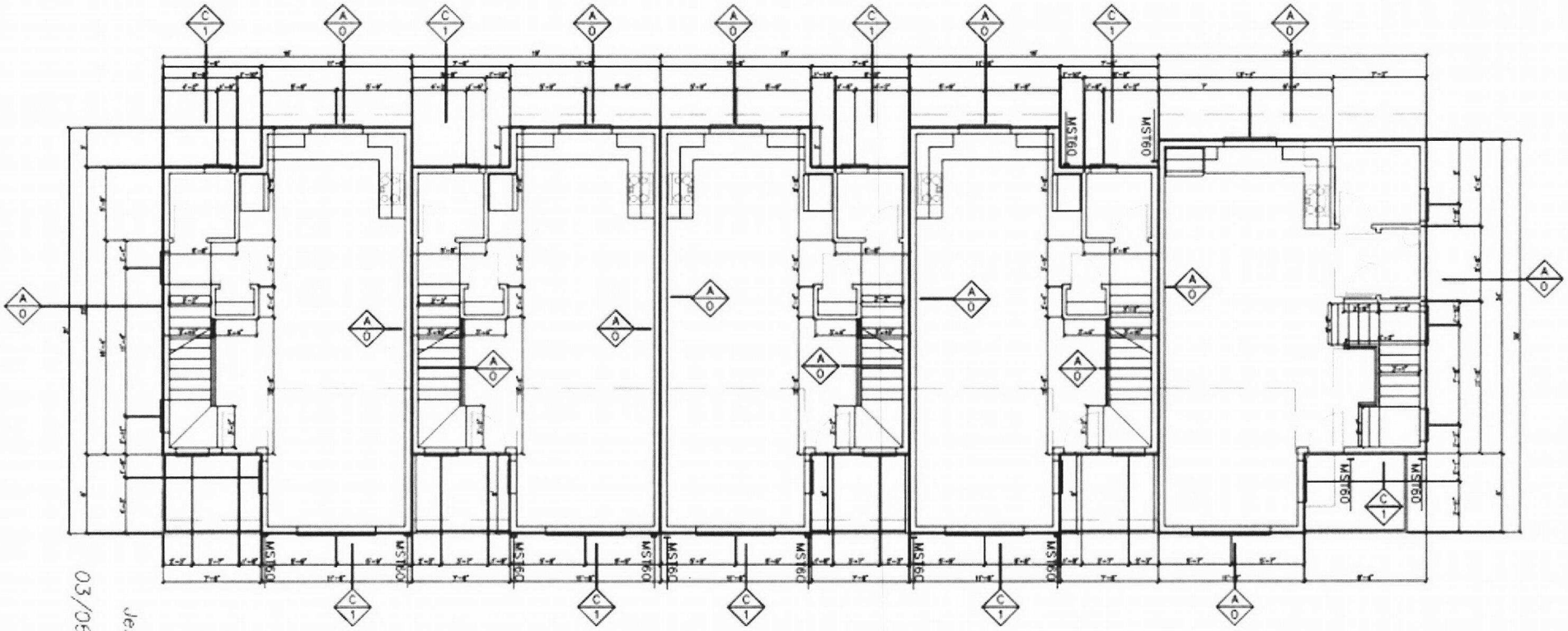
7614 SE Washington St.

Jesse Cereghino

18-05

01/25/18 Rich

L44



MAIN FLOOR SHEARWALLS

RECEIVED
APR 17 2018
BDS
DOCUMENT SERVICES

Revised 9/18/18

7614 SE Washington St

Jesse Cereghino

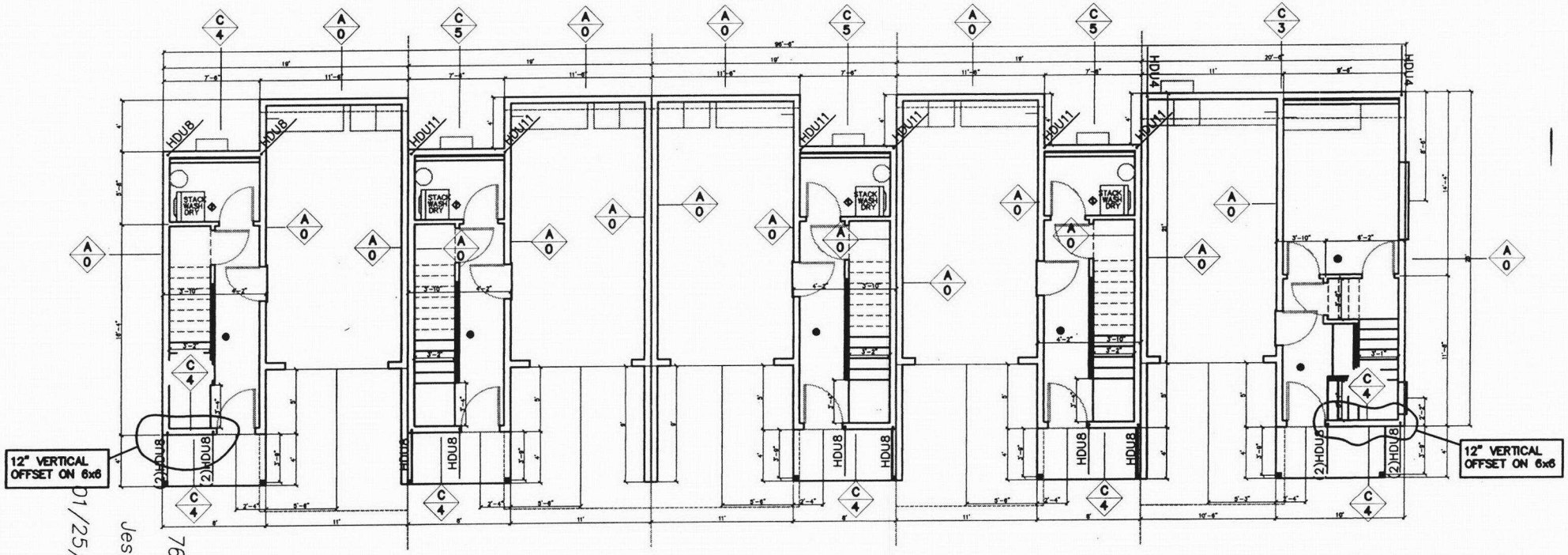
18-05

03/06/18

Rich

L45

17-180493/96/97/98/500-RS



LOWER FLOOR SHEARWALLS

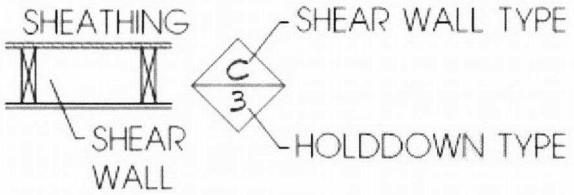
7614 SE Washington St.

Jesse Cereghino

18-05

01/25/18

Rich



- HOLDDOWN/STRAP LOCATION

SHEARWALL SHEATHING SCHEDULE

TYPE	THICKNESS	EDGE NAILING	SILL TO FLOOR	SILL TO FOUNDATION
A	15/32"	8D @ 6" O.C.	SDS25312 @ 16" O.C.	5/8"~ A.B. @ 36" O.C.
B	15/32"	8D @ 4" O.C.	(2) SDS25312 @ 16" O.C.	5/8"~ A.B. @ 24" O.C.
C	15/32"	8D @ 3" O.C.	(2) SDS25312 @ 12" O.C.	5/8"~ A.B. @ 18" O.C.

SHEARWALL HOLDDOWN SCHEDULE

#	TYPE
O	NO HOLDDOWN REQ'D
1	SIMPSON MST6O

MST6O – FILL 23 HOLES TOP AND 23 HOLES BOTTOM

#	TYPE	AB DIA	COL
2	SIMPSON HDU2	5/8"	2–2X
3	SIMPSON HDU4	5/8"	2–2X
4	SIMPSON HDU8	7/8"	2–2X
5	SIMPSON HDU11	1"	6X

ALL HDU FILL ALL HOLES

RECEIVED
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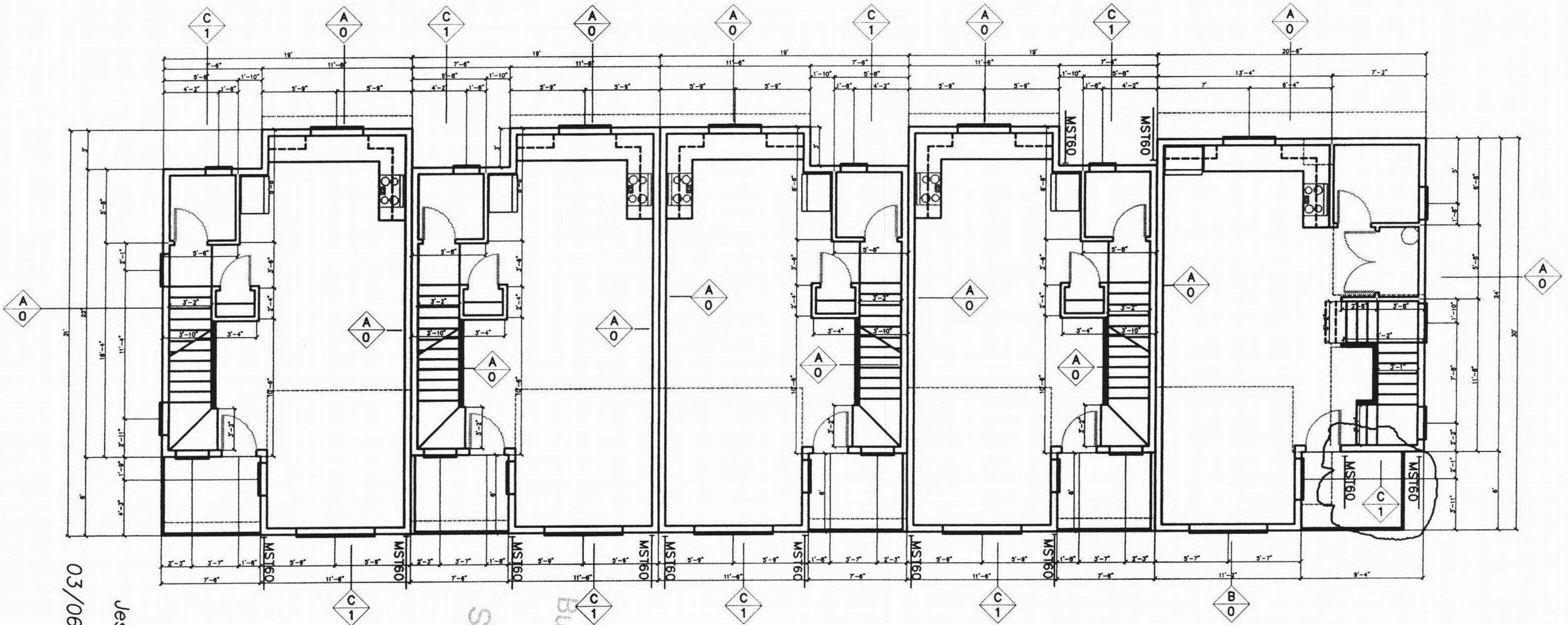
7614 SE Washington St

Jesse Cereghino 18-05

03/06/18 Rich

L47



MAIN FLOOR SHEARWALLS

REVISED 3/6/18

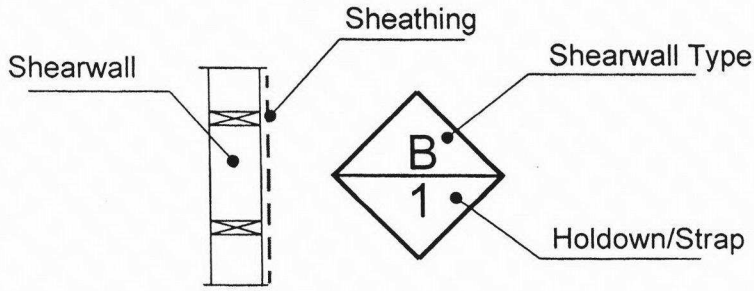
7614 SE Washington St

Jesse Cereghino 18-05

03/06/18 Rich

City of Portland
Bureau of Development Services
VOID:
Save for Reference Only

L45



City of Portland
Bureau of Development Services
VOID:
Save for Reference Only

▲ = HOLDOWN/STRAP LOCATION

SHEARWALL KEY

PLYWOOD or OSB 'RATED SHEATHING' or GYPSUM BOARD SHEATHING
SHEAR WALL PANEL DESCRIPTION

			SILL CONNECTOR & SPACING	
TYPE	SHEATHING THICKNESS	NAILING @ PANEL EDGES	SILL-TO-FLOOR	SILL-TO-FOUNDATION
A	15/32"	8d NAILS @ 6" O.C.	SDS25312 @ 16" O.C.	5/8"Ø Anchor Bolt @ 36" O.C.
B	15/32"	8d NAILS @ 4" O.C.	(2)SDS25312 @ 16" O.C.	5/8"Ø Anchor Bolt @ 24" O.C.
C	15/32"	8d NAILS @ 3" O.C.	(2) SDS25312 @ 12" O.C.	5/8"Ø Anchor Bolt @ 18" O.C.
J	1/2" GB	5d NAILS @ 7" O.C. UNBLKD	(1)16d NAILS @ 12" O.C.	1/2"Ø Anchor Bolt @ 48" O.C.
K	1/2" GB	5d NAILS @ 4" O.C. UNBLKD	(1)16d NAILS @ 12" O.C.	1/2"Ø Anchor Bolt @ 48" O.C.
L	5/8" GB	6d NAILS @ 8/12" O.C. BLKD	(1)16d NAILS @ 12" O.C.	1/2"Ø Anchor Bolt @ 48" O.C.

HOLDOWNS & STRAPS

HOLDOWN DESCRIPTION	
TYPE	
0	NO HOLDOWN REQUIRED
1	SIMPSON MST60
2	SIMPSON HDU2
3	SIMPSON HDU4
4	SIMPSON HDU8

7614 SE Washington St

Jesse Cereghino 18-05

03/06/18 Rich

Revised 03/06/18

L47

Lateral Calculations

New Townhouse
7622 SE Washington Street
Portland, Oregon

REGISTERED PROFESSIONAL ENGINEER
19301
OREGON
JULY 22, 1997
RICHARD D SILKETT

EXPIRES 6/30/18

Engineer was retained in a limited capacity for this project. Design is based upon information provided by the client who is solely responsible for the accuracy of same. No responsibility and/or liability are assumed by, or are to be assigned to, the engineer for items beyond that shown on these sheets.

Job No 17-83
Contact: Rich Silkett, PE
Thursday, January 25, 2018

Revised 03/06/18

17-2582S/4/1/5/3/1/5/7/1/5/8/RS

Benchmark
Engineering
CIVIL - STRUCTURAL

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

JOB: _____
CLIENT: _____ JOB NO. _____
DATE: _____ BY: _____ SHEET NO. _____

Lateral Analysis 7622 SE Washington St
17-83

Design Criteria: Simplified Method

Seismic:

Site Class	D		Ridge = 32	feet
R =	6		Eave = 26	feet
Ss =	0.995	Sds = 0.731	h = 29	feet
S1 =	0.414	Sd1 = 0.438	F = 1.0	
			Wdl = 1.0	

V = ((FxSds)xWdl)/R

V = 0.122 Wdl

Design Dead Loads:

Roof =	17	psf
Wall =	12	psf
Floor =	15	psf

Seismic (Transverse) Front-Rear

Roof =	11968	lbs
Upper Floor =	7095	lbs
Main Floor =	7095	lbs
Wallperp =	10320	lbs

Base:

Vperp = 4444 lbs

Seismic (Longitudinal)Side-Side

Wallprl = 77400 lbs

Base:

Vprl = 11752 lbs

Note

This is a 3-story above grade wood-frame structure with a garage and living facility
The Ground Level has full ht concrete foundation walls on all
exterior sides. The interior party wall and stairway walls are wood framed.

This calculation will be used for both 'A' & 'B' units.

Wind: 3-Story Structure
Light-Frame Wood Construction
2014 OSSC
Exposure 'B'
I = 1.0
V3s = 120 mph

Edge Strip (Es)

Es =	3.0	ft	<- - - Use this
Es =	1.9	ft	
Es =	10.4	ft	
Ez =	6.0	ft	

Roof Angle = 39.8 degrees

Horizontal Loads

Basic Pressures (psf): ASCE 7-10, Figure 28.6-1

Zone =	A	B	C	D	
Ps =	17.8	12.2	14.2	9.8	Case 1
	17.8	12.2	14.2	9.8	Case 2

Wind Pressure: (Transverse) Front-Rear

Roof =	11808	lbs
Main =	12527	lbs
Lower =	12565	lbs
Windperp =	36901	lbs
	Wind Governs!	
Vperp/1.4 =	2557	lbs

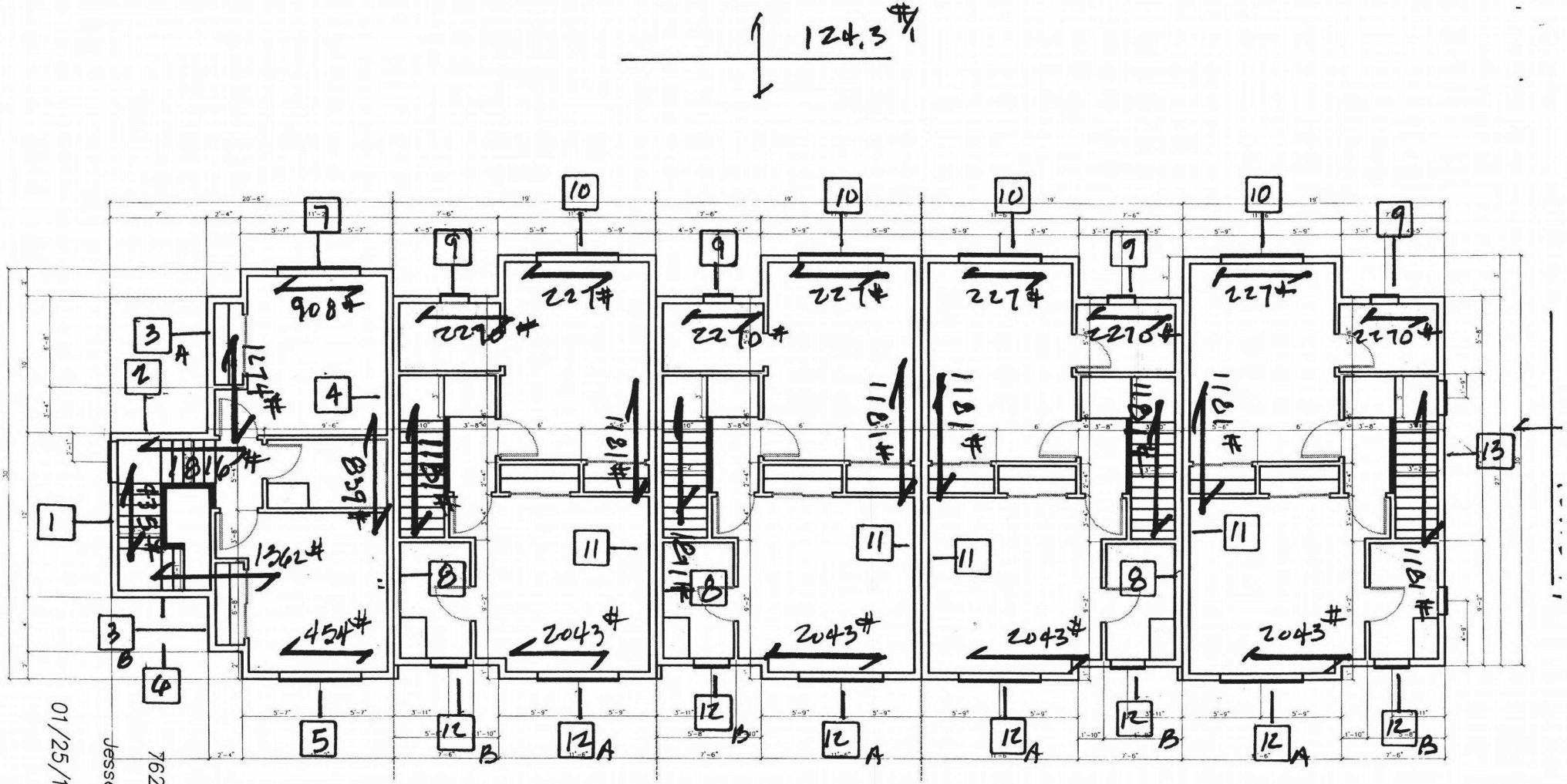
Wind Pressure: (Longintudinal) Side-Side

Roof =	2716	lbs
Main =	4028	lbs
Lower =	4028	lbs
Windprl =	10772	lbs
	Wind Governs!	
Vprl/1.4 =	8395	lbs

Use Seismic force for
Interior Units (all levels)

Seismic Distribution Parallel to Ridge Vprl = 8.39 kips

H	Wdl	HxWdl	%	Vstory	
29	11.64	337.56	54.07	4.54	kips
18	10.62	191.16	30.62	2.57	kips
9	10.62	95.58	15.31	1.29	kips
	Total =	624.3			



UPPER FLOOR SHEARWALLS

7622 SE Washington St.

Jesse Cereghino

17-83

01/25/18

Rich

L3

Roof Diaphragm:

Horizontal Forces and Shears - Wind (Transverse) Front-Rear

Shear = 210.9 plf

Horizontal Forces and Shears - Wind (Longitudinal) Side-Side

Shear = 14.3 plf

Roof Diaphragm
Use 1/2" CDX Plywood (Index 48/24)
W/8d @ 6" O.C. edges
8d @ 12" O.C. field

Upper Floor Shearwalls:

Wind Perpendicular to Ridge
Upper = 124.3 plf

Seismic Parallel to Ridge
Upper = 118.1 plf (Wind)
Upper = 151.3 plf (Seismic) < - - Governs

Wall	Len	Force(lbs)	Shear(plf)	Type
1	8.5	435	51.2	A
2	7	1816	259.4	A
3	14	1274	91.0	A
4	30	839	28.0	A
5	5	454	90.8	A
6	7	1362	194.6	A
7	5	908	181.6	A
8	27	1181	43.7	A
9	5.5	2270	412.7	C
10	5.5	227	41.3	A
11	31	1181	38.1	A
12	10.5	2043	194.6	A
13	22.5	1181	52.5	A

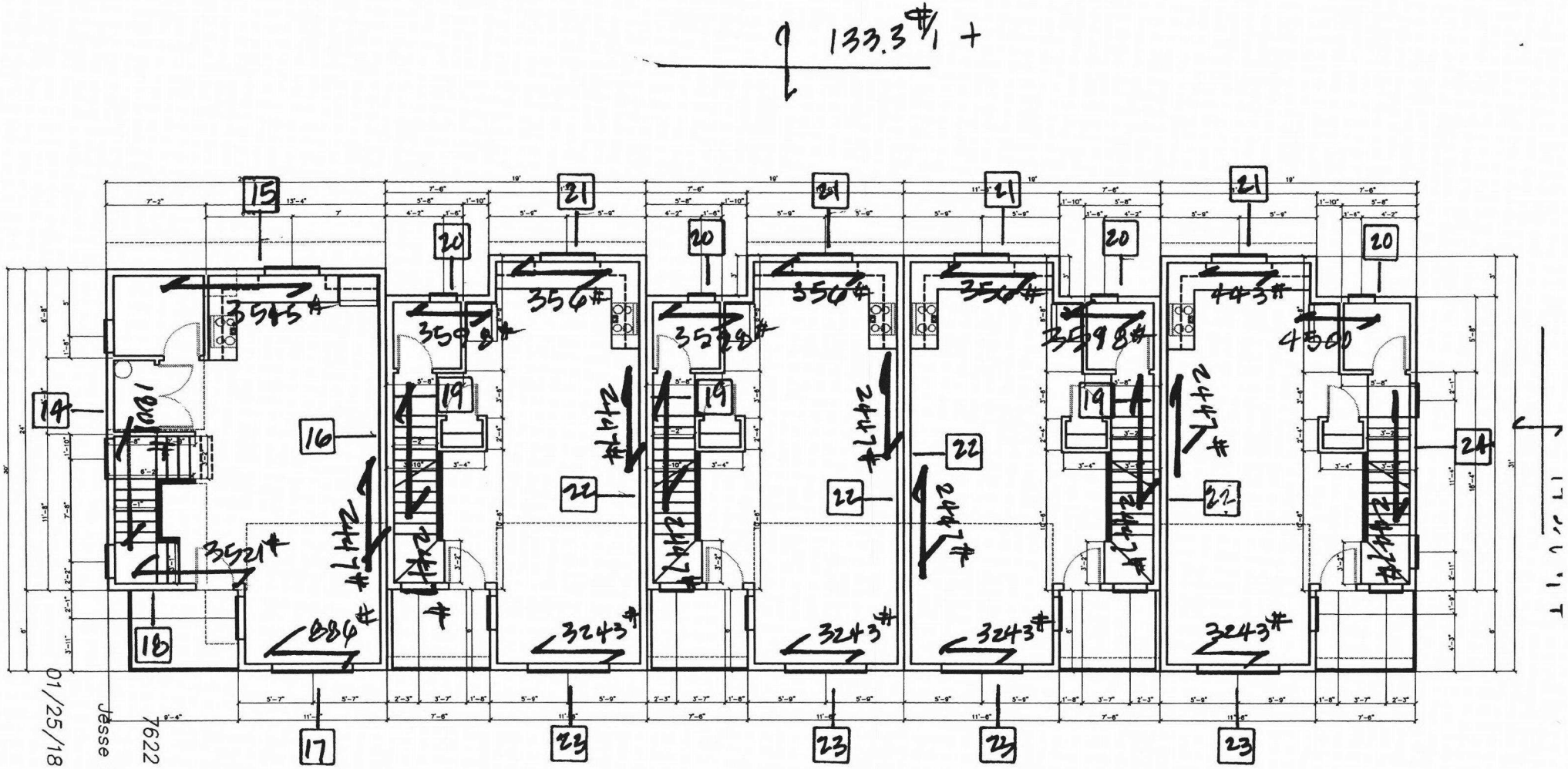
Upper Floor Diaphragm:

Horizontal Forces and Shears - Wind (Transverse) Front-Rear

Shear = 160.4 plf

Upper Floor Diaphragm
Use 3/4" CDX Plywood (Index 32/16)
W/10d @ 6" O.C. edges
10d @ 12" O.C. field

Horizontal Forces and Shears - Wind (Longitudinal) Side-Side



MAIN FLOOR SHEARWALLS

7622 SE Washington St.

Jesse Cereghino

17-83

01/25/18

Rich

L5

Main Shearwalls:

Wind Perpendicular to Ridge
Main = 133.3 plf

Wind Parallel to Ridge
Main = 143.9 plf (Wind) < - - End Units
Main = 85.7 plf (Seismic) < - - Interior

Wall	Len	Force(lbs)	Shear(plf)	Type
14	15.5	1801	116.2	A
15	16.5	3543	214.7	A
16	30	2205	73.5	A
17	5	886	177.2	B
18	6.5	3521	541.7	C
19	22	2447	111.2	A
20	5.5	3598	654.2	C
21	7.5	356	47.5	A
22	31	2447	78.9	A
23	5.5	3243	589.6	C
24	15	2447	163.1	A

Main Floor Diaphragm:

Horizontal Forces and Shears - Wind (Transverse) Front-Rear

Shear = 131.8 plf

Horizontal Forces and Shears - Wind (Longitudinal) Side-Side

Shear = 56.7 plf

Main Floor Diaphragm
Use 3/4" CDX Plywood (Index 32/16)
W/10d @ 6" O.C. edges
10d @ 12" O.C. field

LOWER FLOOR SHEARWALLS

7622 SE Washington St.

Jesse Cereghino

17-83

01/25/18

Rich

L7

Lower Shearwalls:

Wind Perpendicular to Ridge

Lower = 133.7 plf

Wind Parallel to Ridge

Lower = 143.9 plf (Wind) < - - End Units

Lower = 42.8 plf (Seismic) < - - Interior

Wall	Len	Force(lbs)	Shear(plf)	Type	
25	16.5	2436	147.6	A	
26	20.5	5141	250.8	C	
27	30	2940	98.0	A	
28	6	6414	1069.0	C	< - Ea. Face
29	23	1370	59.6	A	
30	22	2948	134.0	A	
31	7.5	4197	559.6	C	
32	11.5	442	38.4	A	
33	21	3216	153.1	A	
34	4	3215	803.8	C	
35	23	1270	55.2	A	
36	8	6515	814.4	C	
37	11.5	731	63.6	A	
38	4	5710	1427.5	C	< - Ea. Face

Component & Cladding - Roof

Roof Slope 4:12

L =	30	ft	Sp =	24	inches Truss Spacing
h =	29	ft	Wdl =	24	plf
λ = 1.0					

Effective Area

be =	10.0	ft
Area =	300.0	sq ft

Design Loads:

Wdl =	24	plf
Wll =	50	plf
Wtl =	74	plf

Zone 1

Negative Pressure p = -15.2 psf
w = -30.4 plf

Zone 2

Negative Pressure p = -23 psf
w = -46 plf

Zone 3

Negative Pressure p = -35.5 psf
w = -71 plf

Zone 1

Positive Pressure p = 8.1 psf
w = 16.2 plf

Zone 2

Positive Pressure p = 8.1 psf
w = 16.2 plf

Zone 3

Positive Pressure p = 8.1 psf
w = 16.2 plf

Number of nails per 4'x8' area = 48 Nails

Max Tension per Nail = -23.7 lbs per nail

Withdrawal capacity (8d) '05 NDS, Table 11.2C
Pn = 89.6 lbs per nail
Safety Factor = 3.8

Wall 1

Len = 8.5 ft

Mot = 3480 ft-lbs

Resisting Moment (Mr)

Mr = -5925 ft-lbs

Uplift (T) T = -9 lbs

Dead Loads:

Roof =	68	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164	plf

No holdowns required

Wall 2

Len = 7 ft

Mot = 14528 ft-lbs

Resisting Moment (Mr)

Mr = -4851 ft-lbs

Uplift (T) T = 1660 lbs

Dead Loads:

Roof =	102	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-198	plf

Use Simpson MST60 straps

Wall 3a

Len = 10 ft

Mot = 7280 ft-lbs

Resisting Moment (Mr)

Mr = -9050 ft-lbs

Uplift (T) T = 185 lbs

Dead Loads:

Roof =	85	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-181	plf

Use Simpson MST60 straps

Wall 3b

Len = 4 ft

Mot = 2912 ft-lbs

Resisting Moment (Mr)

Mr = -1448 ft-lbs

Uplift (T) T = 511 lbs

Dead Loads:

Roof =	85	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-181	plf

Use Simpson MST60 straps

Wall 4

Len = 30 ft

Mot = 6712 ft-lbs

Resisting Moment (Mr)

Mr = -73800 ft-lbs

Uplift (T) T = -1252 lbs

Dead Loads:

Roof =	68	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164	plf

No holdowns required

PERFORATED WALL **Wall 5** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.17	ft
Total Full Ht Segments	(Sw) =	5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw) 44.8 percent

Opening Adjustment Factor (Co) 0.65 Try 15/32 CDX Sheathing

8d @ 6" O.C. v = 393

Capacity of Perforated Wall

Va = 2555 lbs OK Greater than 454 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1118 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 139.7 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 3632 ft-lbs

Dead Loads:

Roof =	68	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164	plf

Resisting Moment (Mr)

Mr = -10231 ft-lbs

Uplift (T) T = -224 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L14

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 6

Len = 7 ft

Mot = 10896 ft-lbs

Resisting Moment (Mr)

Mr = -4851 ft-lbs

Uplift (T) T = 1141 lbs

Dead Loads:

Roof =	102	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-198	plf

Use Simpson MST60 straps

PERFORATED WALL **Wall 7** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.17	ft
Total Full Ht Segments	(Sw) =	5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw) = 44.8 percent

Opening Adjustment Factor (Co) = 0.65

Try 15/32 CDX Sheathing
8d @ 6" O.C. v = 393

Capacity of Perforated Wall

Va = 2555 lbs OK Greater than 908 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 2235 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 279.4 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 8172 ft-lbs

Dead Loads:

Roof =	238.0	plf
Floor =	0	plf
Wall =	108	plf
Total DL =	-346.0	plf

Resisting Moment (Mr)

Mr = -21585 ft-lbs

Uplift (T) T = -428 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L16

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 8

Len = 27 ft

Mot = 9448 ft-lbs

Resisting Moment (Mr)

Mr = -72171 ft-lbs

Uplift (T) T = -1254 lbs

Dead Loads:

Roof =	102	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-198	plf

No holdowns required

PERFORATED WALL **Wall 9** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	7.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 73.3 percent

Opening Adjustment Factor (Co) 0.79

Try 15/32 CDX Sheathing
8d @ 3" O. v = 930

Capacity of Perforated Wall

Va = 8082 lbs OK Greater than 2270 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 4180 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 522.4 plf **Use (2)SDS25312 @ 12" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 20430 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	108	plf
Total DL =	-176.0	plf

Resisting Moment (Mr)

Mr = -4950 ft-lbs

Uplift (T) T = 2328 lbs **Use Simpson MST60 straps**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L18

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PERFORATED WALL **Wall 10** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 47.8 percent

Opening Adjustment Factor (Co) 0.66

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 2853 lbs OK Greater than 227 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 500 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 62.5 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 2043 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	108	plf
Total DL =	176.0	plf

Resisting Moment (Mr)

Mr = -11638 ft-lbs

Uplift (T) T = -430 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L19

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 11

Len = 31 ft

Mot = 9448 ft-lbs

Resisting Moment (Mr)

Mr = -78802 ft-lbs

Uplift (T) T = -1220 lbs

Dead Loads:

Roof =	68	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164	plf

No holdowns required

PERFORATED WALL **Wall 12a** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 47.8 percent

Opening Adjustment Factor (Co) 0.78 Try 15/32 CDX Sheathing

8d @ 6" O. v = 393

Force in wall section 12a = 1070 lbs

Capacity of Perforated Wall

Va = 3372 lbs OK Greater than 1070 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1995 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 249.4 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 8560 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	164.0	plf

Resisting Moment (Mr)

Mr = -10845 ft-lbs

Uplift (T) T = 179 lbs **Use Simpson MST60 straps**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L21

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PERFORATED WALL **Wall 12b** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	7.5	ft
Total Full Ht Segments	(Sw) =	5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 66.7 percent

Opening Adjustment Factor (Co) 0.78 Try 15/32 CDX Sheathing

8d @ 6" O. v = 393

Force in wall section 12b = 973 lbs

Capacity of Perforated Wall

Va = 3065 lbs OK Greater than 973 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1996 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 249.5 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 7784 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	96	plf
Total DL =	-164.0	plf

Resisting Moment (Mr)

Mr = -4613 ft-lbs

Uplift (T) T = 669 lbs **Use Simpson MST60 straps**

PERFORATED WALL **Wall 13** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	27	ft
Total Full Ht Segments	(Sw) =	22.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 83.3 percent

Opening Adjustment Factor (Co) 0.85

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 15032 lbs OK Greater than 1181 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 494 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 61.8 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 10629 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	0	plf
Wall =	108	plf
Total DL =	-176.0	plf

Resisting Moment (Mr)

Mr = -64152 ft-lbs

Uplift (T) T = -1032 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L23

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

PERFORATED WALL **Wall 14** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	21	ft
Total Full Ht Segments	(Sw) =	15.5	ft
Maximum Opening Ht	(Ho) =	2H/3	ft

Percent Full-ht/Sheathed (Sw/Lw 73.8 percent

Opening Adjustment Factor (Co) 0.79

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 4812 lbs OK Greater than 1801 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1177 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 147.1 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 19689 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	150	plf
Wall =	204	plf
Total DL =	-422.0	plf

Resisting Moment (Mr)

Mr = -93051 ft-lbs

Uplift (T) T = -1721 lbs **No holdowns required**

Benchmark Engineering
CIVIL - STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L24

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

PERFORATED WALL **Wall 15** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	20.5	ft
Total Full Ht Segments	(Sw) =	16.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 80.5 percent

Opening Adjustment Factor (Co) 0.84 Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 5447 lbs OK Greater than 3543 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 2045 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 255.6 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 39151 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Resisting Moment (Mr)

Mr = -109055 ft-lbs

Uplift (T) T = -1282 lbs **No holdowns required**

Wall 16

Len = 30 ft

Mot = 26557 ft-lbs

Resisting Moment (Mr)

Mr = -189900 ft-lbs

Uplift (T) T = -2913 lbs

Dead Loads:

Roof =	68	plf
Floor =	150	plf
Wall =	204	plf
Total DL =	-422	plf

No holdowns required

PERFORATED WALL **Wall 17** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.17	ft
Total Full Ht Segments	(Sw) =	5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 44.8 percent

Opening Adjustment Factor (Co) 0.55

Try 15/32 CDX Sheathing
8d @ 4" O. v = 710

Capacity of Perforated Wall

Va = 1953 lbs OK Greater than 886 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 2577 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 322.2 plf **Use (2)SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 11606 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	519.0	plf

Resisting Moment (Mr)

Mr = -32378 ft-lbs

Uplift (T) T = -700 lbs **No holdowns required**

Wall 18

Len = 6.5 ft

Mot = 42585 ft-lbs

Resisting Moment (Mr)

Mr = -7732 ft-lbs

Uplift (T) T = 5838 lbs

Dead Loads:

Roof =	102	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-366	plf

Use simpson MST60 straps

Wall 19

Len = 22 ft

Mot = 31471 ft-lbs

Resisting Moment (Mr)

Mr = -102124 ft-lbs

Uplift (T) T = -1355 lbs

Dead Loads:

Roof =	68	plf
Floor =	150	plf
Wall =	204	plf
Total DL =	-422	plf

No holdowns required

PERFORATED WALL **Wall 20** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	7.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 73.3 percent

Opening Adjustment Factor (Co) 0.79

Try 15/32 CDX Sheathing
8d @ 3" O. v = 930

Capacity of Perforated Wall

Va = 4041 lbs OK Greater than 886 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1631 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 203.9 plf **Use (2)SDS25312 @ 12" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 11606 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Resisting Moment (Mr)

Mr = -14597 ft-lbs

Uplift (T) T = 380 lbs **Use Simpson MST60 straps**

PERFORATED WALL **Wall 21** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.5	ft
Total Full Ht Segments	(Sw) =	7.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 65.2 percent

Opening Adjustment Factor (Co) 0.66 Try 15/32 CDX Sheathing.
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 1945 lbs OK Greater than 356 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 575 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 71.9 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 5020 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Resisting Moment (Mr)

Mr = -34319 ft-lbs

Uplift (T) T = -1354 lbs **No holdowns required**

Benchmark Engineering
CIVIL - STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L30

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 22

Len = 30 ft

Mot = 28735 ft-lbs

Resisting Moment (Mr)

Mr = -189900 ft-lbs

Uplift (T) T = -2840 lbs

Dead Loads:

Roof =	68	plf
Floor =	150	plf
Wall =	204	plf
Total DL =	-422	plf

No holdowns required

PERFORATED WALL **Wall 23** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	11.5	ft
Total Full Ht Segments	(Sw) =	5.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 47.8 percent

Opening Adjustment Factor (Co) 0.56 Try 15/32 CDX Sheathing
8d @ 3" O. v = 930

Capacity of Perforated Wall

Va = 3581 lbs OK Greater than 3243 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 8423 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 1052.9 plf

Use (2)Simpson SDS25312 @ 12" O.C.

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 45531 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Resisting Moment (Mr)

Mr = -34319 ft-lbs

Uplift (T) T = 2169 lbs **Use Simpson MST60 straps**

Benchmark Engineering
CIVIL - STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L32

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

PERFORATED WALL **Wall 24** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	17.5	ft
Total Full Ht Segments	(Sw) =	15	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw		85.7	percent
Opening Adjustment Factor	(Co)	0.83	

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 4893 lbs OK Greater than 2447 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1572 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 196.5 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 31471 ft-lbs

Dead Loads:

Roof =	255.0	plf
Floor =	60	plf
Wall =	204	plf
Total DL =	-519.0	plf

Resisting Moment (Mr)

Mr = -79472 ft-lbs

Uplift (T) T = -926 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L33

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

PERFORATED WALL **Wall 25** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	22.5	ft
Total Full Ht Segments	(Sw) =	16.5	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 73.3 percent

Opening Adjustment Factor (Co) 0.71 Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 9208 lbs OK Greater than 2436 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 1664 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 207.9 plf **Use (SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 39812 ft-lbs

Dead Loads:

Roof =	68.0	plf
Floor =	150	plf
Wall =	312	plf
Total DL =	-530.0	plf

Resisting Moment (Mr)

Mr = -134156 ft-lbs

Uplift (T) T = -1808 lbs **No holdowns required**

Wall 26

Len = 20.5 ft

Mot = 84334 ft-lbs

Resisting Moment (Mr)

Mr = -131748 ft-lbs

Uplift (T) T = 258 lbs

Dead Loads:

Roof =	255	plf
Floor =	60	plf
Wall =	312	plf
Total DL =	-627	plf

Use Simpson HDU4 holdowns

Wall 27

Len = 30 ft

Mot = 50812 ft-lbs

Resisting Moment (Mr)

Mr = -238500 ft-lbs

Uplift (T) T = -3076 lbs

Dead Loads:

Roof =	68	plf
Floor =	150	plf
Wall =	312	plf
Total DL =	-530	plf

No holdowns required

Wall 28

Len = 6 ft

Mot = 96790 ft-lbs

Resisting Moment (Mr)

Mr = -8532 ft-lbs

Uplift (T) T = 15278 lbs

Dead Loads:

Roof =	102	plf
Floor =	60	plf
Wall =	312	plf
Total DL =	-474	plf

Use (2)Simpson HDU8 holdowns
W/12" Vertical offset on 6x6 stud

PERFORATED WALL **Wall 29** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	26	ft
Total Full Ht Segments	(Sw) =	23	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw 88.5 percent

Opening Adjustment Factor (Co) 0.88

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 15909 lbs OK Greater than 1370 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 542 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 67.7 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 10960 ft-lbs

Dead Loads:

Roof =	0.0	plf
Floor =	150	plf
Wall =	96	plf
Total DL =	-246.0	plf

Resisting Moment (Mr)

Mr = -83148 ft-lbs

Uplift (T) T = -1497 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L37

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 30

Len = 22 ft

Mot = 55556 ft-lbs

Resisting Moment (Mr)

Mr = -140844 ft-lbs

Uplift (T) T = -1316 lbs

Dead Loads:

Roof =	102	plf
Floor =	180	plf
Wall =	300	plf
Total DL =	-582	plf

No holdowns required

Wall 31

Len = 7.5 ft

Mot = 84717 ft-lbs

Resisting Moment (Mr)

Mr = -18506 ft-lbs

Uplift (T) T = 9815 lbs

Dead Loads:

Roof =	238	plf
Floor =	120	plf
Wall =	300	plf
Total DL =	-658	plf

Use Simpson HDU11 holdowns

Wall 32

Len = 11.5 ft

Mot = 8642 ft-lbs

Resisting Moment (Mr)

Mr = -44634 ft-lbs

Uplift (T) T = -1577 lbs

Dead Loads:

Roof =	255	plf
Floor =	120	plf
Wall =	300	plf
Total DL =	-675	plf

No holdowns required

Wall 33

Len = 21 ft

Mot = 57968 ft-lbs

Resisting Moment (Mr)

Mr = -143987 ft-lbs

Uplift (T) T = -1354 lbs

Dead Loads:

Roof =	68	plf
Floor =	285	plf
Wall =	300	plf
Total DL =	-653	plf

No holdowns required

Wall 34

Len = 4 ft

Mot = 28935 ft-lbs

Resisting Moment (Mr)

Mr = -3592 ft-lbs

Uplift (T) T = 6695 lbs

Dead Loads:

Roof =	221	plf
Floor =	120	plf
Wall =	108	plf
Total DL =	-449	plf

Use Simpson HDU8 holdown

PERFORATED WALL **Wall 35** 2008 NDS, Section 4.3.3.4

Overall Length	(Lw) =	26	ft
Total Full Ht Segments	(Sw) =	23	ft
Maximum Opening Ht	(Ho) =	5H/6	ft

Percent Full-ht/Sheathed (Sw/Lw		88.5	percent
Opening Adjustment Factor	(Co)	0.86	

Try 15/32 CDX Sheathing
8d @ 6" O. v = 393

Capacity of Perforated Wall

Va = 15547 lbs OK Greater than 1270 lbs Shear Force

Tension & Compression chord at perforated wall ends (T), (Sect. 4.3.6.1.2)

(Equation 4.3-8) T = 514 lbs **Use (2)2x6 stud each end of perforate wall**

Check Top & Bottom chord shear (Sect 4.3.6.4.1)

(Equation 4.3-9) v = 64.2 plf **Use SDS25312 @ 16" O.C.**

Wall Overturning (Sect 4.3.6.4.2.1)

Mot = 19048 ft-lbs

Dead Loads:

Roof =	0.0	plf
Floor =	90	plf
Wall =	108	plf
Total DL =	-198.0	plf

Resisting Moment (Mr)

Mr = -66924 ft-lbs

Uplift (T) T = -812 lbs **No holdowns required**

Benchmark Engineering
CIVIL – STRUCTURAL

JOB: 7622 SE Washington St
CLIENT: Jesse Cereghino JOB NO. 17-83
DATE: 03/06/18 BY: Rich SHEET NO. L41

2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

Wall 36

Len = 8 ft

Mot = 58635 ft-lbs

Resisting Moment (Mr)

Mr = -12448 ft-lbs

Uplift (T) T = 6396 lbs

Dead Loads:

Roof =	221	plf
Floor =	60	plf
Wall =	108	plf
Total DL =	-389	plf

Use Simpson HDU8 holdown

Wall 37

Len = 11.5 ft

Mot = 11939 ft-lbs

Resisting Moment (Mr)

Mr = -42386 ft-lbs

Uplift (T) T = -1173 lbs

Dead Loads:

Roof =	221	plf
Floor =	120	plf
Wall =	300	plf
Total DL =	-641	plf

No holdowns required

Wall 38

Len = 4 ft

Mot = 51390 ft-lbs

Resisting Moment (Mr)

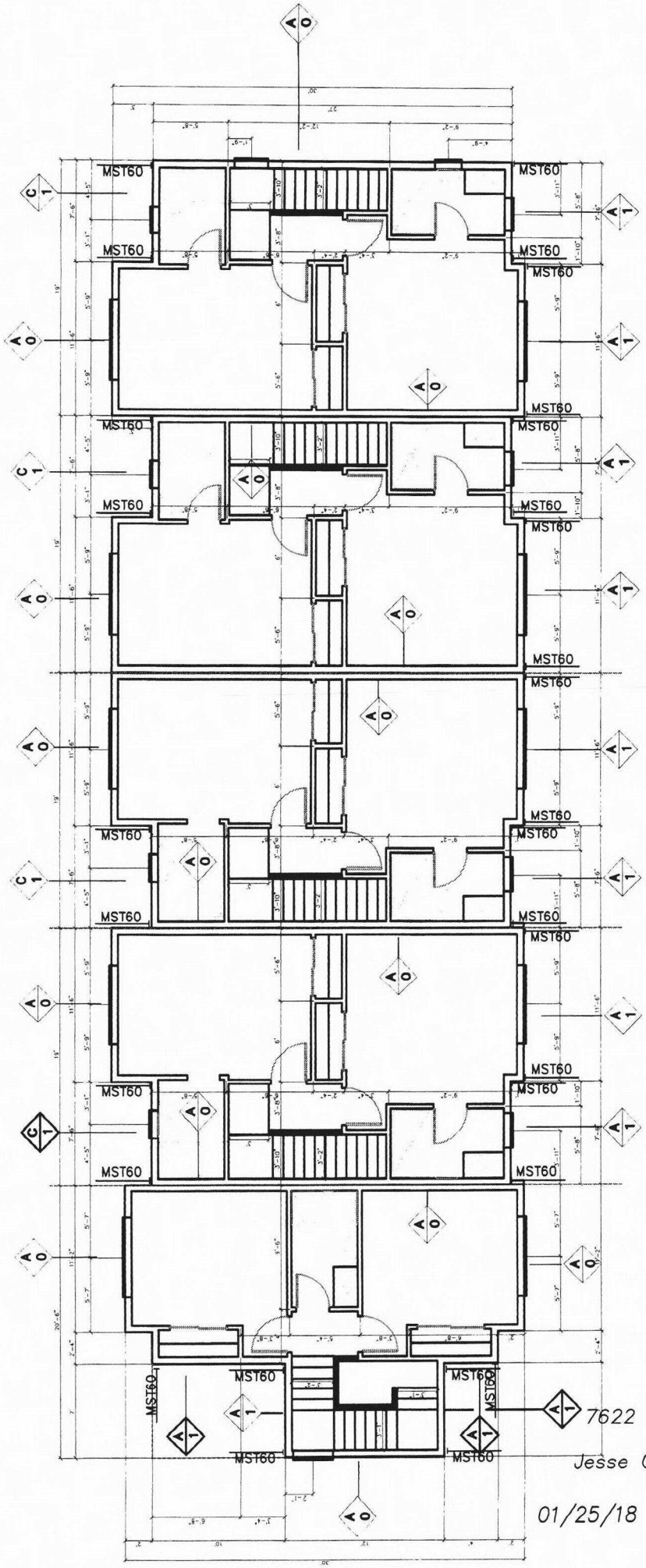
Mr = -3320 ft-lbs

Uplift (T) T = 12350 lbs

Dead Loads:

Roof =	187	plf
Floor =	120	plf
Wall =	108	plf
Total DL =	-415	plf

Use (2)Simpson HDU8 holdowns
W/12" Vertical Offset on 6x6 stud



UPPER FLOOR SHEARWALLS

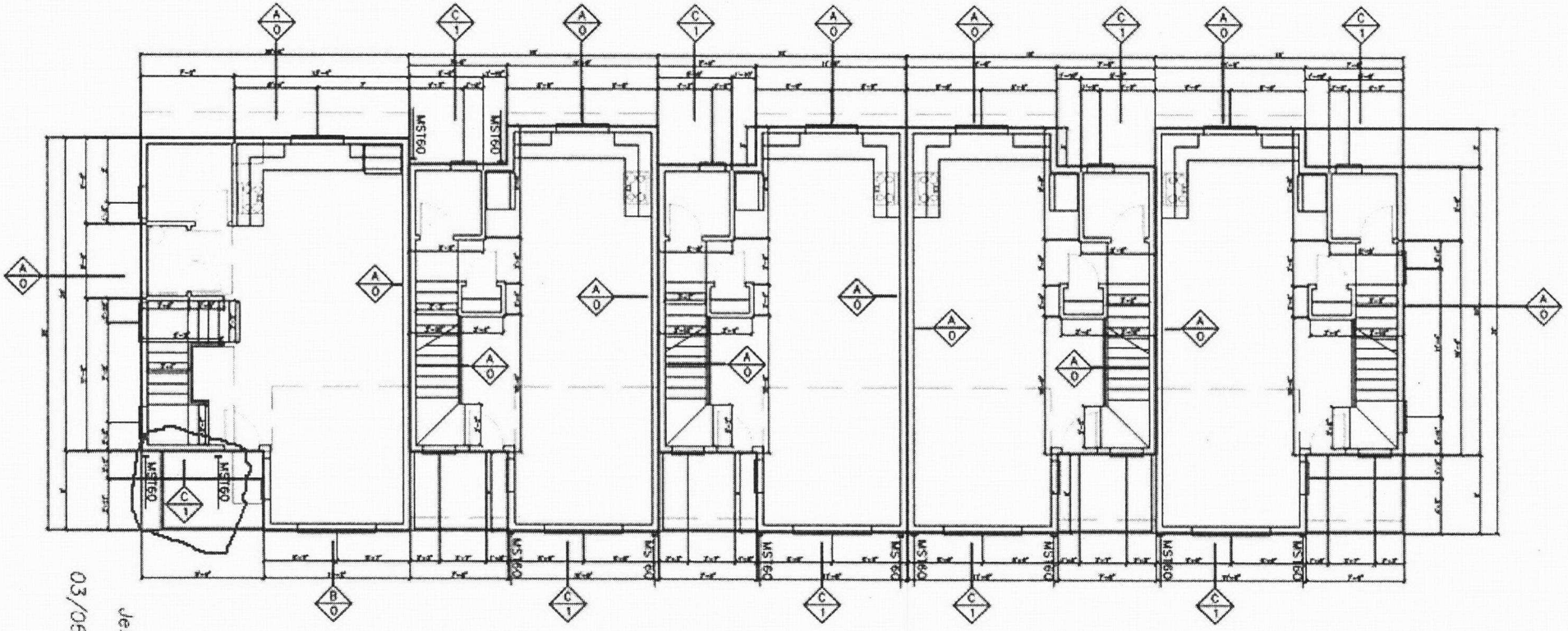
7622 SE Washington St.

Jesse Cereghino

17-83

01/25/18 Rich

644



MAIN FLOOR SHEARWALLS

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7622 SE Washington St

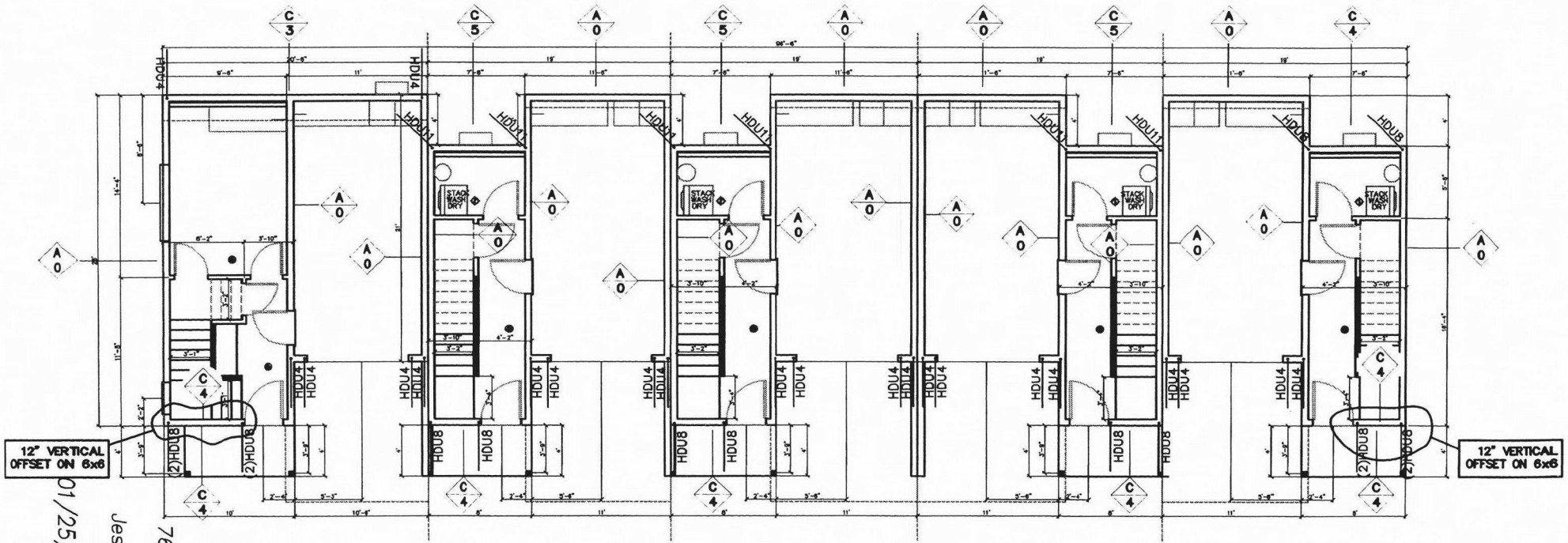
Jesse Cereghino

03/05/18 Rich 18-05

SCAN

L45

17-258825/47/53/57/58-RS



LOWER FLOOR SHEARWALLS

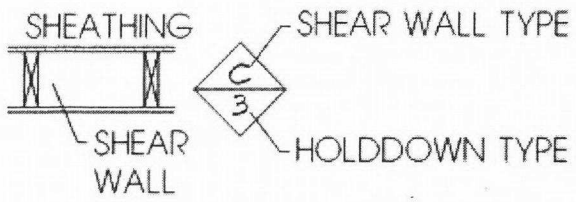
7622 SE Washington St.

Jesse Cereghino

01/25/18 Rich

17-83

L46



- HOLDDOWN/STRAP LOCATION

SHEARWALL SHEATHING SCHEDULE

TYPE	THICKNESS	EDGE NAILING	SILL TO FLOOR	SILL TO FOUNDATION
A	15/32"	8D @ 6" O.C.	SDS25312 @ 16" O.C.	5/8"~ A.B. @ 36" O.C.
B	15/32"	8D @ 4" O.C.	(2) SDS25312 @ 16" O.C.	5/8"~ A.B. @ 24" O.C.
C	15/32"	8D @ 3" O.C.	(2) SDS25312 @ 12" O.C.	5/8"~ A.B. @ 18" O.C.

SHEARWALL HOLDDOWN SCHEDULE

#	TYPE
O	NO HOLDDOWN REQ'D
1	SIMPSON MST6O

MST6O – FILL 23 HOLES TOP AND 23 HOLES BOTTOM

#	TYPE	AB DIA	COL
2	SIMPSON HDU2	5/8"	2–2X
3	SIMPSON HDU4	5/8"	2–2X
4	SIMPSON HDU8	7/8"	2–2X
5	SIMPSON HDU11	1"	6X

ALL HDU FILL ALL HOLES

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7622 SE Washington St

Jesse Cereghino 18–05

03/06/18 Rich

L47

MAIN FLOOR SHEARWALLS

City of Portland
Bureau of Development Services
VOID:
Save for Reference Only

7622 SE Washington St.

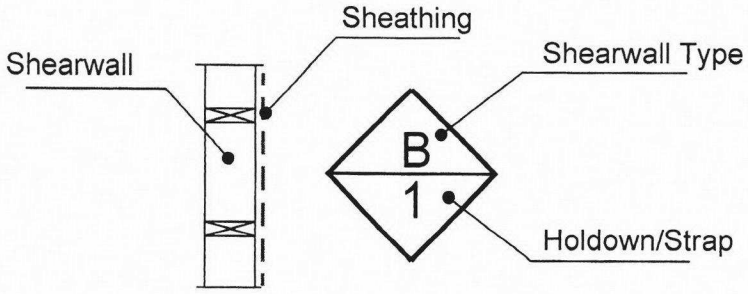
Jesse Cereghino

17-83

01/25/18

Rich

L46



▲ = HOLDOWN/STRAP LOCATION

SHEARWALL KEY

PLYWOOD or OSB 'RATED SHEATHING' or GYPSUM BOARD SHEATHING
SHEAR WALL PANEL DESCRIPTION

			SILL CONNECTOR & SPACING	
TYPE	SHEATHING THICKNESS	NAILING @ PANEL EDGES	SILL-TO-FLOOR	SILL-TO-FOUNDATION
A	15/32"	8d NAILS @ 6" O.C.	SDS25312 @ 16" O.C.	5/8"Ø Anchor Bolt @ 36" O.C.
B	15/32"	8d NAILS @ 4" O.C.	(2)SDS25312 @ 16" O.C.	5/8"Ø Anchor Bolt @ 24" O.C.
C	15/32"	8d NAILS @ 3" O.C.	(2) SDS25312 @ 12" O.C.	5/8"Ø Anchor Bolt @ 18" O.C.
J	1/2" GB	5d NAILS @ 7" O.C. UNBLKD	(1)16d NAILS @ 12" O.C.	1/2"Ø Anchor Bolt @ 48" O.C.
K	1/2" GB	5d NAILS @ 4" O.C. UNBLKD	(1)16d NAILS @ 12" O.C.	1/2"Ø Anchor Bolt @ 48" O.C.
L	5/8" GB	6d NAILS @ 8/12" O.C. BLKD	(1)16d NAILS @ 12" O.C.	1/2"Ø Anchor Bolt @ 48" O.C.

HOLDOWNS & STRAPS

HOLDOWN DESCRIPTION	
TYPE	
0	NO HOLDOWN REQUIRED
1	SIMPSON MST60
2	SIMPSON HDU2
3	SIMPSON HDU4
4	SIMPSON HDU8

L47

Project: Washington5

Location: Upper floor rear carrier joists
Floor Joist
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 8.5 FT @ 16 O.C.
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 69.3%
Controlling Factor: Shear

StruCalc

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DEFLECTIONS

	Center	
Live Load	0.04	IN L/2797
Dead Load	0.02	in
Total Load	0.06	IN L/1774

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

	A	B
Live Load	289 lb	697 lb
Dead Load	140 lb	499 lb
Total Load	430 lb	1196 lb
Bearing Length	0.46 in	1.28 in

BEAM DATA

	Center
Span Length	8.5 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft

Floor sheathing applied to top of joists-top of joists fully braced.
Floor Duration Factor 1.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

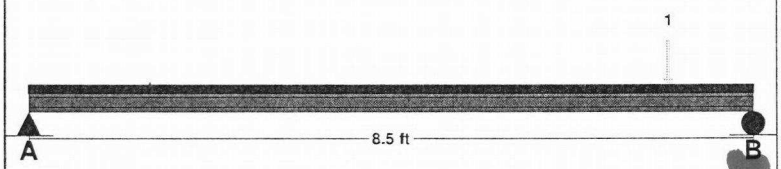
	Base Values		Adjusted	
Bending Stress:	Fb =	900 psi	Fb' =	1035 psi
	Cd=1.00 CF=1.00 Cr=1.15			
Shear Stress:	Fv =	180 psi	Fv' =	180 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1600 ksi	E' =	1600 ksi
Min. Mod. of Elasticity:	E_min =	580 ksi	E_min' =	580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	625 psi	Fc - ⊥' =	625 psi

Controlling Moment: 1258 ft-lb
5.86 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -1196 lb
8.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	14.59 in3	31.64 in3
Area (Shear):	9.97 in2	16.88 in2
Moment of Inertia (deflection):	36.11 in4	177.98 in4
Moment:	1258 ft-lb	2729 ft-lb
Shear:	-1196 lb	2025 lb

LOADING DIAGRAM



JOIST LOADING

Uniform Floor Loading

		Center	
Live Load	LL =	40	psf
Dead Load	DL =	15	psf
Total Load	TL =	55	psf
TL Adj. For Joist Spacing	wT =	73.3	plf

Wall Loading

Wall One

Live Load (⊥ to Joists):	L1 =	400	plf
Dead Load (⊥ to Joists)	D1 =	352	plf
Load Location	X1 =	7.5	ft

NOTES

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SCAN

Project: Washington5

Location: Main floor front cantilever joists
Floor Joist
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 11.0 FT (9 + 2) @ 16 O.C.
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 27.4%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	-0.03	IN L/3398	0.04	IN 2L/1076
Dead Load	-0.03	in	0.04	in
Total Load	-0.06	IN L/1878	0.09	IN 2L/548

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

	A		B	
Live Load	240	lb	909	lb
Dead Load	-36	lb	803	lb
Total Load	204	lb	1712	lb
Uplift (1.5 F.S)	**-148**	**lb**	0	**lb**
Bearing Length	0.22	in	1.83	in

BEAM DATA

	Center		Right	
Span Length	9	ft	2	ft
Unbraced Length-Top	0	ft	0	ft
Unbraced Length-Bottom	0	ft	0	ft

Floor sheathing applied to top of joists-top of joists fully braced.
Sheathing/sheetrock applied to bottom of joists-bottom of joists fully braced.
Floor Duration Factor 1.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

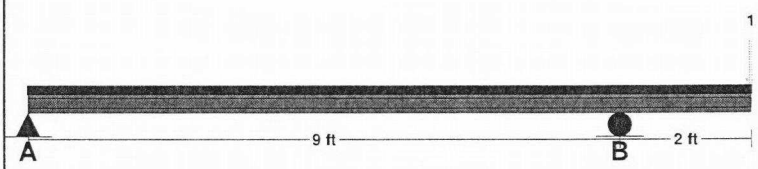
	Base Values		Adjusted	
Bending Stress:	Fb = 900 psi		Fb' = 1035 psi	
	Cd=1.00 CF=1.00 Cr=1.15			
Shear Stress:	Fv = 180 psi		Fv' = 180 psi	
	Cd=1.00			
Modulus of Elasticity:	E = 1600 ksi		E' = 1600 ksi	
Min. Mod. of Elasticity:	E_min = 580 ksi		E_min' = 580 ksi	
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi		Fc - ⊥' = 625 psi	

Controlling Moment: -2141 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Controlling Shear: 1144 lb
At left support of span 3 (Right Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	24.83 in3	31.64 in3
Area (Shear):	9.53 in2	16.88 in2
Moment of Inertia (deflection):	116.96 in4	177.98 in4
Moment:	-2141 ft-lb	2729 ft-lb
Shear:	1144 lb	2025 lb

LOADING DIAGRAM



JOIST LOADING

Uniform Floor Loading		Center		Right	
Live Load	LL =	40	psf	40	psf
Dead Load	DL =	15	psf	15	psf
Total Load	TL =	55	psf	55	psf
TL Adj. For Joist Spacing	wT =	73.3	plf	73.3	plf

Wall Loading

Wall One

Live Load (⊥ to Joists):	L1 =	0	plf	338	plf
Dead Load (⊥ to Joists)	D1 =	0	plf	410	plf
Load Location	X1 =	0	ft	2	ft

NOTES

Project: Washington5

Location: Beam #1 upper floor
Roof Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 6.0 IN x 6.5 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 27.9%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.15	IN L/534
Dead Load	0.11	in
Total Load	0.25	IN L/309

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1341	lb	1341	lb
Dead Load	976	lb	976	lb
Total Load	2316	lb	2316	lb
Bearing Length	1.02	in	1.02	in

BEAM DATA

Span Length	6.5	ft
Unbraced Length-Top	2	ft
Unbraced Length-Bottom	0	ft
Roof Pitch	4	:12
Roof Duration Factor	1.15	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values			Adjusted		
Bending Stress:	Fb =	2400	psi	*Controlled by:*		
	Fb_cmpr =	1850	psi	Fb' =	2751	psi
	Cd=1.15 Cl=1.00					
Shear Stress:	Fv =	265	psi	Fv' =	305	psi
	Cd=1.15					
Modulus of Elasticity:	E =	1800	ksi	E' =	1800	ksi
Min. Mod. of Elasticity:	E_min =	930	ksi	E_min' =	930	ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650	psi	Fc - ⊥' =	650	psi

Controlling Moment: 3764 ft-lb
3.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -2316 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	16.42 in3	21 in3
Area (Shear):	11.4 in2	21 in2
Moment of Inertia (deflection):	48.93 in4	63 in4
Moment:	3764 ft-lb	4815 ft-lb
Shear:	-2316 lb	4267 lb

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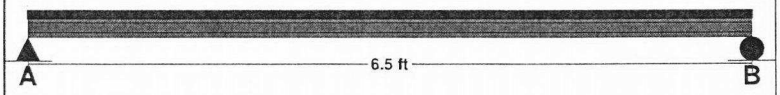

ROOF LOADING

Side One:

Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	17	psf
Tributary Width:	TW =	15.5	ft

Side Two:

Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	17	psf
Tributary Width:	TW =	1	ft
Wall Load:	WALL =	0	plf

SLOPE/PITCH ADJUSTED LENGTHS AND LOADS

Adjusted Beam Length:	Ladj =	6.5	ft
Beam Self Weight:	BSW =	5	plf
Beam Uniform Live Load:	wL =	413	plf
Beam Uniform Dead Load:	wD_adj =	300	plf
Total Uniform Load:	wT =	713	plf

NOTES

Project: Washington5

Location: Beam #2 kitchen header
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 4.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 183.5%
Controlling Factor: Shear

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DEFLECTIONS

	Center	
Live Load	0.01	IN L/9805
Dead Load	0.00	in
Total Load	0.01	IN L/5252

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	383 lb	383 lb
Dead Load	332 lb	332 lb
Total Load	714 lb	714 lb
Bearing Length	0.76 in	0.76 in

BEAM DATA

	Center
Span Length	4.5 ft
Unbraced Length-Top	1.33 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 888 psi
	Cd=1.00 Cl=0.99 CF=1.00	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 803 ft-lb
2.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -714 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	10.85 in3	31.64 in3
Area (Shear):	5.95 in2	16.88 in2
Moment of Inertia (deflection):	8.13 in4	177.98 in4
Moment:	803 ft-lb	2342 ft-lb
Shear:	-714 lb	2025 lb

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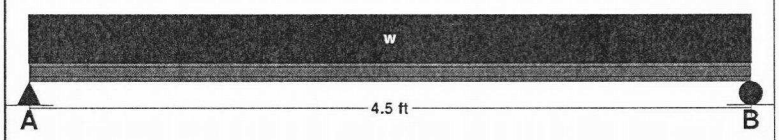

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	4.3 ft	0 ft
Wall Load	WALL =	80 plf	

BEAM LOADING

Beam Total Live Load:	wL =	170 plf
Beam Total Dead Load:	wD =	144 plf
Beam Self Weight:	BSW =	4 plf
Total Maximum Load:	wT =	317 plf

NOTES

Project: Washington5

Location: Beam #3 over kitchen
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 13.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 42.7%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.14	IN L/1152
Dead Load	0.06	in
Total Load	0.19	IN L/800

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	910 lb	910 lb
Dead Load	400 lb	400 lb
Total Load	1310 lb	1310 lb
Bearing Length	0.60 in	0.60 in

BEAM DATA

	Center
Span Length	13 ft
Unbraced Length-Top	1.33 ft
Unbraced Length-Bottom	13 ft
Live Load Duration Factor	1.00
Notch Depth	0.00

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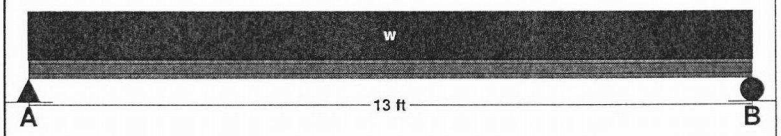

UNIFORM LOADS

	Center
Uniform Live Load	140 plf
Uniform Dead Load	53 plf
Beam Self Weight	9 plf
Total Uniform Load	202 plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 988 psi
	Cd=1.00 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 4257 ft-lb
6.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 1310 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	51.72 in3	73.83 in3
Area (Shear):	10.92 in2	39.38 in2
Moment of Inertia (deflection):	129.74 in4	415.28 in4
Moment:	4257 ft-lb	6077 ft-lb
Shear:	1310 lb	4725 lb

NOTES

Project: Washington5

Location: Beam #4 under upper front cant
Combination Roof And Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 7.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 8.2%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.05	IN L/1708
Dead Load	0.05	in
Total Load	0.10	IN L/915

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	1844 lb	1844 lb
Dead Load	1601 lb	1601 lb
Total Load	3445 lb	3445 lb
Bearing Length	1.57 in	1.57 in

BEAM DATA

	Center
Span Length	7.5 ft
Unbraced Length-Top	1.33 ft
Roof Pitch	4 :12
Floor Duration Factor	1.00
Roof Duration Factor	1.15
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 1136 psi
	Cd=1.15 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 207 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 6459 ft-lb
3.75 ft from left support
Created by combining all dead and live loads.

Controlling Shear: 3445 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	68.25 in3	73.83 in3
Area (Shear):	24.96 in2	39.38 in2
Moment of Inertia (deflection):	108.97 in4	415.28 in4
Moment:	6459 ft-lb	6986 ft-lb
Shear:	3445 lb	5434 lb

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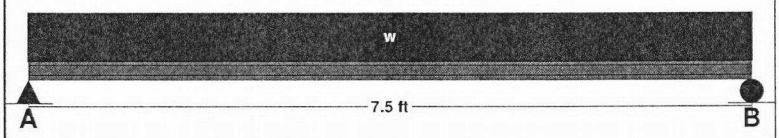

ROOF LOADING

		Side 1	Side 2
Roof Live Load	RLL =	25 psf	25 psf
Roof Dead Load	RDL =	17 psf	17 psf
Roof Tributary Width	RTW =	13.7 ft	2 ft

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	2.5 ft	0 ft
Wall Load	WALL =	100 plf	

BEAM LOADING

Roof Uniform Live Load:	wL-roof =	392 plf
Roof Uniform Dead Load:	wD-roof =	281 plf
Floor Uniform Live Load:	wL-floor =	100 plf
Floor Uniform Dead Load:	wD-floor =	38 plf
Beam Self Weight:	BSW =	9 plf
Combined Uniform Live Load:	wL =	492 plf
Combined Uniform Dead Load:	wD =	427 plf
Combined Uniform Total Load:	wT =	919 plf
Controlling Total Design Load:	wT-cont =	919 plf

NOTES

Project: Washington5

Location: Beam #5 carrier for #4
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 16.5 IN x 13.0 FT (8 + 5)
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 15.4%
Controlling Factor: Moment

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DEFLECTIONS	Center		Right	
Live Load	0.00	IN L/Infinity	0.00	IN 2L/Infinity
Dead Load	-0.05	in	0.28	in
Total Load	-0.05	IN L/1867	0.28	IN 2L/424

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	0 lb	0 lb
Dead Load	-1863 lb	6721 lb
Total Load	-1863 lb	6721 lb
Uplift (1.5 F.S)	**-1863 lb**	0 **lb**
Bearing Length	0.00 in	2.95 in

BEAM DATA	Center	Right
Span Length	8 ft	5 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	8 ft	5 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb_cmpr' =	1614 psi
	Cd=0.90 Cl=0.97			
Shear Stress:	Fv =	265 psi	Fv' =	239 psi
	Cd=0.90			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: -18506 ft-lb
Over right support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 3958 lb
At left support of span 3 (Right Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	137.56 in3	158.81 in3
Area (Shear):	24.89 in2	57.75 in2
Moment of Inertia (deflection):	741.68 in4	1310.2 in4
Moment:	-18506 ft-lb	21366 ft-lb
Shear:	3958 lb	9182 lb

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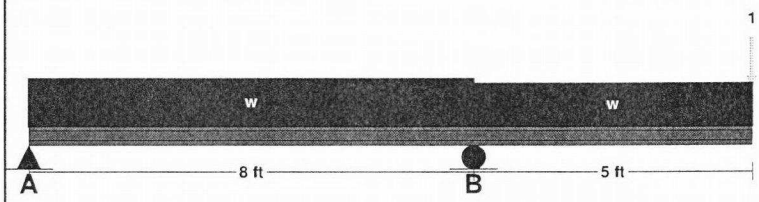

FLOOR LOADING		Center		Right	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width Side One	TW1 =	0	ft	0	ft
Floor Tributary Width Side Two	TW2 =	0	ft	0	ft
Wall Load	WALL =	100	plf	90	plf

POINT LOADS - RIGHT SPAN	
Load Number	One
Live Load	0 lb
Dead Load	3445 lb
Location	5 ft

BEAM LOADING	Center		Right	
Reduced Floor Live Load	40	psf	40	psf
Total Live Load	0	plf	0	plf
Total Dead Load	100	plf	90	plf
Beam Self Weight	13	plf	13	plf
Total Load	113	plf	103	plf

NOTES

Project: Washington5

Location: Beam #6 end unit
Combination Roof And Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 10.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 52.8%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.16	IN L/739
Dead Load	0.12	in
Total Load	0.29	IN L/420

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	2194 lb	2194 lb
Dead Load	1663 lb	1663 lb
Total Load	3857 lb	3857 lb
Bearing Length	1.70 in	1.70 in

BEAM DATA

	Center
Span Length	10 ft
Unbraced Length-Top	1.33 ft
Roof Pitch	9 :12
Floor Duration Factor	1.00
Roof Duration Factor	1.15
Camber Adj. Factor	1
Camber Required	0.12
Notch Depth	0.00

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2750 psi
	Cd=1.15 Cl=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	305 psi
	Cd=1.15			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 9643 ft-lb
5.0 ft from left support
Created by combining all dead and live loads.

Controlling Shear: 3857 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	42.08 in3	64.31 in3
Area (Shear):	18.98 in2	36.75 in2
Moment of Inertia (deflection):	192.82 in4	337.64 in4
Moment:	9643 ft-lb	14737 ft-lb
Shear:	3857 lb	7466 lb

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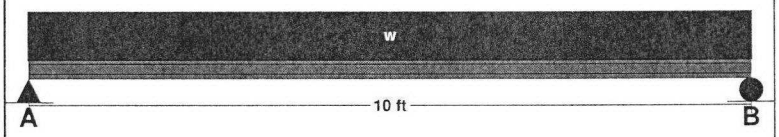

ROOF LOADING

		Side 1	Side 2
Roof Live Load	RLL =	25 psf	25 psf
Roof Dead Load	RDL =	17 psf	17 psf
Roof Tributary Width	RTW =	6.8 ft	0 ft

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	6.8 ft	0 ft
Wall Load	WALL =	80 plf	

BEAM LOADING

Roof Uniform Live Load:	wL-roof =	169 plf
Roof Uniform Dead Load:	wD-roof =	143 plf
Floor Uniform Live Load:	wL-floor =	270 plf
Floor Uniform Dead Load:	wD-floor =	101 plf
Beam Self Weight:	BSW =	8 plf
Combined Uniform Live Load:	wL =	439 plf
Combined Uniform Dead Load:	wD =	333 plf
Combined Uniform Total Load:	wT =	771 plf
Controlling Total Design Load:	wT-cont =	771 plf

NOTES

Project: Washington5

Location: Beam #7 end unit
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 12.0 FT (8 + 4)
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 59.4%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	0.07	IN L/1442	0.15	IN 2L/656
Dead Load	0.02	in	0.03	in
Total Load	0.09	IN L/1110	0.18	IN 2L/546

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	1756 lb	3951 lb
Dead Load	975 lb	2925 lb
Total Load	2731 lb	6876 lb
Bearing Length	1.20 in	3.02 in

BEAM DATA

	Center	Right
Span Length	8 ft	4 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	8 ft	4 ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

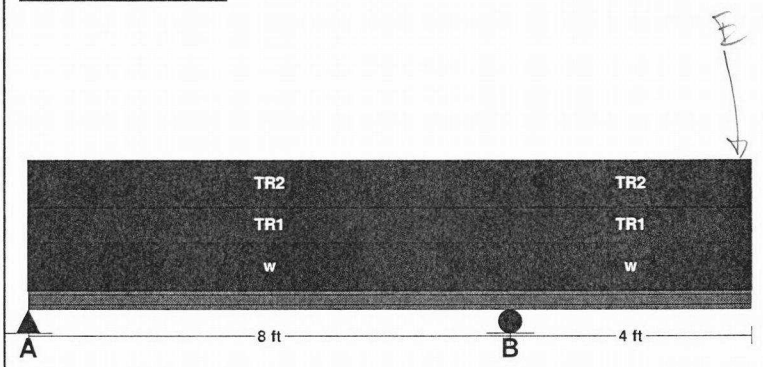
	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb_cmpr' =	1818 psi
	Cd=1.00 Cl=0.98			
Shear Stress:	Fv =	265 psi	Fv' =	265 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: -6112 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 3

Controlling Shear: -3820 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	40.35 in3	64.31 in3
Area (Shear):	21.62 in2	36.75 in2
Moment of Inertia (deflection):	185.43 in4	337.64 in4
Moment:	-6112 ft-lb	9742 ft-lb
Shear:	-3820 lb	6493 lb

LOADING DIAGRAM



UNIFORM LOADS

	Center	Right
Uniform Live Load	0 plf	0 plf
Uniform Dead Load	100 plf	100 plf
Beam Self Weight	8 plf	8 plf
Total Uniform Load	108 plf	108 plf

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two
Left Live Load	169 plf	270 plf
Left Dead Load	115 plf	102 plf
Right Live Load	169 plf	270 plf
Right Dead Load	115 plf	102 plf
Load Start	0 ft	0 ft
Load End	8 ft	8 ft
Load Length	8 ft	8 ft

RIGHT SPAN

Load Number	One	Two
Left Live Load	169 plf	270 plf
Left Dead Load	115 plf	102 plf
Right Live Load	169 plf	270 plf
Right Dead Load	115 plf	102 plf
Load Start	0 ft	0 ft
Load End	4 ft	4 ft
Load Length	4 ft	4 ft

NOTES

Project: Washington5

Location: Beam #8 end unit carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 14.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 47.3%
Controlling Factor: Shear

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DEFLECTIONS Center

Live Load	0.11	IN L/1477
Dead Load	0.19	in
Total Load	0.30	IN L/555

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	560 lb	560 lb
Dead Load	541 lb	3847 lb
Total Load	1101 lb	4407 lb
Bearing Length	0.48 in	1.94 in

BEAM DATA Center

Span Length	14	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	14	ft
Floor Duration Factor	1.00	
Camber Adj. Factor	1	
Camber Required	0.19	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2400 psi
	Cd=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	265 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 5140 ft-lb
9.38 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -4407 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	25.7 in3	64.31 in3
Area (Shear):	24.95 in2	36.75 in2
Moment of Inertia (deflection):	145.94 in4	337.64 in4
Moment:	5140 ft-lb	12863 ft-lb
Shear:	-4407 lb	6493 lb

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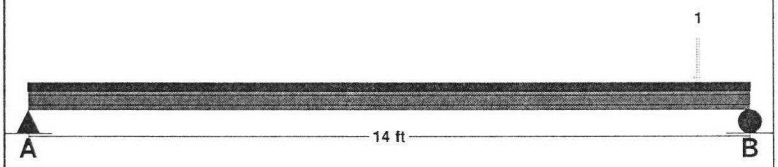

FLOOR LOADING Center

Floor Live Load	FLL =	40	psf
Floor Dead Load	FDL =	15	psf
Floor Tributary Width Side One	TW1 =	1	ft
Floor Tributary Width Side Two	TW2 =	1	ft
Wall Load	WALL =	0	plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	3857 lb
Location	13 ft

BEAM LOADING Center

Reduced Floor Live Load	40	psf
Total Live Load	80	plf
Total Dead Load	30	plf
Beam Self Weight	8	plf
Total Load	118	plf

NOTES

Project: Washington5

Location: Beam #9 end unit deck door
Multi-Span Roof Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 9.0 IN x 3.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 5.6%
Controlling Factor: Shear

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DEFLECTIONS

	Center	
Live Load	0.00	IN L/Infinity
Dead Load	0.02	in
Total Load	0.02	IN L/2319

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

REACTIONS

	A	B
Live Load	0 lb	0 lb
Dead Load	4744 lb	2452 lb
Total Load	4744 lb	2452 lb
Bearing Length	2.09 in	1.08 in

BEAM DATA

	Center
Span Length	3 ft
Unbraced Length-Top	2 ft
Unbraced Length-Bottom	3 ft
Roof Pitch	9 :12
Roof Duration Factor	1.15
Camber Adj. Factor	1
Camber Required	0.02
Notch Depth	0.00

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2152 psi
	Cd=0.90 Cl=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	239 psi
	Cd=0.90			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 4646 ft-lb
1.02 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 4744 lb
At left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	25.91 in3	47.25 in3
Area (Shear):	29.84 in2	31.5 in2
Moment of Inertia (deflection):	16.5 in4	212.63 in4
Moment:	4646 ft-lb	8473 ft-lb
Shear:	4744 lb	5009 lb

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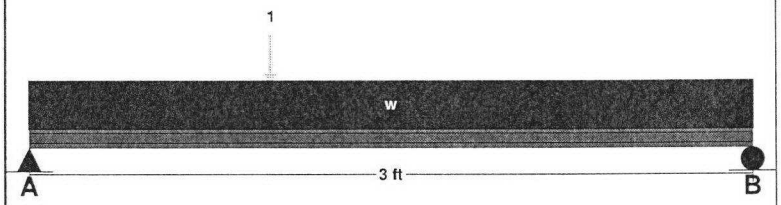

ROOF LOADING

		Center
Roof Live Load	RLL =	25 psf
Roof Dead Load	RDL =	17 psf
Roof Tributary Width Side One	TW1 =	0 ft
Roof Tributary Width Side Two	TW2 =	0 ft
Wall Load	WALL =	100 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	6876 lb
Location	1 ft

BEAM LOADING

	Center
Total Live Load	0 plf
Total Dead Load (Adjusted for Roof Pitch)	100 plf
Beam Self Weight	7 plf
Total Load	107 plf

NOTES

Project: Washington5

Location: Beam #10 garage header
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 8.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 162.8%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.03	IN L/3206
Dead Load	0.01	in
Total Load	0.05	IN L/2254

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	765	lb	765	lb
Dead Load	323	lb	323	lb
Total Load	1088	lb	1088	lb
Bearing Length	0.50	in	0.50	in

BEAM DATA

	Center	
Span Length	8.5	ft
Unbraced Length-Top	1.33	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Bending Stress:	Fb = 900	psi	Fb' = 988	psi
	Cd=1.00 Cl=1.00 CF=1.10			
Shear Stress:	Fv = 180	psi	Fv' = 180	psi
	Cd=1.00			
Modulus of Elasticity:	E = 1600	ksi	E' = 1600	ksi
Min. Mod. of Elasticity:	E_min = 580	ksi	E_min' = 580	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625	psi	Fc - ⊥' = 625	psi

Controlling Moment: 2312 ft-lb
4.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -1088 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	28.09 in3	73.83 in3
Area (Shear):	9.07 in2	39.38 in2
Moment of Inertia (deflection):	46.63 in4	415.28 in4
Moment:	2312 ft-lb	6077 ft-lb
Shear:	-1088 lb	4725 lb

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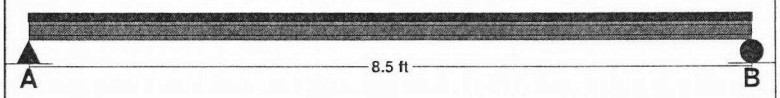

FLOOR LOADING

		Side 1		Side 2	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width	FTW =	4.5	ft	0	ft
Wall Load	WALL =	0	plf		

BEAM LOADING

Beam Total Live Load:	wL =	180	plf
Beam Total Dead Load:	wD =	68	plf
Beam Self Weight:	BSW =	9	plf
Total Maximum Load:	wT =	256	plf

NOTES

Project: Washington5

Location: Beam #11 in front of garage
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 12.0 IN x 11.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 7.6%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.14	IN L/976
Dead Load	0.26	in
Total Load	0.40	IN L/331

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	2461 lb	2461 lb
Dead Load	4321 lb	4321 lb
Total Load	6782 lb	6782 lb
Bearing Length	2.98 in	2.98 in

BEAM DATA Center

Span Length	11 ft
Unbraced Length-Top	1.33 ft
Unbraced Length-Bottom	11 ft
Live Load Duration Factor	1.00
Camber Adj. Factor	1
Camber Required	0.26
Notch Depth	0.00

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values	Adjusted
Bending Stress:	Fb = 2400 psi	*Controlled by:*
	Fb_cmpr = 1850 psi	Fb' = 2391 psi
	Cd=1.00 Cl=1.00	
Shear Stress:	Fv = 265 psi	Fv' = 265 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi
Min. Mod. of Elasticity:	E_min = 930 ksi	E_min' = 930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 650 psi	Fc - ⊥' = 650 psi

Controlling Moment: 15556 ft-lb
5.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -6782 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	78.07 in3	84 in3
Area (Shear):	38.39 in2	42 in2
Moment of Inertia (deflection):	365.75 in4	504 in4
Moment:	15556 ft-lb	16738 ft-lb
Shear:	-6782 lb	7420 lb

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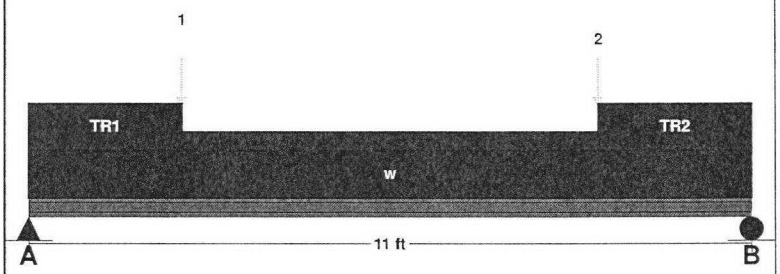

UNIFORM LOADS Center

Uniform Live Load	260	plf
Uniform Dead Load	98	plf
Beam Self Weight	9	plf
Total Uniform Load	367	plf

POINT LOADS - CENTER SPAN

Load Number	One	Two
Live Load	0 lb	0 lb
Dead Load	2816 lb	2816 lb
Location	2.33 ft	8.67 ft

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two	Three
Left Live Load	388 plf	388 plf	40 plf
Left Dead Load	264 plf	264 plf	95 plf
Right Live Load	388 plf	388 plf	40 plf
Right Dead Load	264 plf	264 plf	95 plf
Load Start	0 ft	8.67 ft	2.33 ft
Load End	2.33 ft	11 ft	8.67 ft
Load Length	2.33 ft	2.33 ft	6.34 ft

NOTES

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Project: Washington5

Location: Beam #12 at lower stairs
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 8.83 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 2.0%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.08	IN L/1355
Dead Load	0.05	in
Total Load	0.13	IN L/843

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	1678 lb	1678 lb
Dead Load	1020 lb	1020 lb
Total Load	2698 lb	2698 lb
Bearing Length	1.23 in	1.23 in

BEAM DATA

	Center
Span Length	8.83 ft
Unbraced Length-Top	1.33 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 988 psi
	Cd=1.00 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 5955 ft-lb
4.415 ft from left support
Created by combining all dead and live loads.

Controlling Shear: 2698 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	72.35 in3	73.83 in3
Area (Shear):	22.48 in2	39.38 in2
Moment of Inertia (deflection):	118.3 in4	415.28 in4
Moment:	5955 ft-lb	6077 ft-lb
Shear:	2698 lb	4725 lb

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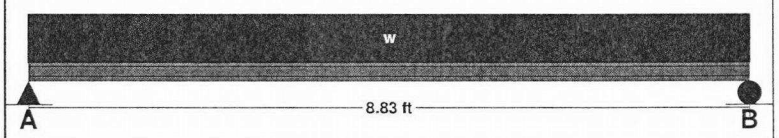

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	0 ft	9.5 ft
Wall Load	WALL =	80 plf	

BEAM LOADING

Beam Total Live Load:	wL =	380 plf
Beam Total Dead Load:	wD =	223 plf
Beam Self Weight:	BSW =	9 plf
Total Maximum Load:	wT =	611 plf

NOTES

Project: Washington5

Location: Beam #13 lower stairs carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 12.0 IN x 7.33 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 25.3%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.01	IN L/7680
Dead Load	0.10	in
Total Load	0.12	IN L/762

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	586 lb	586 lb
Dead Load	3574 lb	3288 lb
Total Load	4161 lb	3875 lb
Bearing Length	1.83 in	1.70 in

BEAM DATA

	Center
Span Length	7.33 ft
Unbraced Length-Top	1.33 ft
Unbraced Length-Bottom	7.33 ft
Floor Duration Factor	1.00
Camber Adj. Factor	0
Camber Required	0
Notch Depth	0.00

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values	Adjusted
Bending Stress:	Fb = 2400 psi	*Controlled by:*
	Fb_cmpr = 1850 psi	Fb' = 2153 psi
	Cd=0.90 Cl=1.00	
Shear Stress:	Fv = 265 psi	Fv' = 265 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi
Min. Mod. of Elasticity:	E_min = 930 ksi	E_min' = 930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 650 psi	Fc - ⊥' = 650 psi

Controlling Moment: 12031 ft-lb
3.52 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 4161 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	67.06 in3	84 in3
Area (Shear):	23.55 in2	42 in2
Moment of Inertia (deflection):	158.74 in4	504 in4
Moment:	12031 ft-lb	15070 ft-lb
Shear:	4161 lb	7420 lb

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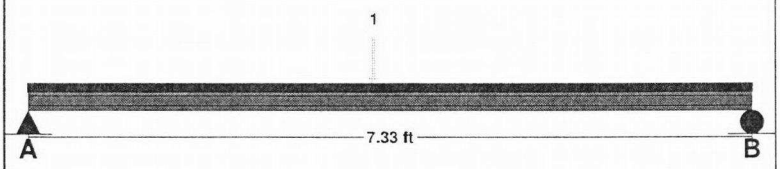

FLOOR LOADING

		Center
Floor Live Load	FLL =	40 psf
Floor Dead Load	FDL =	15 psf
Floor Tributary Width Side One	TW1 =	4 ft
Floor Tributary Width Side Two	TW2 =	0 ft
Wall Load	WALL =	0 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	6356 lb
Location	3.5 ft

BEAM LOADING

	Center
Reduced Floor Live Load	40 psf
Total Live Load	160 plf
Total Dead Load	60 plf
Beam Self Weight	9 plf
Total Load	229 plf

NOTES

Project: Washington5

Location: Beam #14 front edge carrier end unit
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 9.33 FT (7.3 + 2)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 40.8%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	-0.01	IN L/5882	0.03	IN 2L/1880
Dead Load	0.01	in	0.00	in
Total Load	0.01	IN L/7065	0.02	IN 2L/1930

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	0 lb	813 lb
Dead Load	304 lb	1016 lb
Total Load	304 lb	1828 lb
Bearing Length	0.32 in	1.95 in

BEAM DATA

	Center	Right
Span Length	7.33 ft	2 ft
Unbraced Length-Top	1.33 ft	1.33 ft
Unbraced Length-Bottom	7.33 ft	2 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 680 psi
	Cd=1.00 Cl=0.76 CF=1.00	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: -1274 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Controlling Shear: 1274 lb
At left support of span 3 (Right Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	22.47 in3	31.64 in3
Area (Shear):	10.62 in2	16.88 in2
Moment of Inertia (deflection):	34.09 in4	177.98 in4
Moment:	-1274 ft-lb	1794 ft-lb
Shear:	1274 lb	2025 lb

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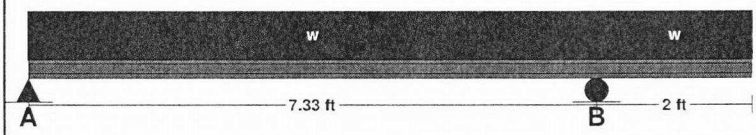

FLOOR LOADING

		Center	Right
Floor Live Load	FLL =	40 psf	65 psf
Floor Dead Load	FDL =	15 psf	32 psf
Floor Tributary Width Side One	TW1 =	0 ft	0 ft
Floor Tributary Width Side Two	TW2 =	0 ft	5.5 ft
Wall Load	WALL =	100 plf	100 plf

BEAM LOADING

	Center	Right
Reduced Floor Live Load	40 psf	65 psf
Total Live Load	0 plf	358 plf
Total Dead Load	100 plf	276 plf
Beam Self Weight	4 plf	4 plf
Total Load	104 plf	637 plf

NOTES

Project: Washington5

Location: Beam #15 front edge carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 9.67 FT (7.7 + 2)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 10.7%
Controlling Factor: Shear

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DEFLECTIONS	Center		Right	
Live Load	0.00	IN L/MAX	0.01	IN 2L/6862
Dead Load	-0.03	in	0.05	in
Total Load	-0.03	IN L/3100	0.06	IN 2L/862

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	0 lb	497 lb
Dead Load	-83 lb	4742 lb
Total Load	-83 lb	5240 lb
Uplift (1.5 F.S)	**-140 lb**	**0 lb**
Bearing Length	0.00 in	2.40 in

BEAM DATA	Center	Right
Span Length	7.67 ft	2 ft
Unbraced Length-Top	1.33 ft	1.33 ft
Unbraced Length-Bottom	7.67 ft	2 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

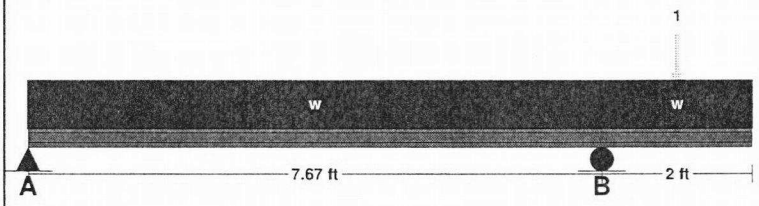
	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 975 psi
	Cd=1.00 Cl=0.98 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: -4267 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Controlling Shear: 4267 lb
At left support of span 3 (Right Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	52.52 in3	73.83 in3
Area (Shear):	35.56 in2	39.38 in2
Moment of Inertia (deflection):	115.72 in4	415.28 in4
Moment:	-4267 ft-lb	5998 ft-lb
Shear:	4267 lb	4725 lb

LOADING DIAGRAM



FLOOR LOADING		Center	Right
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width Side One	TW1 =	0 ft	0 ft
Floor Tributary Width Side Two	TW2 =	0 ft	5.5 ft
Wall Load	WALL =	100 plf	100 plf

POINT LOADS - RIGHT SPAN	
Load Number	One
Live Load	0 lb
Dead Load	3445 lb
Location	1 ft

BEAM LOADING	Center	Right
Reduced Floor Live Load	40 psf	40 psf
Total Live Load	0 plf	220 plf
Total Dead Load	100 plf	183 plf
Beam Self Weight	9 plf	9 plf
Total Load	109 plf	411 plf

NOTES

Project: Washington5

Location: Beam #16 main floor stair beam
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 9.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 13.6%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.07	IN L/1519
Dead Load	0.05	in
Total Load	0.12	IN L/920

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1440	lb	1440	lb
Dead Load	938	lb	938	lb
Total Load	2378	lb	2378	lb
Bearing Length	1.09	in	1.09	in

BEAM DATA

	Center	
Span Length	9	ft
Unbraced Length-Top	1.33	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Bending Stress:	Fb = 900	psi	Fb' = 988	psi
	Cd=1.00 Cl=1.00 CF=1.10			
Shear Stress:	Fv = 180	psi	Fv' = 180	psi
	Cd=1.00			
Modulus of Elasticity:	E = 1600	ksi	E' = 1600	ksi
Min. Mod. of Elasticity:	E_min = 580	ksi	E_min' = 580	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625	psi	Fc - ⊥' = 625	psi

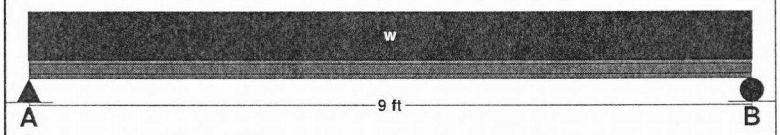
Controlling Moment: 5351 ft-lb
4.5 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -2378 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	65.01 in3	73.83 in3
Area (Shear):	19.82 in2	39.38 in2
Moment of Inertia (deflection):	108.35 in4	415.28 in4
Moment:	5351 ft-lb	6077 ft-lb
Shear:	-2378 lb	4725 lb

LOADING DIAGRAM



FLOOR LOADING

		Side 1		Side 2	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width	FTW =	8	ft	0	ft
Wall Load	WALL =	80	plf		

BEAM LOADING

Beam Total Live Load:	wL =	320	plf
Beam Total Dead Load:	wD =	200	plf
Beam Self Weight:	BSW =	9	plf
Total Maximum Load:	wT =	529	plf

NOTES

Project: Washington5

Location: Beam #17 over great room
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
(2) 1.5 IN x 11.25 IN x 14.83 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 56.5%
Controlling Factor: Moment

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CAUTIONS

* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS

	Center	
Live Load	0.05	IN L/3320
Dead Load	0.11	in
Total Load	0.17	IN L/1065

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	600 lb	89 lb
Dead Load	680 lb	227 lb
Total Load	1280 lb	316 lb
Bearing Length	0.68 in	0.17 in

BEAM DATA

	Center
Span Length	14.83 ft
Unbraced Length-Top	1.33 ft
Unbraced Length-Bottom	14.83 ft
Live Load Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 897 psi
	Cd=1.00 Cl=1.00 CF=1.00	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 3024 ft-lb
3.86 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 1280 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	40.43 in3	63.28 in3
Area (Shear):	10.67 in2	33.75 in2
Moment of Inertia (deflection):	80.21 in4	355.96 in4
Moment:	3024 ft-lb	4733 ft-lb
Shear:	1280 lb	4050 lb

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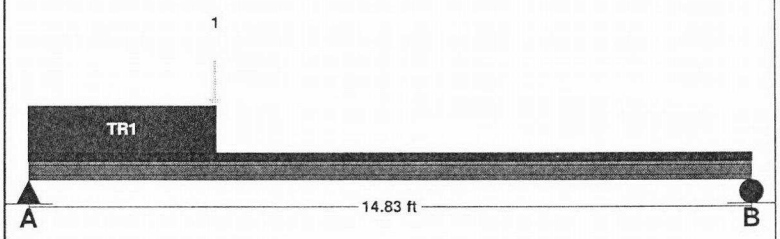

UNIFORM LOADS

	Center
Uniform Live Load	0 plf
Uniform Dead Load	0 plf
Beam Self Weight	7 plf
Total Uniform Load	7 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	538 lb
Location	3.83 ft

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One
Left Live Load	180 plf
Left Dead Load	68 plf
Right Live Load	180 plf
Right Dead Load	68 plf
Load Start	0 ft
Load End	3.83 ft
Load Length	3.83 ft

NOTES

Project: Washington5

Location: Beam #18 over end unit lower floor
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 9.5 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 58.4%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.02	IN L/7134
Dead Load	0.15	in
Total Load	0.17	IN L/684

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	252	lb	252	lb
Dead Load	1148	lb	2975	lb
Total Load	1400	lb	3227	lb
Bearing Length	0.62	in	1.42	in

BEAM DATA

	Center	
Span Length	9.5	ft
Unbraced Length-Top	1.33	ft
Unbraced Length-Bottom	9.5	ft
Live Load Duration Factor	1.00	
Camber Adj. Factor	1	
Camber Required	0.15	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2154 psi
	Cd=0.90 Cl=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	239 psi
	Cd=0.90			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 7288 ft-lb
6.93 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: -2975 lb
At right support of span 2 (Center Span)
Created by dead loads only on all span(s).

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	40.6 in3	64.31 in3
Area (Shear):	18.71 in2	36.75 in2
Moment of Inertia (deflection):	118.41 in4	337.64 in4
Moment:	7288 ft-lb	11543 ft-lb
Shear:	-2975 lb	5843 lb

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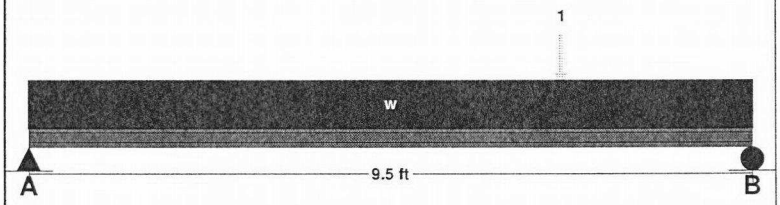

UNIFORM LOADS

	Center	
Uniform Live Load	53	plf
Uniform Dead Load	20	plf
Beam Self Weight	8	plf
Total Uniform Load	81	plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	3857 lb
Location	7 ft

NOTES

Project: Washington5

Location: Beam #19 over lower floor garage
Combination Roof And Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 10.5 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 77.1%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.12	IN L/1077
Dead Load	0.12	in
Total Load	0.24	IN L/533

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1365	lb	1365	lb
Dead Load	1394	lb	1394	lb
Total Load	2759	lb	2759	lb
Bearing Length	1.21	in	1.21	in

BEAM DATA

	Center	
Span Length	10.5	ft
Unbraced Length-Top	1.33	ft
Roof Pitch	10	:12
Floor Duration Factor	1.00	
Roof Duration Factor	1.15	
Camber Adj. Factor	1	
Camber Required	0.12	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2392 psi
	Cd=1.00 Cl=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	265 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 7242 ft-lb
5.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -2759 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	36.32 in3	64.31 in3
Area (Shear):	15.62 in2	36.75 in2
Moment of Inertia (deflection):	152.05 in4	337.64 in4
Moment:	7242 ft-lb	12821 ft-lb
Shear:	-2759 lb	6493 lb

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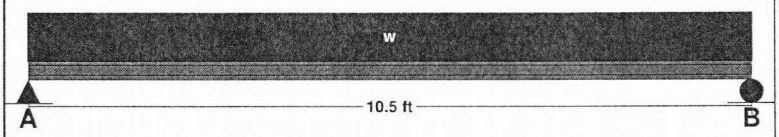

ROOF LOADING

		Side 1		Side 2	
Roof Live Load	RLL =	25	psf	25	psf
Roof Dead Load	RDL =	17	psf	17	psf
Roof Tributary Width	RTW =	0	ft	1.5	ft

FLOOR LOADING

		Side 1		Side 2	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width	FTW =	3	ft	3.5	ft
Wall Load	WALL =	160	plf		

BEAM LOADING

Roof Uniform Live Load:	wL-roof =	38	plf
Roof Uniform Dead Load:	wD-roof =	33	plf
Floor Uniform Live Load:	wL-floor =	260	plf
Floor Uniform Dead Load:	wD-floor =	98	plf
Beam Self Weight:	BSW =	8	plf
Combined Uniform Live Load:	wL =	298	plf
Combined Uniform Dead Load:	wD =	299	plf
Combined Uniform Total Load:	wT =	596	plf
Controlling Total Design Load:	wT-cont =	525	plf

NOTES

Project: Washington5

Location: Beam #20 front carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 11.0 FT (9 + 2)
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 115.5%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	0.00	IN L/Infinity	0.00	IN 2L/Infinity
Dead Load	-0.06	in	0.08	in
Total Load	-0.06	IN L/1854	0.08	IN 2L/582

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	0 lb	0 lb
Dead Load	-416 lb	2820 lb
Total Load	-416 lb	2820 lb
Uplift (1.5 F.S)	**-416 lb**	**0 lb**
Bearing Length	0.00 in	1.24 in

BEAM DATA

	Center	Right
Span Length	9 ft	2 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	9 ft	2 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

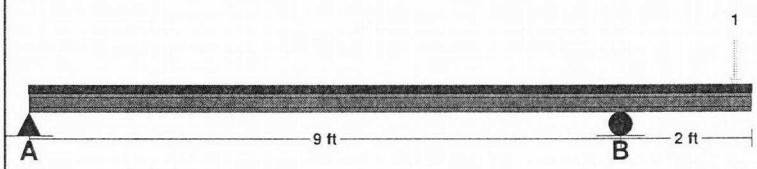
	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb_cmpr' =	1636 psi
	Cd=0.90 Cl=0.98			
Shear Stress:	Fv =	265 psi	Fv' =	239 psi
	Cd=0.90			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: -4069 ft-lb
Over right support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 2332 lb
At left support of span 3 (Right Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	29.84 in3	64.31 in3
Area (Shear):	14.67 in2	36.75 in2
Moment of Inertia (deflection):	139.05 in4	337.64 in4
Moment:	-4069 ft-lb	8769 ft-lb
Shear:	2332 lb	5843 lb

LOADING DIAGRAM



FLOOR LOADING

		Center		Right	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width Side One	TW1 =	0	ft	0	ft
Floor Tributary Width Side Two	TW2 =	0	ft	0	ft
Wall Load	WALL =	0	plf	0	plf

POINT LOADS - RIGHT SPAN

Load Number	One
Live Load	0 lb
Dead Load	2316 lb
Location	1.75 ft

BEAM LOADING

	Center		Right	
Reduced Floor Live Load	40	psf	40	psf
Total Live Load	0	plf	0	plf
Total Dead Load	0	plf	0	plf
Beam Self Weight	8	plf	8	plf
Total Load	8	plf	8	plf

NOTES

Project: Washington5

Location: Beam #21 over rear of garage
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 12.0 IN x 11.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 39.4%
Controlling Factor: Shear

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DEFLECTIONS

	Center	
Live Load	0.03	IN L/4214
Dead Load	0.27	in
Total Load	0.30	IN L/444

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	962 lb	962 lb
Dead Load	4361 lb	4361 lb
Total Load	5323 lb	5323 lb
Bearing Length	2.34 in	2.34 in

BEAM DATA

	Center
Span Length	11 ft
Unbraced Length-Top	1.33 ft
Unbraced Length-Bottom	11 ft
Live Load Duration Factor	1.00
Camber Adj. Factor	1
Camber Required	0.27
Notch Depth	0.00

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2391 psi
	Cd=1.00 Cl=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	265 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 11219 ft-lb
5.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 5323 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	56.3 in3	84 in3
Area (Shear):	30.13 in2	42 in2
Moment of Inertia (deflection):	272.37 in4	504 in4
Moment:	11219 ft-lb	16738 ft-lb
Shear:	5323 lb	7420 lb

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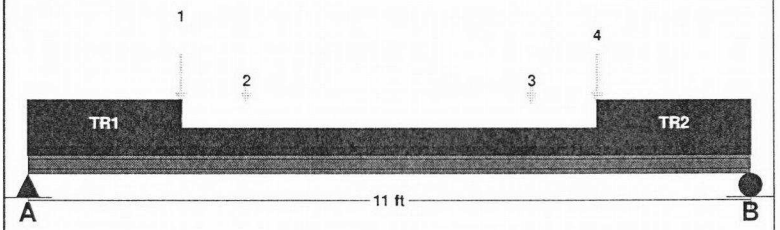

UNIFORM LOADS

	Center
Uniform Live Load	0 plf
Uniform Dead Load	0 plf
Beam Self Weight	9 plf
Total Uniform Load	9 plf

POINT LOADS - CENTER SPAN

Load Number	One	Two	Three	Four
Live Load	0 lb	0 lb	0 lb	0 lb
Dead Load	2316 lb	714 lb	714 lb	2316 lb
Location	2.33 ft	3.33 ft	7.67 ft	8.67 ft

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two	Three
Left Live Load	413 plf	413 plf	0 plf
Left Dead Load	441 plf	441 plf	80 plf
Right Live Load	413 plf	413 plf	0 plf
Right Dead Load	441 plf	441 plf	80 plf
Load Start	0 ft	8.67 ft	2.33 ft
Load End	2.33 ft	11 ft	8.67 ft
Load Length	2.33 ft	2.33 ft	6.34 ft

NOTES

Project: Washington5

Location: Beam #22 over main floor stairs
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 14.0 FT (2 + 12)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 55.0%
Controlling Factor: Moment

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DEFLECTIONS

	Left		Center	
Live Load	-0.06	IN 2L/806	0.12	IN L/1244
Dead Load	-0.01	in	0.03	in
Total Load	-0.07	IN 2L/668	0.14	IN L/1019

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	482 lb	521 lb
Dead Load	131 lb	238 lb
Total Load	613 lb	759 lb
Bearing Length	0.65 in	0.81 in

BEAM DATA

	Left	Center
Span Length	2 ft	12 ft
Unbraced Length-Top	0 ft	1.33 ft
Unbraced Length-Bottom	2 ft	12 ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 888 psi
	Cd=1.00 Cl=0.99 CF=1.00	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 1511 ft-lb
8.04 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -759 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	20.41 in3	31.64 in3
Area (Shear):	6.33 in2	16.88 in2
Moment of Inertia (deflection):	79.43 in4	177.98 in4
Moment:	1511 ft-lb	2342 ft-lb
Shear:	-759 lb	2025 lb

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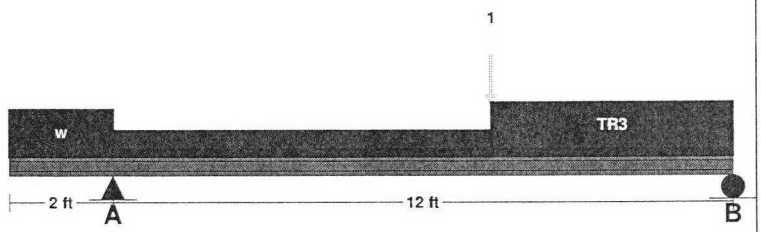

UNIFORM LOADS

	Left	Center
Uniform Live Load	53 plf	0 plf
Uniform Dead Load	13 plf	0 plf
Beam Self Weight	4 plf	4 plf
Total Uniform Load	70 plf	4 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	-200 lb
Location	7.33 ft

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two	Three
Left Live Load	53 plf	53 plf	107 plf
Left Dead Load	13 plf	20 plf	80 plf
Right Live Load	53 plf	53 plf	107 plf
Right Dead Load	13 plf	20 plf	80 plf
Load Start	0 ft	4 ft	7.33 ft
Load End	4 ft	7.33 ft	12 ft
Load Length	4 ft	3.33 ft	4.67 ft

NOTES

Project: Washington5

Location: Deck Guardrail
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
1.5 IN x 5.5 IN x 8.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 48.7%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.00	IN L/Infinity
Dead Load	0.12	in
Total Load	0.12	IN L/830

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	0 lb	0 lb
Dead Load	107 lb	107 lb
Total Load	107 lb	107 lb
Bearing Length	0.11 in	0.11 in

BEAM DATA

	Center
Span Length	8 ft
Unbraced Length-Top	8 ft
Unbraced Length-Bottom	8 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

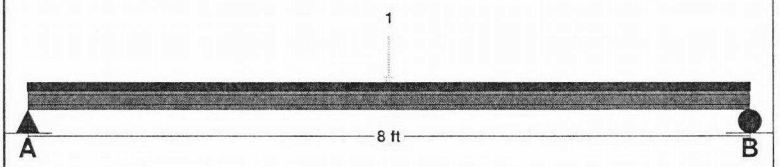
	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 978 psi
	Cd=0.90 Cl=0.93 CF=1.30	
Shear Stress:	Fv = 180 psi	Fv' = 162 psi
	Cd=0.90	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 414 ft-lb
4.0 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 107 lb
At left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	5.09 in3	7.56 in3
Area (Shear):	0.99 in2	8.25 in2
Moment of Inertia (deflection):	6.02 in4	20.8 in4
Moment:	414 ft-lb	616 ft-lb
Shear:	107 lb	891 lb

LOADING DIAGRAM



FLOOR LOADING

		Center
Floor Live Load	FLL =	0 psf
Floor Dead Load	FDL =	0 psf
Floor Tributary Width Side One	TW1 =	0 ft
Floor Tributary Width Side Two	TW2 =	0 ft
Wall Load	WALL =	0 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	200 lb
Location	4 ft

BEAM LOADING

	Center
Reduced Floor Live Load	0 psf
Total Live Load	0 plf
Total Dead Load	0 plf
Beam Self Weight	2 plf
Total Load	2 plf

NOTES

Project: Washington5

Location: Footing A
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 3.0 FT x 3.0 FT x 12.00 IN
Reinforcement: #4 Bars @ 7.00 IN. O.C. E/W / (5) min.
Section Footing Design Adequate

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FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Width:	W =	3	ft
Length:	L =	3	ft
Depth:	Depth =	12	in
Effective Depth to Top Layer of Steel:	d =	8.25	in

COLUMN AND BASEPLATE SIZE

Column Type:	Wood		
Column Width:	m =	3.5	in
Column Depth:	n =	5.5	in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	1253	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1350	psf
Required Footing Area:	Areq =	8.35	sf
Area Provided:	A =	9.00	sf

Baseplate Bearing:

Bearing Required:	Bear =	15788	lb
Allowable Bearing:	Bear-A =	53178	lb

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	4276	lb
Allowable Beam Shear:	Vc1 =	22275	lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter:	Bo =	51	in
Punching Shear:	Vu2 =	13820	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	71719	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	133650	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	63113	lb
Controlling Allowable Punching Shear:	vc2 =	63113	lb

Bending Calculations:

Factored Moment:	Mu =	71045	in-lb
Nominal Moment Strength:	Mn =	282369	in-lb

Reinforcement Calculations:

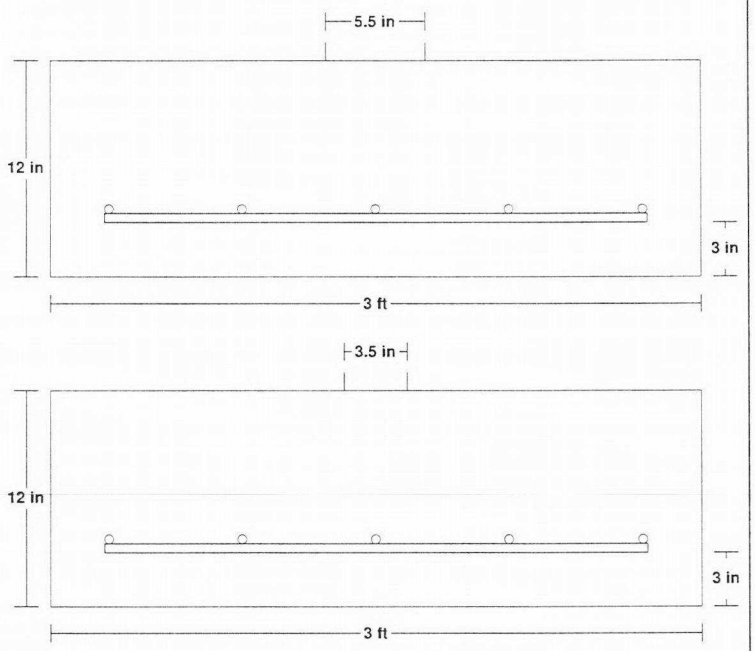
Concrete Compressive Block Depth:	a =	0.51	in
Steel Required Based on Moment:	As(1) =	0.24	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.86	in2
Controlling Reinforcing Steel:	As-reqd =	0.86	in2
Selected Reinforcement:	#4's @ 7.0 in. o.c. e/w (5) Min.		
Reinforcement Area Provided:	As =	0.98	in2

Development Length Calculations:

Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	15	in

Note: Plain concrete adequate for bending,
therefore adequate development length not required.

LOADING DIAGRAM



FOOTING LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	11277	lb
Total Load:	PT =	11277	lb
Ultimate Factored Load:	Pu =	15788	lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. =	870	lb

NOTES

Project: Washington5

Location: Footing B
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 3.17 FT x 3.17 FT x 12.00 IN
Reinforcement: #4 Bars @ 7.00 IN. O.C. E/W / (5) min.
Section Footing Design Adequate

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FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Width:	W =	3.17	ft
Length:	L =	3.17	ft
Depth:	Depth =	12	in
Effective Depth to Top Layer of Steel:	d =	8.25	in

COLUMN AND BASEPLATE SIZE

Column Type:	Wood
Column Width:	m = 3.5 in
Column Depth:	n = 5.5 in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	1350	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1350	psf
Required Footing Area:	Areq =	10.05	sf
Area Provided:	A =	10.05	sf

Baseplate Bearing:

Bearing Required:	Bear =	18990	lb
Allowable Bearing:	Bear-A =	53178	lb

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	5376	lb
Allowable Beam Shear:	Vc1 =	23537	lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter:	Bo =	51	in
Punching Shear:	Vu2 =	16869	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	71719	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	133650	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	63113	lb
Controlling Allowable Punching Shear:	vc2 =	63113	lb

Bending Calculations:

Factored Moment:	Mu =	90296	in-lb
Nominal Moment Strength:	Mn =	282855	in-lb

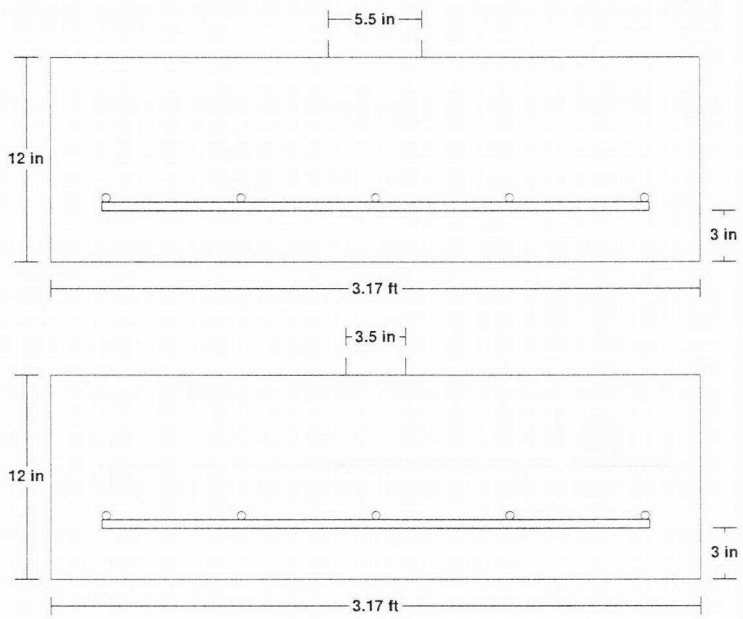
Reinforcement Calculations:

Concrete Compressive Block Depth:	a =	0.49	in
Steel Required Based on Moment:	As(1) =	0.31	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.91	in2
Controlling Reinforcing Steel:	As-reqd =	0.91	in2
Selected Reinforcement:	#4's @ 7.0 in. o.c. e/w (5) Min.		
Reinforcement Area Provided:	As =	0.98	in2

Development Length Calculations:

Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	16.02	in

LOADING DIAGRAM



FOOTING LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	13564	lb
Total Load:	PT =	13564	lb
Ultimate Factored Load:	Pu =	18990	lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. =	971	lb

NOTES

Project: Washington5

Location: Strip footings
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 15.0 IN Wide x 7.0 IN Deep Continuous Footing With 6.0 IN Thick x 12.0 IN Tall Stemwall
Section Footing Design Adequate

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CAUTIONS
* Footing has been designed without reinforcement

FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Width:	W =	15	in
Depth:	Depth =	7	in
Effective Depth to Top Layer of Steel:	d =	5	in

STEMWALL SIZE

Stemwall Width:	6	in
Stemwall Height:	12	in
Stemwall Weight:	150	pcf

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	1389	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1413	psf
Width Required:	Wreq =	1.23	in2

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	0	lb
Allowable Beam Shear:	Vc1 =	2200	lb

Transverse Direction:

Bending Calculations:

Factored Moment:	Mu =	1673	in-lb
Nominal Moment Strength:	Mn =	6875	in-lb

NOTES

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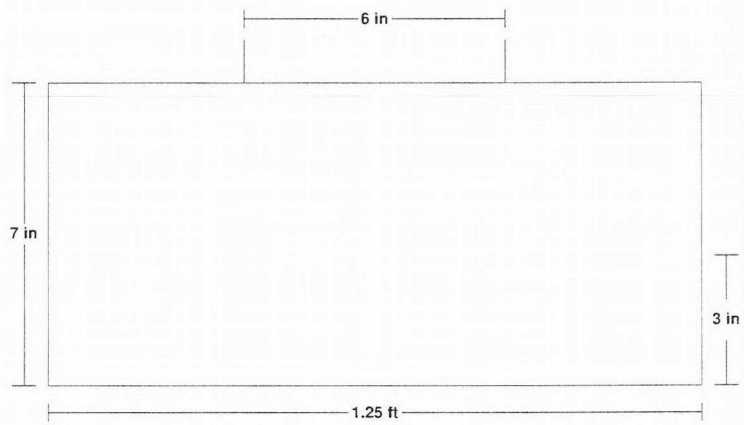


FOOTING LOADING

Live Load:	PL =	989	lb
Dead Load:	PD =	672	lb
Total Load:	PT =	1736	lb
Ultimate Factored Load:	Pu =	2479	lb

LOAD CALCULATOR

	Live Load		Dead Load		Tributary Width	
Roof:	LL =	25 psf	DL =	17 psf	TA =	6.8 ft2
Second Floor:	LL =	40 psf	DL =	15 psf	TA =	10.3 ft2
First Floor:	LL =	40 psf	DL =	15 psf	TA =	10.3 ft2

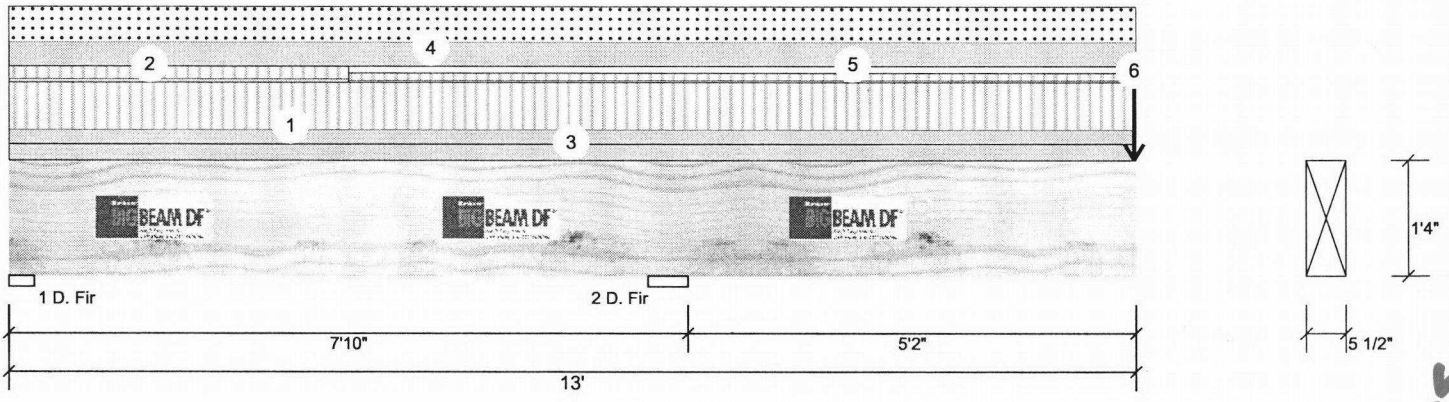
9.75

Client:	Kevin Brayson - Precision Truss & Lumber	Date:	2/16/2018
Project:	CANTILEVER X-BEAM	Designer:	EVAN KELLY
Address:		Job Name:	STOCKHOUSE PLAN
		Project #:	

B2 Rosboro Big Beam DF 5.500" X 16.000" - PASSED

BEAM #5

Level: Level



Member Information

Type:	Girder	Application:	Floor
Moisture Condition:	Dry	Design Method:	ASD
Deflection LL:	480	Building Code:	IBC/IRC 2015
Deflection TL:	360	Load Sharing:	No
Importance:	Normal	Wet Use:	No
Temperature:	Temp <= 100°F	Deck:	Not Checked
General Load			
Floor Live:	40 PSF		
Dead:	12 PSF		

Reactions UNPATTERNED lb (Uplift)

Brg	Live	Dead	Snow	Wind	Const
1	708	(-239)	0 (-1279)	0	0
2	3267	5978	6209	0	0

Bearings

Bearing	Length	Cap.	React D/L lb	Total	Ld. Case	Ld. Comb.
1 - D. Fir	3.500"	8%	-239 / 1246	1007 (-1875)	L_	D+L
2 - D. Fir	5.500"	69%	5978 / 7107	13085	LL	D+0.75(L+S)

Analysis Results

Analysis	Actual	Location	Allowed	Capacity	Comb.	Case
Neg Moment	26607 ft-lb	7'7 1/4"	67467 ft-lb	0.394 (39%)	D+S	_L
Unbraced	26607 ft-lb	7'7 1/4"	66383 ft-lb	0.401 (40%)	D+S	_L
Pos Moment	557 ft-lb	1'6 1/8"	58667 ft-lb	0.009 (1%)	D+L	L_
Unbraced	557 ft-lb	1'6 1/8"	58427 ft-lb	0.010 (1%)	D+L	L_
Shear	5875 lb	9'2"	17879 lb	0.329 (33%)	D+0.75(L+S)	LL
LL Defl inch	0.021 (L/4127)	4'6 3/8"	0.185 (L/480)	0.120 (12%)	S	_L
TL Defl inch	0.034 (L/2630)	4'7 7/16"	0.246 (L/360)	0.140 (14%)	D+S	_L
LL Cant	0.136 (2L/910)	Rt Cant	0.258 (2L/480)	0.530 (53%)	S	_L
TL Cant	0.229 (2L/542)	Rt Cant	0.344 (2L/360)	0.660 (66%)	D+S	_L

Design Notes

1 Warning Note: right cant exceeds 1/3 of back span, wind uplift may need to be checked.
2 Girders are designed to be supported on the bottom edge only.
3 Tie-down connection required at bearing 1 for uplift 1875 lb (Combination D+S, Load Case _L).
4 Top braced at bearings.
5 Bottom braced at bearings.

ID	Load Type	Location	Trib Width	Side	Dead 0.9	Live 1	Snow 1.15	Wind 1.6	Const. 1.25	Comments
1	Tie-In	0-0-0 to 13-0-0	(Span) 12-10-8	Top	12 PSF	40 PSF	0 PSF	0 PSF	0 PSF	LSC
2	Tie-In	0-0-0 to 3-11-0	(Span)3-4-8	Top	12 PSF	40 PSF	0 PSF	0 PSF	0 PSF	RSC1

Continued on page 2...

Manufacturer Info

Rosboro
Springfield, OR 97477
(877) 457-4139
www.rosboro.com
APA: PR-L251

INTERNATIONAL WOOD PRODUCTS
14421 SE 98th CT, OR 97015

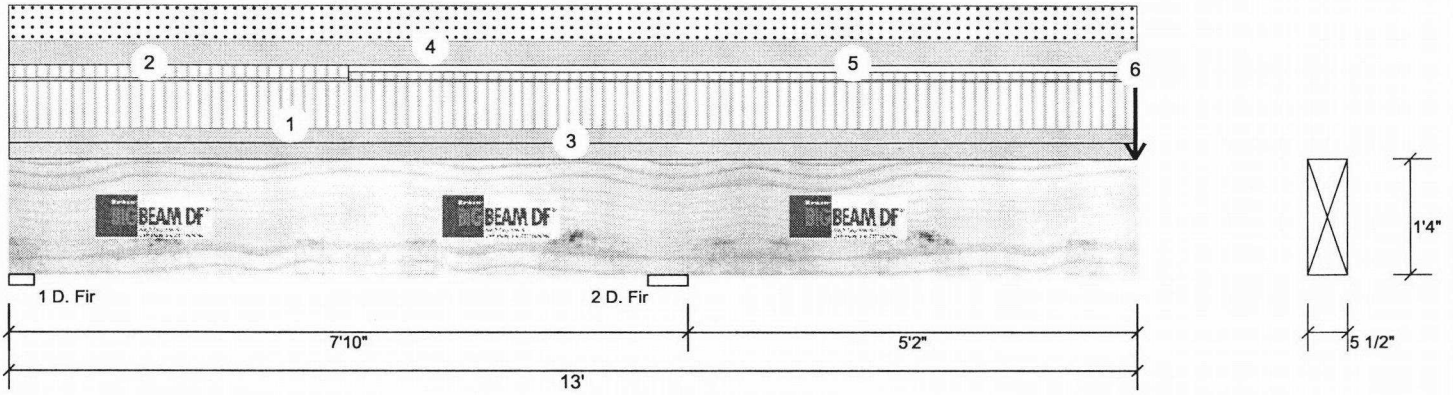
17-2586 25/47/53/57/58 JS

SCAN

Client:	Kevin Brayson - Precision Truss & Lumber	Date:	2/16/2018
Project:	CANTILEVER X-BEAM	Designer:	EVAN KELLY
Address:		Job Name:	STOCKHOUSE PLAN
		Project #:	

B2 Rosboro Big Beam DF 5.500" X 16.000" - PASSED

Level: Level



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ID	Load Type	Location	Trib Width	Side	Dead 0.9	Live 1	Snow 1.15	Wind 1.6	Const. 1.25	Comments
3	Uniform			Top	90 PLF	0 PLF	0 PLF	0 PLF	0 PLF	WALL
4	Tie-In	0-0-0 to 13-0-0	(Span)15-6-0	Top	17 PSF	0 PSF	25 PSF	0 PSF	0 PSF	ROOF
5	Tie-In	3-11-0 to 13-0-0	(Span)2-0-0	Top	12 PSF	40 PSF	0 PSF	0 PSF	0 PSF	RSC2
6	Point	12-11-12		Top	1378 lb	0 lb	2411 lb	0 lb	0 lb	PL
	Self Weight				22 PLF					

Manufacturer Info

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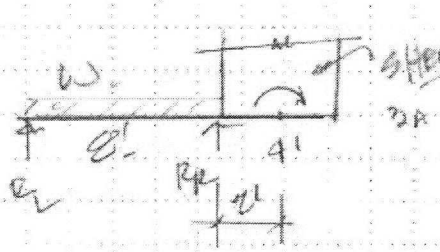
Springfield, OR 97477
(877) 457-4139
www.rosboro.com
APA: PR-L251

INTERNATIONAL WOOD PRODUCTS
14421 SE 98th CT, OR 97015

✓ BEAM SUPPORTING WALL 3A



$w_{DL} + w_{LL} + M_{OT}$

LEFT

$w_{DL} = 15(8)/2 + 12(8) + 17(8)/2 = 224^{\#}$

$w_{LL} = 40(8)/2 + 25(8)/2 = 260^{\#}/'$

RIGHT

$w_{DL} = 181^{\#}/'$ (LAST LINE)

$M_{OT} = 2912'\text{-}\#$ @ 2' CASE I

$M_{OT} = -2912'\text{-}\#$ @ 2' CASE II

USE 4x12 DF #2

17-180493 | 496 | 497 | 498 | 500-B

Benchmark Engineering
CIVIL - STRUCTURAL
2905 SE OAK GROVE BLVD, SUITE #8, MILWAUKIE, OREGON 97267 503-659-9371/659-9796 FAX

JOB: ~~7614 SE Washington~~ 7614 SE Washington

CLIENT: _____ JOB NO. 18-05

DATE: 01/06/18 BY: Rich SHEET NO. 1/8

Benchmark Engineering LLC
2905 SE Oak Grove Blvd, Ste 8
Milwaukie, Oregon 97267
503-659-9371

Title :
Dsgnr:
Description :
Scope :
Job #
Date:

Rev. 580024
User: KW-0507115, Ver 5.8.0, 1-Dec-2003
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General Timber Beam

Description 7614 SE Washington St Beam Supporting Shearwall 3a BEAM #7
7622 SE Washington St

General Information

Code Ref: 1997/2001 NDS, 2000/2003 IBC, 2003 NFPA 5000. Base allowables are user defined

Section Name	4x12	Center Span	8.33 ft	.....Lu	0.00 ft
Beam Width	3.500 in	Left Cantilever	ft	.....Lu	0.00 ft
Beam Depth	11.250 in	Right Cantilever	4.00 ft	.....Lu	0.00 ft
Member Type	Sawn	Douglas Fir - Larch, No.2			
Bm Wt. Added to Loads		Fb Base Allow	875.0 psi		
Load Dur. Factor	1.330	Fv Allow	170.0 psi		
Beam End Fixity	Pin-Pin	Fc Allow	625.0 psi		
Wood Density	30.000 pcf	E	1,300.0 ksi		

Trapezoidal Loads

#1 DL @ Left	224.00 #/ft	LL @ Left	#/ft	Start Loc	0.000 ft
DL @ Right	224.00 #/ft	LL @ Right	#/ft	End Loc	8.330 ft
#2 DL @ Left	181.00 #/ft	LL @ Left	#/ft	Start Loc	8.330 ft
DL @ Right	181.00 #/ft	LL @ Right	#/ft	End Loc	12.330 ft

Moment Loads

Dead Load	in-#	in-#	in-#	in-#	in-#	in-#	in-#
Live Load	2,912.00 in-#	in-#	in-#	in-#	in-#	in-#	in-#
...distance	10.330 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft

Summary

Beam Design OK

Span= 8.33ft, Right Cant= 4.00ft, Beam Width = 3.500in x Depth = 11.25in. Ends are Pin-Pin

Max Stress Ratio 0.192 : 1

Maximum Moment	-1.5 k-ft	Maximum Shear * 1.5	1.4 k
Allowable	7.9 k-ft	Allowable	8.9 k

Max. Positive Moment	1.33 k-ft	at	3.401 ft	Shear:	@ Left	0.81 k
Max. Negative Moment	-1.51 k-ft	at	8.330 ft		@ Right	1.15 k
Max @ Left Support	0.00 k-ft			Camber:	@ Left	0.000 in
Max @ Right Support	-1.27 k-ft				@ Center	0.039 in
Max. M allow	7.88				@ Right	0.002 in

fb	246.02 psi	fv	35.48 psi	Reactions...			
Fb	1,280.13 psi	Fv	226.10 psi	Left DL	0.79 k	Max	0.81 k
				Right DL	1.91 k	Max	1.88 k

Deflections

Center Span...	Dead Load	Total Load
Deflection	-0.026 in	-0.026 in
...Location	3.746 ft	3.746 ft
...Length/Defl	3,855.4	3,855.43

Left Cantilever...	Dead Load	Total Load
Deflection	0.000 in	0.000 in
...Length/Defl	0.0	0.0

Right Cantilever...		
Deflection	-0.001 in	0.012 in
...Length/Defl	75,849.3	8,180.5

Camber (using 1.5 * D.L. Defl) ...	
@ Center	0.039 in
@ Left	0.000 in
@ Right	0.002 in

2/8

Benchmark Engineering LLC
2905 SE Oak Grove Blvd, Ste 8
Milwaukie, Oregon 97267
503-659-9371

Title :
Dsgnr:
Description :
Scope :
Job #
Date:

Description 7614 SE Washington St Beam Supporting Shearwall 3a
7622 SE Washington St

Stress Calcs

Bending Analysis

Ck	27.106	Le	0.000 ft	Sxx	73.828 in3	Area	39.375 in2
Cf	1.100	Rb	0.000	Cl	0.000		

	Max Moment	Sxx Req'd	Allowable fb
@ Center	1.51 k-ft	14.19 in3	1,280.13 psi
@ Left Support	0.00 k-ft	0.00 in3	1,280.13 psi
@ Right Support	1.27 k-ft	11.91 in3	1,280.13 psi

Shear Analysis	@ Left Support	@ Right Support
Design Shear	0.90 k	1.40 k
Area Required	3.961 in2	6.179 in2
Fv: Allowable	226.10 psi	226.10 psi

Bearing @ Supports

Max. Left Reaction	0.81 k	Bearing Length Req'd	0.372 in
Max. Right Reaction	1.88 k	Bearing Length Req'd	0.858 in

Query Values

M, V, & D @ Specified Locations		**Moment**	**Shear**	**Deflection**
@ Center Span Location =	0.00 ft	0.00 k-ft	0.81 k	0.0000 in
@ Right Cant. Location =	0.00 ft	0.00 k-ft	0.81 k	0.0000 in
@ Left Cant. Location =	0.00 ft	0.00 k-ft	0.00 k	0.0000 in

Benchmark Engineering LLC
2905 SE Oak Grove Blvd, Ste 8
Milwaukie, Oregon 97267
503-659-9371

Title :
Dsgnr:
Description :
Scope :

Job #
Date:

Rev. 580004
User: KW-0607116, Ver 5.8.0, 1-Dec-2003
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General Timber Beam

Description 7614 SE Washington St Beam Supporting Shearwall 3a

General Information

Code Ref: 1997/2001 NDS, 2000/2003 IBC, 2003 NFPA 5000. Base allowables are user defined

Section Name	**4x12**	Center Span	8.33 ft	.....Lu	0.00 ft
Beam Width	3.500 in	Left Cantilever	ft	.....Lu	0.00 ft
Beam Depth	11.250 in	Right Cantilever	4.00 ft	.....Lu	0.00 ft
Member Type	Sawn	Douglas Fir - Larch, No.2			
Bm Wt. Added to Loads		Fb Base Allow	875.0 psi		
Load Dur. Factor	1.330	Fv Allow	170.0 psi		
Beam End Fixity	Pin-Pin	Fc Allow	625.0 psi		
Wood Density	30.000 pcf	E	1,300.0 ksi		

Trapezoidal Loads

#1 DL @ Left	224.00	#/ft	LL @ Left	#/ft	Start Loc	0.000 ft
DL @ Right	224.00	#/ft	LL @ Right	#/ft	End Loc	8.330 ft
#2 DL @ Left	181.00	#/ft	LL @ Left	#/ft	Start Loc	8.330 ft
DL @ Right	181.00	#/ft	LL @ Right	#/ft	End Loc	12.330 ft

Moment Loads

Dead Load	in-#	in-#	in-#	in-#	in-#	in-#	in-#
Live Load	-2,912.00 in-#	in-#	in-#	in-#	in-#	in-#	in-#
...distance	10.330 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft

Summary

Beam Design OK

Span= 8.33ft, Right Cant= 4.00ft, Beam Width = 3.500in x Depth = 11.25in, Ends are Pin-Pin

Max Stress Ratio 0.223 : 1

Maximum Moment	-1.8 k-ft	Maximum Shear * 1.5	1.4 k
Allowable	7.9 k-ft	Allowable	8.9 k

Max. Positive Moment	1.33 k-ft	at	3.401 ft	Shear:	@ Left	0.79 k
Max. Negative Moment	-1.51 k-ft	at	8.330 ft		@ Right	1.18 k
Max @ Left Support	0.00 k-ft			Camber:	@ Left	0.000 in
Max @ Right Support	-1.76 k-ft				@ Center	0.039 in
Max. M allow	7.88				@ Right	0.002 in

				Reactions...			
fb	285.47 psi	fv	36.59 psi	Left DL	0.79 k	Max	0.79 k
Fb	1,280.13 psi	Fv	226.10 psi	Right DL	1.91 k	Max	1.93 k

Deflections

Center Span...	Dead Load	Total Load
Deflection	-0.026 in	-0.026 in
...Location	3.746 ft	3.746 ft
...Length/Defl	3,855.4	3,855.43

Camber (using 1.5 * D.L. Defl) ...

@ Center	0.039 in
@ Left	0.000 in
@ Right	0.002 in

Left Cantilever...	Dead Load	Total Load
Deflection	0.000 in	0.000 in
...Length/Defl	0.0	0.0
Right Cantilever...		
Deflection	-0.001 in	-0.015 in
...Length/Defl	75,849.3	6,607.8

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503-659-9371

Title :
Dsgnr:
Description :
Scope :

Job #
Date:

General Timber Beam

Description 7614 SE Washington St Beam Supporting Shearwall 3a
7622 SE Washington St

Stress Calcs

Bending Analysis

Ck	27.106	Le	0.000 ft	Sxx	73.828 in3	Area	39.375 in2
Cf	1.100	Rb	0.000	Cl	0.000		

	Max Moment	Sxx Req'd	Allowable fb
@ Center	1.51 k-ft	14.19 in3	1,280.13 psi
@ Left Support	0.00 k-ft	0.00 in3	1,280.13 psi
@ Right Support	1.76 k-ft	16.46 in3	1,280.13 psi

Shear Analysis	@ Left Support	@ Right Support
Design Shear	0.85 k	1.44 k
Area Required	3.768 in2	6.372 in2
Fv: Allowable	226.10 psi	226.10 psi

Bearing @ Supports

Max. Left Reaction	0.79 k	Bearing Length Req'd	0.359 in
Max. Right Reaction	1.93 k	Bearing Length Req'd	0.884 in

Query Values

M, V, & D @ Specified Locations		Moment	Shear	Deflection
@ Center Span Location =	0.00 ft	0.00 k-ft	0.76 k	0.0000 in
@ Right Cant. Location =	0.00 ft	0.00 k-ft	0.76 k	0.0000 in
@ Left Cant. Location =	0.00 ft	0.00 k-ft	0.00 k	0.0000 in

Anchor Bolt Pullout: Edge Bolts

(ACI 318-05, Appendix D) Normal Strength Concrete:

$\phi := 0.70$ for Tension design $f_c := 2500$ psi

Category 1, Condition A

REGISTERED PROFESSIONAL ENGINEER 19301 OREGON JULY 22, 1997 RICHARD D SILKETT

EXPIRES 6/30/18

Anchor Bolt Strength: (2)7/8" Anchor Bolt with 12" Embed, Edge distance = 2" min

Section D.5.1:

Single Anchor bolt (n) $n := 2$

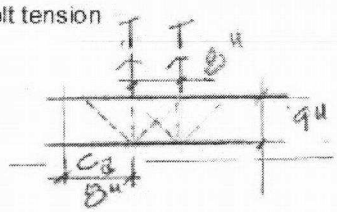
Cross sectional area of bolt (Ase) $Ase := 0.60$

Allowable tension stress of bolt (Futa) $Futa := 1.9 \cdot 36$ $Futa = 68.4 < 125$ OK

Nominal tension strengh of bolt (Nsa) $Nsa := n \cdot Ase \cdot Futa$

$Nsa = 82.08$ kips

Allowable tension strengh (ϕNsa) $\phi \cdot Nsa = 57.46$ kips Allowable Bolt tension



Concrete Strength: 7/8" Anchor Bolt with 9" Embed, Edge distance = 8" min

$Ca := 8$

Sectiion D.5.2.3 $hef := \frac{8}{1.5}$ $hef = 5.333$ inches (use for design)

Section D.5.2.1 $(Ca + 5 + 1.5\,hef)(2 \cdot 1.5\,hef)$

Projected concrete failure area (Anc) $Anc := (8 + 8 + 1.5 \cdot 5.33) \cdot (2 \cdot 1.5 \cdot 5.33)$ $Anc = 384$ inches^2

Projected concrete failure area at edge (Anco) $Anco := 9 \cdot 5.33^2$ $Anco = 256$ inches^2

Modification factor for edge anchors (ψed) $\psi ed := 0.7 + 0.3 \cdot \left(\frac{2}{1.5 \cdot 5.33}\right)$ $\psi ed = 0.775$

Max Allowed (Nb) (D-8) $Nb := \frac{16 \cdot \sqrt{f_c} \cdot 5.33^{1.5}}{1000}$ $Nb = 9.844$ kips N.A.

$hef < 11$

Single Anchor breakout strength (Nb) $Nb := \frac{24 \cdot \sqrt{f_c} \cdot 5.33^{1.5}}{1000}$

$Nb = 14.77$ kips <- - Use This!!

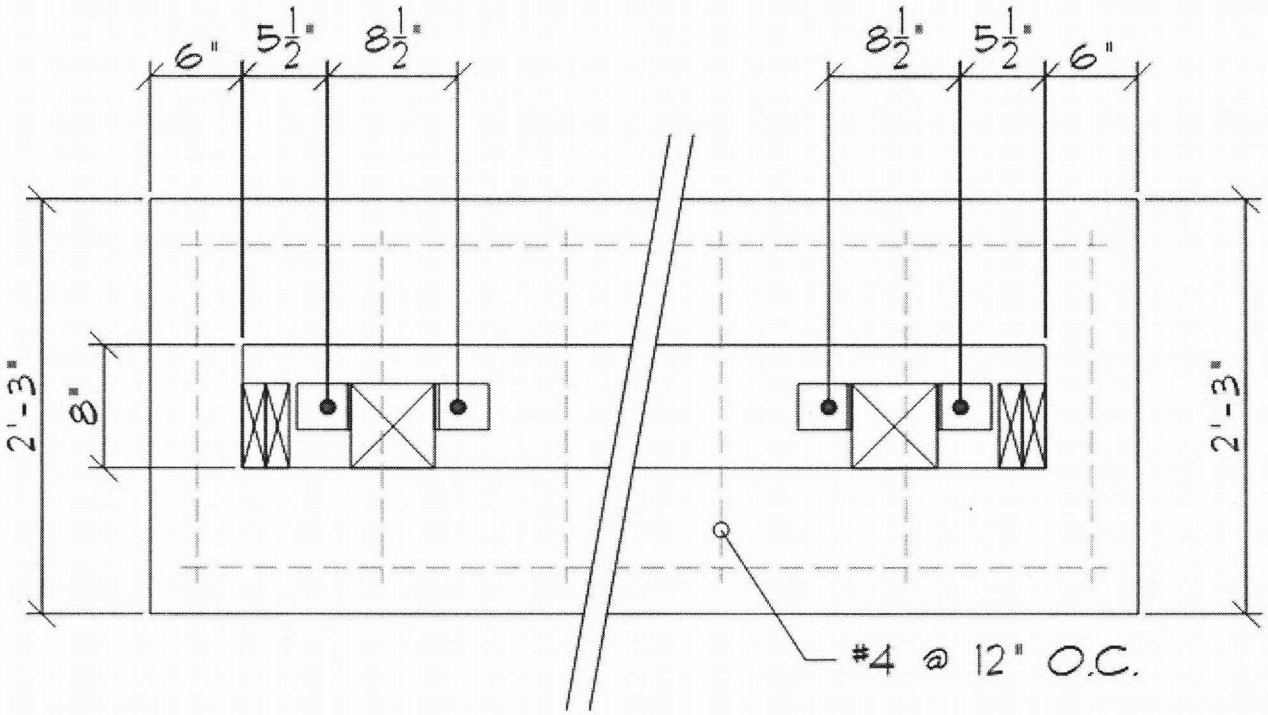
Single Anchor Allowable breakout strength (Ncb)

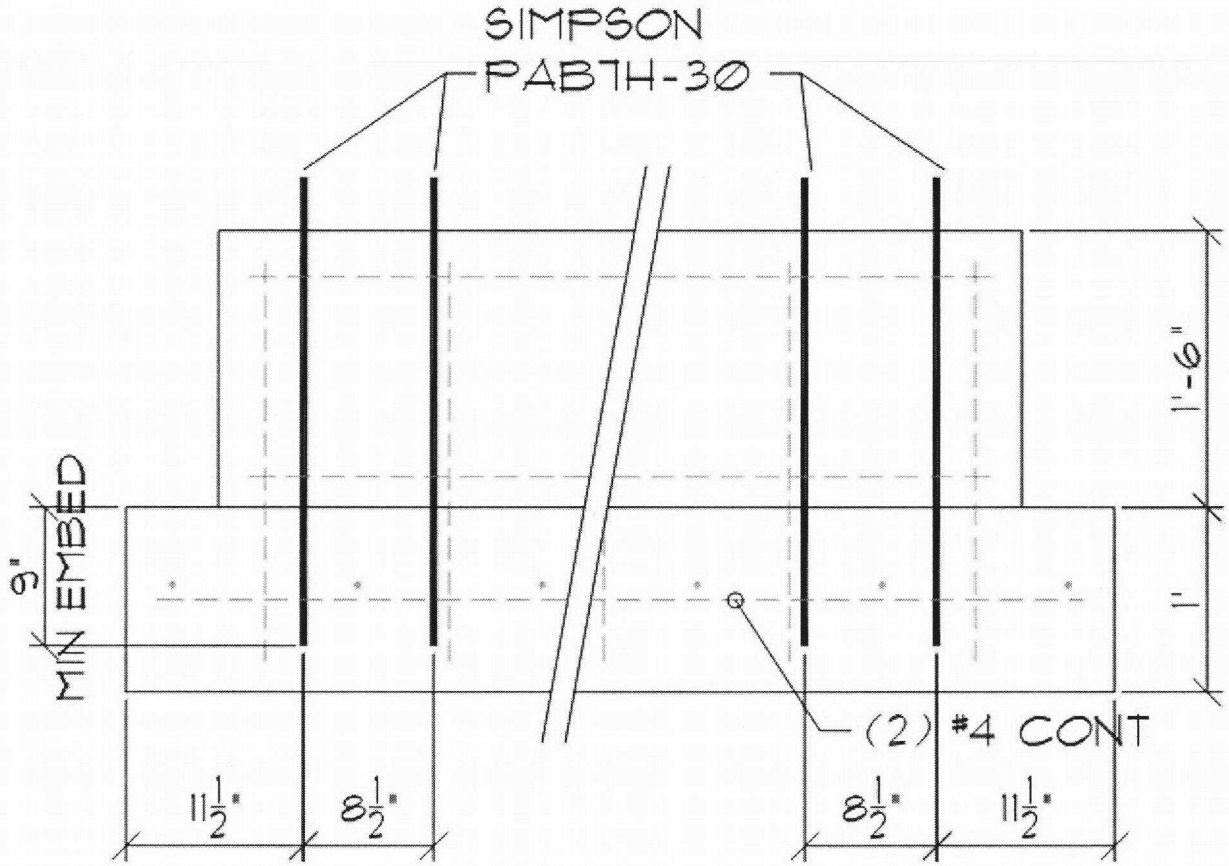
$$Ncb := \phi \cdot \frac{Anc}{Anco} \cdot \psi ed \cdot Nb$$

$Ncb = 12.02$ kips Allowable in Concrete W/9" embedment (Single Anchor)

$T := Ncb \cdot 2$

$T = 24.04$ kips Capacity **OK**

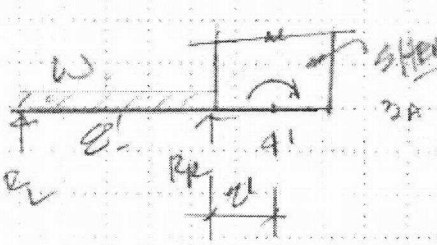




04/06/18 Rich

6/2

BEAM SUPPORTING WALL 3A – BEAM #7



$w_{DL} + w_{LL} + M_{OT}$

LEFT

$w_{DL} = 15(8)\frac{1}{2} + 12(8) + 17(8)\frac{1}{2} = 272\#$

$w_{LL} = 40(8)\frac{1}{2} + 20(8)\frac{1}{2} = 260\#/'$

RIGHT

$w_{DL} = 18(\#/')$ (LAST LIE)

$M_{OT} = 2912'\text{-}\#$ @ 2' CASE I

$M_{OT} = -2912'\text{-}\#$ @ 2' CASE II

USE 4x12 DF#2

17-25825/47/53/57/58-RS

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JOB: 7614 SE WASHINGTON ~~7614 SE Washington~~

CLIENT: _____ JOB NO. 18-05

DATE: 04/06/18 BY: Rich SHEET NO. 1/8

SCAN

Benchmark Engineering LLC
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Title :
Dsgnr:
Description :
Scope :
Job #
Date:

Rev: 580034
User: KW-0607115, Ver 5.8.0, 1-Dec-2003
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General Timber Beam

Description 7614 SE Washington St Beam Supporting Shearwall 3a – BEAM #7
7622 SE Washington St

General Information

Code Ref: 1997/2001 NDS, 2000/2003 IBC, 2003 NFPA 5000. Base allowables are user defined

Section Name	4x12	Center Span	8.33 ft	.....Lu	0.00 ft
Beam Width	3.500 in	Left Cantilever	ft	.....Lu	0.00 ft
Beam Depth	11.250 in	Right Cantilever	4.00 ft	.....Lu	0.00 ft
Member Type	Sawn	Douglas Fir - Larch, No.2			
Bm Wt. Added to Loads		Fb Base Allow	875.0 psi		
Load Dur. Factor	1.330	Fv Allow	170.0 psi		
Beam End Fixity	Pin-Pin	Fc Allow	625.0 psi		
Wood Density	30.000 pcf	E	1,300.0 ksi		

Trapezoidal Loads

#1	DL @ Left	224.00 #/ft	LL @ Left	#/ft	Start Loc	0.000 ft
	DL @ Right	224.00 #/ft	LL @ Right	#/ft	End Loc	8.330 ft
#2	DL @ Left	181.00 #/ft	LL @ Left	#/ft	Start Loc	8.330 ft
	DL @ Right	181.00 #/ft	LL @ Right	#/ft	End Loc	12.330 ft

Moment Loads

Dead Load	in-#	in-#	in-#	in-#	in-#	in-#	in-#
Live Load	2,912.00 in-#	in-#	in-#	in-#	in-#	in-#	in-#
...distance	10.330 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft

Summary

Beam Design OK

Span= 8.33ft, Right Cant= 4.00ft, Beam Width = 3.500in x Depth = 11.25in, Ends are Pin-Pin

Max Stress Ratio	0.192 : 1		
Maximum Moment	-1.5 k-ft	Maximum Shear * 1.5	1.4 k
Allowable	7.9 k-ft	Allowable	8.9 k

Max. Positive Moment	1.33 k-ft	at	3.401 ft	Shear:	@ Left	0.81 k
Max. Negative Moment	-1.51 k-ft	at	8.330 ft		@ Right	1.15 k
Max @ Left Support	0.00 k-ft			Camber:	@ Left	0.000 in
Max @ Right Support	-1.27 k-ft				@ Center	0.039 in
Max. M allow	7.88				@ Right	0.002 in

fb	246.02 psi	fv	35.48 psi	Reactions...			
Fb	1,280.13 psi	Fv	226.10 psi	Left DL	0.79 k	Max	0.81 k
				Right DL	1.91 k	Max	1.88 k

Deflections

Center Span...	Dead Load	Total Load
Deflection	-0.026 in	-0.026 in
...Location	3.746 ft	3.746 ft
...Length/Defl	3,855.4	3,855.43

Left Cantilever...	Dead Load	Total Load
Deflection	0.000 in	0.000 in
...Length/Defl	0.0	0.0

Camber (using 1.5 * D.L. Defl) ...	
@ Center	0.039 in
@ Left	0.000 in
@ Right	0.002 in

Right Cantilever...	Dead Load	Total Load
Deflection	-0.001 in	0.012 in
...Length/Defl	75,849.3	8,180.5

2/8

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Title :
Dsgnr:
Description :
Scope :
Job #
Date:

General Timber Beam

Description 7614 SE Washington St Beam Supporting Shearwall 3a
7622 SE Washington St

Stress Calcs

Bending Analysis

Ck	27.106	Le	0.000 ft	Sxx	73.828 in3	Area	39.375 in2
Cf	1.100	Rb	0.000	Cl	0.000		

	Max Moment	Sxx Req'd	Allowable fb
@ Center	1.51 k-ft	14.19 in3	1,280.13 psi
@ Left Support	0.00 k-ft	0.00 in3	1,280.13 psi
@ Right Support	1.27 k-ft	11.91 in3	1,280.13 psi

Shear Analysis	@ Left Support	@ Right Support
Design Shear	0.90 k	1.40 k
Area Required	3.961 in2	6.179 in2
Fv: Allowable	226.10 psi	226.10 psi

Bearing @ Supports

Max. Left Reaction	0.81 k	Bearing Length Req'd	0.372 in
Max. Right Reaction	1.88 k	Bearing Length Req'd	0.858 in

Query Values

M, V, & D @ Specified Locations		Moment	Shear	Deflection
@ Center Span Location =	0.00 ft	0.00 k-ft	0.81 k	0.0000 in
@ Right Cant. Location =	0.00 ft	0.00 k-ft	0.81 k	0.0000 in
@ Left Cant. Location =	0.00 ft	0.00 k-ft	0.00 k	0.0000 in

3/8

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Title :
Dsgnr:
Description :
Scope :

Job #
Date:

Rev. 580004
User: KW-0607116, Ver 5.8.0, 1-Dec-2003
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General Timber Beam

Description 7614 SE Washington St Beam Supporting Shearwall 3a – BEAM #7

General Information

Code Ref: 1997/2001 NDS, 2000/2003 IBC, 2003 NFPA 5000. Base allowables are user defined

Section Name	**4x12**	Center Span	8.33 ft	.....Lu	0.00 ft
Beam Width	3.500 in	Left Cantilever	ft	.....Lu	0.00 ft
Beam Depth	11.250 in	Right Cantilever	4.00 ft	.....Lu	0.00 ft
Member Type	Sawn	Douglas Fir - Larch, No.2			
Bm Wt. Added to Loads		Fb Base Allow	875.0 psi		
Load Dur. Factor	1.330	Fv Allow	170.0 psi		
Beam End Fixity	Pin-Pin	Fc Allow	625.0 psi		
Wood Density	30.000 pcf	E	1,300.0 ksi		

Trapezoidal Loads

#1 DL @ Left	224.00 #/ft	LL @ Left	#/ft	Start Loc	0.000 ft
DL @ Right	224.00 #/ft	LL @ Right	#/ft	End Loc	8.330 ft
#2 DL @ Left	181.00 #/ft	LL @ Left	#/ft	Start Loc	8.330 ft
DL @ Right	181.00 #/ft	LL @ Right	#/ft	End Loc	12.330 ft

Moment Loads

Dead Load	in-#	in-#	in-#	in-#	in-#	in-#	in-#
Live Load	-2,912.00 in-#	in-#	in-#	in-#	in-#	in-#	in-#
...distance	10.330 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft	0.000 ft

Summary

Beam Design OK

Span= 8.33ft, Right Cant= 4.00ft, Beam Width = 3.500in x Depth = 11.25in, Ends are Pin-Pin

Max Stress Ratio 0.223 : 1

Maximum Moment	-1.8 k-ft	Maximum Shear * 1.5	1.4 k
Allowable	7.9 k-ft	Allowable	8.9 k

Max. Positive Moment	1.33 k-ft	at	3.401 ft	Shear:	@ Left	0.79 k
Max. Negative Moment	-1.51 k-ft	at	8.330 ft		@ Right	1.18 k
Max @ Left Support	0.00 k-ft			Camber:	@ Left	0.000 in
Max @ Right Support	-1.76 k-ft				@ Center	0.039 in
Max. M allow	7.88				@ Right	0.002 in

fb	285.47 psi	fv	36.59 psi	Reactions...			
Fb	1,280.13 psi	Fv	226.10 psi	Left DL	0.79 k	Max	0.79 k
				Right DL	1.91 k	Max	1.93 k

Deflections

Center Span...	Dead Load	Total Load
Deflection	-0.026 in	-0.026 in
...Location	3.746 ft	3.746 ft
...Length/Defl	3,855.4	3,855.43

Camber (using 1.5 * D.L. Defl) ...

@ Center	0.039 in
@ Left	0.000 in
@ Right	0.002 in

Left Cantilever...	Dead Load	Total Load
Deflection	0.000 in	0.000 in
...Length/Defl	0.0	0.0
Right Cantilever...		
Deflection	-0.001 in	-0.015 in
...Length/Defl	75,849.3	6,607.8

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Title :
Dsgnr:
Description :
Scope :

Job #
Date:

General Timber Beam

Description 7614 SE Washington St Beam Supporting Shearwall 3a
7622 SE Washington St

Stress Calcs

Bending Analysis

Ck	27.106	Le	0.000 ft	Sxx	73.828 in3	Area	39.375 in2
Cf	1.100	Rb	0.000	Cl	0.000		

	Max Moment	Sxx Req'd	Allowable fb
@ Center	1.51 k-ft	14.19 in3	1,280.13 psi
@ Left Support	0.00 k-ft	0.00 in3	1,280.13 psi
@ Right Support	1.76 k-ft	16.46 in3	1,280.13 psi

Shear Analysis	@ Left Support	@ Right Support
Design Shear	0.85 k	1.44 k
Area Required	3.768 in2	6.372 in2
Fv: Allowable	226.10 psi	226.10 psi

Bearing @ Supports

Max. Left Reaction	0.79 k	Bearing Length Req'd	0.359 in
Max. Right Reaction	1.93 k	Bearing Length Req'd	0.884 in

Query Values

M, V, & D @ Specified Locations		Moment	Shear	Deflection
@ Center Span Location =	0.00 ft	0.00 k-ft	0.76 k	0.0000 in
@ Right Cant. Location =	0.00 ft	0.00 k-ft	0.76 k	0.0000 in
@ Left Cant. Location =	0.00 ft	0.00 k-ft	0.00 k	0.0000 in

7614 SE Washington St
18-05
7614 SE WASHINGTON

Anchor Bolt Pullout: Edge Bolts

(ACI 318-05, Appendix D) Normal Strength Concrete:

$\phi := 0.70$ for Tension design $f_c := 2500$ psi

Category 1, Condition A

REGISTERED PROFESSIONAL ENGINEER 19301 OREGON JULY 22, 1997 RICHARD D SILKETT

EXPIRES 6/30/18

Anchor Bolt Strength: (2)7/8" Anchor Bolt with 12" Embed, Edge distance = 2" min

Section D.5.1:

Single Anchor bolt (n) $n := 2$

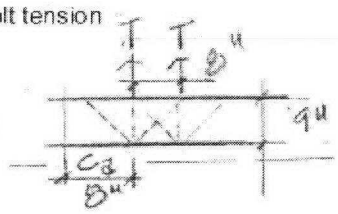
Cross sectional area of bolt (Ase) $Ase := 0.60$

Allowable tension stress of bolt (Futa) $Futa := 1.9 \cdot 36$ $Futa = 68.4$ < 125 OK

Nominal tension strengh of bolt (Nsa) $Nsa := n \cdot Ase \cdot Futa$

$Nsa = 82.08$ kips

Allowable tension strengh (ϕNsa) $\phi \cdot Nsa = 57.46$ kips Allowable Bolt tension



Concrete Strength: 7/8" Anchor Bolt with 9" Embed, Edge distance = 8" min

$Ca := 8$

Sectiion D.5.2.3 $hef := \frac{8}{1.5}$ $hef = 5.333$ inches (use for design)

Section D.5.2.1

$(Ca + 5 + 1.5hef)(2 \cdot 1.5hef)$

Projected concrete failure area (Anc) $Anc := (8 + 8 + 1.5 \cdot 5.33) \cdot (2 \cdot 1.5 \cdot 5.33)$ $Anc = 384$ $inches^2$

Projected concrete failure area at edge (Anco) $Anco := 9 \cdot 5.33^2$ $Anco = 256$ $inches^2$

Modification factor for edge anchors (ψed) $\psi ed := 0.7 + 0.3 \cdot \left(\frac{2}{1.5 \cdot 5.33}\right)$ $\psi ed = 0.775$

Max Allowed (Nb) (D-8) $Nb := \frac{16 \cdot \sqrt{f_c} \cdot 5.33^{1.5}}{1000}$ $Nb = 9.844$ kips N.A.

$hef < 11$

Single Anchor breakout strength (Nb) $Nb := \frac{24 \cdot \sqrt{f_c} \cdot 5.33^{1.5}}{1000}$

$Nb = 14.77$ kips < - - Use This!!

7614 SE Washington

Osterman Designs 18-05

04/06/18 Rich 6/8

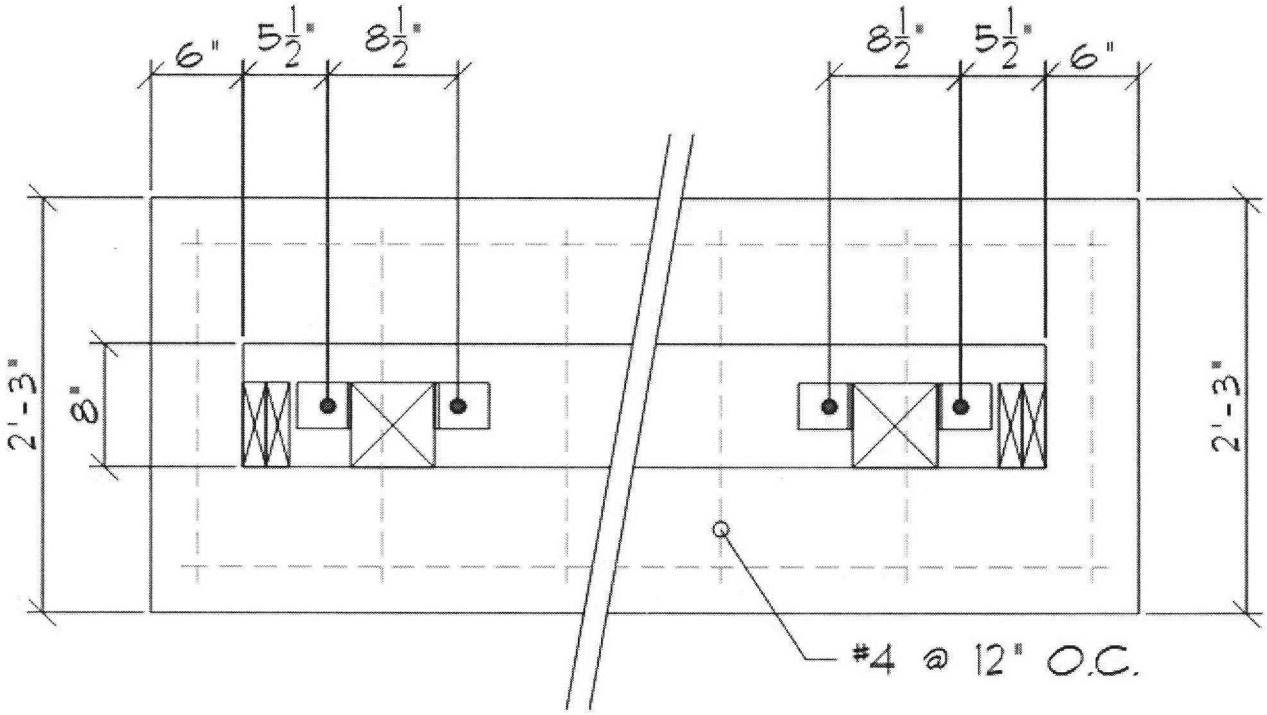
Single Anchor Allowable breakout strength (Ncb)

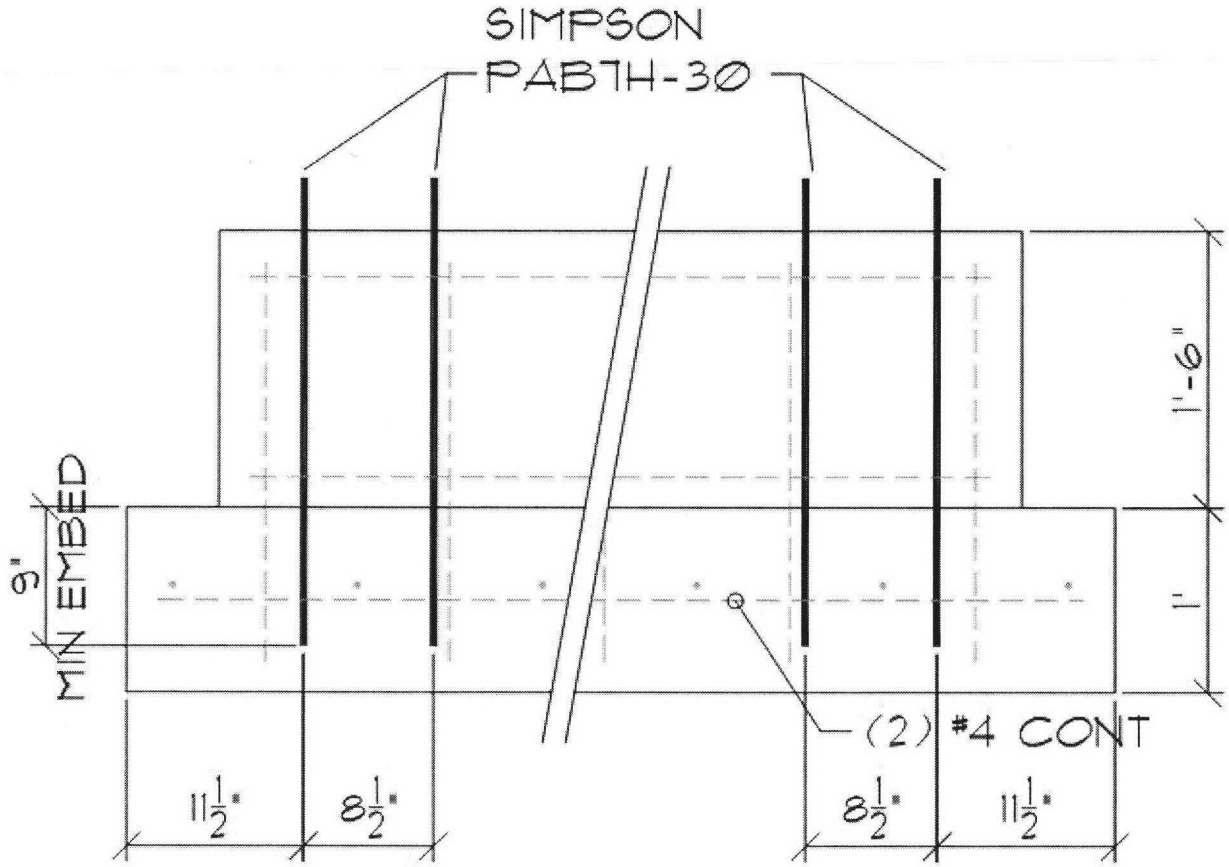
$$Ncb := \phi \cdot \frac{Anc}{Anco} \cdot \psi ed \cdot Nb$$

$Ncb = 12.02$ kips Allowable in Concrete W/9" embedment (Single Anchor)

$T := Ncb \cdot 2$

$T = 24.04$ kips Capacity **OK**





04/06/18 Rich

6/2

Project: Washington5

Location: Beam #7 end unit
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 12.0 FT (8 + 4)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 17.5%
Controlling Factor: Moment

Brian D'Agostine
Istockhouseplans

page 1 of

StruCalc Version 8.0.113.0 3/9/2018 10:55:33 AM

DEFLECTIONS

	Center		Right	
Live Load	0.06	IN L/1577	-0.10	IN 2L/986
Dead Load	0.03	in	0.00	in
Total Load	0.09	IN L/1117	-0.10	IN 2L/1004

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	1756 lb	2851 lb
Dead Load	1060 lb	2515 lb
Total Load	2816 lb	5366 lb
Bearing Length	1.29 in	2.45 in

BEAM DATA

	Center	Right
Span Length	8 ft	4 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	8 ft	4 ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

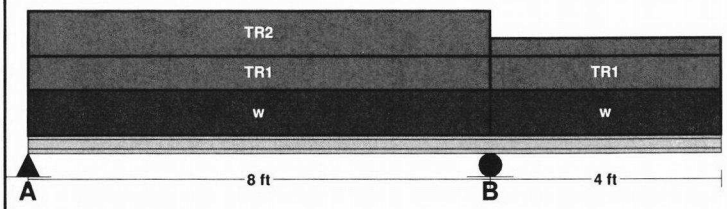
	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 990 psi
	Cd=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 5185 ft-lb
3.68 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -3520 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	62.84 in3	73.83 in3
Area (Shear):	29.33 in2	39.38 in2
Moment of Inertia (deflection):	151.7 in4	415.28 in4
Moment:	5185 ft-lb	6091 ft-lb
Shear:	-3520 lb	4725 lb

LOADING DIAGRAM



UNIFORM LOADS

	Center	Right
Uniform Live Load	0 plf	0 plf
Uniform Dead Load	100 plf	100 plf
Beam Self Weight	9 plf	9 plf
Total Uniform Load	109 plf	109 plf

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two
Left Live Load	169 plf	270 plf
Left Dead Load	115 plf	102 plf
Right Live Load	169 plf	270 plf
Right Dead Load	115 plf	102 plf
Load Start	0 ft	0 ft
Load End	8 ft	8 ft
Load Length	8 ft	8 ft

RIGHT SPAN

Load Number	One	Two
Left Live Load	169 plf	50 plf
Left Dead Load	115 plf	19 plf
Right Live Load	169 plf	50 plf
Right Dead Load	115 plf	19 plf
Load Start	0 ft	0 ft
Load End	4 ft	4 ft
Load Length	4 ft	4 ft

NOTES

SGN

17-180443/96/1978/500-PS

Project: Washington5

Location: Beam #9 end unit deck door
Multi-Span Roof Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 3.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 13.7%
Controlling Factor: Shear

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DEFLECTIONS

	Center	
Live Load	0.00	IN L/Infinity
Dead Load	0.01	in
Total Load	0.01	IN L/5110

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

REACTIONS

	A	B
Live Load	0 lb	0 lb
Dead Load	3740 lb	1951 lb
Total Load	3740 lb	1951 lb
Bearing Length	1.71 in	0.89 in

BEAM DATA

	Center
Span Length	3 ft
Unbraced Length-Top	2 ft
Unbraced Length-Bottom	3 ft
Roof Pitch	9 :12
Roof Duration Factor	1.15
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 888 psi
	Cd=0.90 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 162 psi
	Cd=0.90	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 3651 ft-lb
1.02 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 3740 lb
At left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	49.33 in3	73.83 in3
Area (Shear):	34.63 in2	39.38 in2
Moment of Inertia (deflection):	14.63 in4	415.28 in4
Moment:	3651 ft-lb	5465 ft-lb
Shear:	3740 lb	4253 lb

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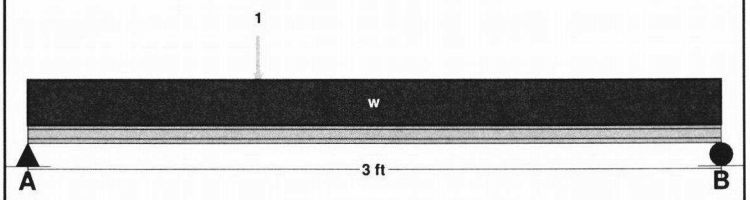

ROOF LOADING

		Center
Roof Live Load	RLL =	25 psf
Roof Dead Load	RDL =	17 psf
Roof Tributary Width Side One	TW1 =	0 ft
Roof Tributary Width Side Two	TW2 =	0 ft
Wall Load	WALL =	100 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	5366 lb
Location	1 ft

BEAM LOADING

	Center
Total Live Load	0 plf
Total Dead Load (Adjusted for Roof Pitch)	100 plf
Beam Self Weight	9 plf
Total Load	109 plf

NOTES

Project: Washington5

Location: Beam #10 garage header
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 9.25 IN x 8.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 95.0%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.06	IN L/1782
Dead Load	0.02	in
Total Load	0.08	IN L/1260

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	765 lb	765 lb
Dead Load	317 lb	317 lb
Total Load	1082 lb	1082 lb
Bearing Length	0.49 in	0.49 in

BEAM DATA

	Center
Span Length	8.5 ft
Unbraced Length-Top	1.33 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 1078 psi
	Cd=1.00 Cl=1.00 CF=1.20	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 2299 ft-lb
4.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -1082 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	25.59 in3	49.91 in3
Area (Shear):	9.01 in2	32.38 in2
Moment of Inertia (deflection):	46.63 in4	230.84 in4
Moment:	2299 ft-lb	4483 ft-lb
Shear:	-1082 lb	3885 lb

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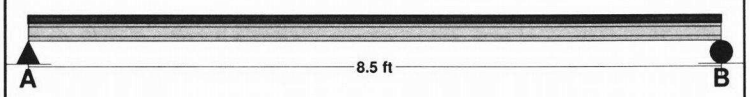

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	4.5 ft	0 ft
Wall Load	WALL =	0 plf	

BEAM LOADING

Beam Total Live Load:	wL =	180 plf
Beam Total Dead Load:	wD =	68 plf
Beam Self Weight:	BSW =	7 plf
Total Maximum Load:	wT =	255 plf

NOTES

Project: Washington5

Location: Beam #20 front carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
(2) 1.5 IN x 11.25 IN x 11.0 FT (9 + 2)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 2.8%
Controlling Factor: Moment

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CAUTIONS

* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS	Center		Right	
Live Load	0.00	IN L/Infinity	0.00	IN 2L/Infinity
Dead Load	-0.06	in	0.09	in
Total Load	-0.06	IN L/1734	0.09	IN 2L/546

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	0	lb	0	lb
Dead Load	-419	lb	2816	lb
Total Load	-419	lb	2816	lb
Uplift (1.5 F.S)	**-419**	**lb**	**0**	**lb**
Bearing Length	0.00	in	1.50	in

BEAM DATA	Center	Right
Span Length	9 ft	2 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	9 ft	2 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Bending Stress:	Fb =	900 psi	Fb' =	793 psi
	Cd=0.90 Cl=0.98 CF=1.00			
Shear Stress:	Fv =	180 psi	Fv' =	162 psi
	Cd=0.90			
Modulus of Elasticity:	E =	1600 ksi	E' =	1600 ksi
Min. Mod. of Elasticity:	E_min =	580 ksi	E_min' =	580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	625 psi	Fc - ⊥' =	625 psi

Controlling Moment: -4068 ft-lb
Over right support of span 2 (Center Span)
Created by dead loads only on all span(s).
Controlling Shear: 2331 lb
At left support of span 3 (Right Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	61.55 in3	63.28 in3
Area (Shear):	21.58 in2	33.75 in2
Moment of Inertia (deflection):	156.6 in4	355.96 in4
Moment:	-4068 ft-lb	4182 ft-lb
Shear:	2331 lb	3645 lb

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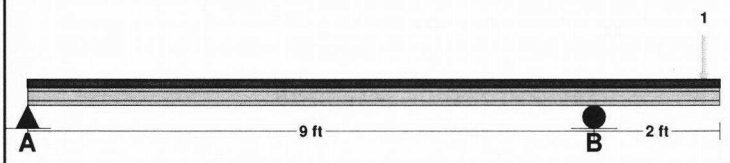

FLOOR LOADING		Center		Right	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width Side One	TW1 =	0	ft	0	ft
Floor Tributary Width Side Two	TW2 =	0	ft	0	ft
Wall Load	WALL =	0	plf	0	plf

POINT LOADS - RIGHT SPAN	
Load Number	One
Live Load	0 lb
Dead Load	2316 lb
Location	1.75 ft

BEAM LOADING	Center		Right	
Reduced Floor Live Load	40	psf	40	psf
Total Live Load	0	plf	0	plf
Total Dead Load	0	plf	0	plf
Beam Self Weight	7	plf	7	plf
Total Load	7	plf	7	plf

NOTES

Project: Washington5

Location: Beam #23 over front porch
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 8.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 132.7%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.02	IN L/4327
Dead Load	0.02	in
Total Load	0.04	IN L/2137

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	640 lb	640 lb
Dead Load	709 lb	453 lb
Total Load	1349 lb	1093 lb
Bearing Length	0.62 in	0.50 in

BEAM DATA

	Center
Span Length	8 ft
Unbraced Length-Top	1.33 ft
Unbraced Length-Bottom	8 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 988 psi
	Cd=1.00 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 2612 ft-lb
3.2 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 1349 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	31.73 in3	73.83 in3
Area (Shear):	11.24 in2	39.38 in2
Moment of Inertia (deflection):	46.63 in4	415.28 in4
Moment:	2612 ft-lb	6077 ft-lb
Shear:	1349 lb	4725 lb

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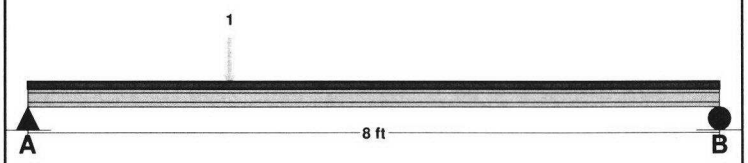

FLOOR LOADING

		Center
Floor Live Load	FLL =	40 psf
Floor Dead Load	FDL =	15 psf
Floor Tributary Width Side One	TW1 =	2 ft
Floor Tributary Width Side Two	TW2 =	2 ft
Wall Load	WALL =	0 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	613 lb
Location	2.33 ft

BEAM LOADING

	Center
Reduced Floor Live Load	40 psf
Total Live Load	160 plf
Total Dead Load	60 plf
Beam Self Weight	9 plf
Total Load	229 plf

NOTES

Project: Washington5

Location: Roof Rafter 1
Roof Rafter
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 11.2 FT (11 + 0.2) @ 24 O.C.
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 124.4%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	0.09	IN L/1826	0.00	IN 2L/MAX
Dead Load	0.08	in	0.00	in
Total Load	0.17	IN L/987	0.00	IN 2L/Infinity

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

RAFTER REACTIONS

	LOADS	REACTIONS
Upper Live Load @ A	138 plf	275 lb
Upper Dead Load @ A	117 plf	234 lb
Upper Total Load @ A	254 plf	509 lb
Lower Live Load @ B	143 plf	285 lb
Lower Dead Load @ B	121 plf	242 lb
Lower Total Load @ B	264 plf	527 lb

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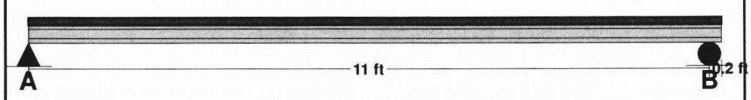

RAFTER SUPPORT DATA

	A	B
Bearing Length	0.54 in	0.56 in

RAFTER DATA

	Interior	Eave
Span Length	11 ft	0.2 ft
Rafter Pitch	9 :12	

Roof sheathing applied to top of joists-top of rafters fully braced.

Roof Duration Factor	1.15
Peak Notch Depth	0.00
Base Notch Depth	0.00

RAFTER LOADING

Uniform Roof Loading

Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	17	psf

Slope Adjusted Spans And Loads

Interior Span:	L-adj =	13.75	ft
Eave Span:	L-Eave-adj =	0.25	ft
Rafter Live Load:	wL-adj =	32	plf
Eave Live Load:	wL-Eave-adj =	32	plf
Rafter Dead Load:	wD-adj =	27	plf
Rafter Total Load:	wT-adj =	59	plf
Eave Total Load:	wT-Eave-adj =	59	plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 1190 psi
	Cd=1.15 CF=1.00 Cr=1.15	
Shear Stress:	Fv = 180 psi	Fv' = 207 psi
	Cd=1.15	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 1399 ft-lb
5.504 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -407 lb
11.2 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	14.1 in3	31.64 in3
Area (Shear):	2.95 in2	16.88 in2
Moment of Inertia (deflection):	32.45 in4	177.98 in4
Moment:	1399 ft-lb	3138 ft-lb
Shear:	-407 lb	2329 lb

NOTES

Project: Washington5

Location: Front porch column
Column
[2009 International Building Code(2005 NDS)]
3.5 IN x 5.5 IN x 8.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 9.4%

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VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	0	lb
Dead Load:	Vert-DL-Rxn =	13533	lb
Total Load:	Vert-TL-Rxn =	13533	lb

COLUMN DATA

Total Column Length:	8	ft
Unbraced Length (X-Axis) Lx:	8	ft
Unbraced Length (Y-Axis) Ly:	8	ft
Column End Condtion-K (e):	0.8	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values			Adjusted		
Compressive Stress:	Fc =	1350	psi	Fc' =	776	psi
	Cd=0.90 Cf=1.10 Cp=0.58					
Bending Stress (X-X Axis):	Fbx =	900	psi	Fbx' =	1053	psi
	Cd=0.90 CF=1.30					
Bending Stress (Y-Y Axis):	Fby =	900	psi	Fby' =	1053	psi
	Cd=0.90 CF=1.30					
Modulus of Elasticity:	E =	1600	ksi	E' =	1600	ksi
Min. Mod. of Elasticity:	E_min =	580	ksi	E_min' =	580	ksi

Column Section (X-X Axis):	dx =	5.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	19.25	in2
Section Modulus (X-X Axis):	Sx =	17.65	in3
Section Modulus (Y-Y Axis):	Sy =	11.23	in3
Slenderness Ratio:	Lex/dx =	13.96	
	Ley/dy =	21.94	

Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Dead Load Only (D)

Actual Compressive Stress:	Fc =	703	psi
Allowable Compressive Stress:	Fc' =	776	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	1053	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	1053	psi
Combined Stress Factor:	**CSF =**	**0.91**	

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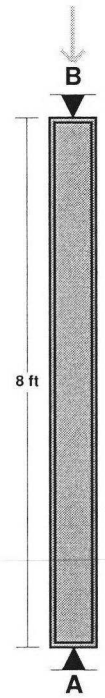

AXIAL LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	13500	lb
Column Self Weight:	CSW =	33	lb
Total Load:	PT =	13533	lb

NOTES

Project: Washington5

Location: Footing C
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 2.67 FT x 2.67 FT x 12.00 IN
Reinforcement: #4 Bars @ 8.00 IN. O.C. E/W / (4) min.
Section Footing Design Adequate

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FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Width:	W =	2.67	ft
Length:	L =	2.67	ft
Depth:	Depth =	12	in
Effective Depth to Top Layer of Steel:	d =	8.25	in

COLUMN AND BASEPLATE SIZE

Column Type:	Wood		
Column Width:	m =	3.5	in
Column Depth:	n =	5.5	in

FOOTING CALCULATIONS

Bearing Calculations:			
Ultimate Bearing Pressure:	Qu =	1331	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1350	psf
Required Footing Area:	Areq =	7.03	sf
Area Provided:	A =	7.13	sf
Baseplate Bearing:			
Bearing Required:	Bear =	13286	lb
Allowable Bearing:	Bear-A =	53178	lb
Beam Shear Calculations (One Way Shear):			
Beam Shear:	Vu1 =	3222	lb
Allowable Beam Shear:	Vc1 =	19825	lb
Punching Shear Calculations (Two Way Shear):			
Critical Perimeter:	Bo =	51	in
Punching Shear:	Vu2 =	11195	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	71719	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	133650	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	63113	lb
Controlling Allowable Punching Shear:	vc2 =	63113	lb
Bending Calculations:			
Factored Moment:	Mu =	53210	in-lb
Nominal Moment Strength:	Mn =	226628	in-lb
Reinforcement Calculations:			
Concrete Compressive Block Depth:	a =	0.46	in
Steel Required Based on Moment:	As(1) =	0.18	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.77	in2
Controlling Reinforcing Steel:	As-reqd =	0.77	in2
Selected Reinforcement:	#4's @ 8.0 in. o.c. e/w (4) Min.		
Reinforcement Area Provided:	As =	0.79	in2
Development Length Calculations:			
Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	13.02	in

Note: Plain concrete adequate for bending,
therefore adequate development length not required.

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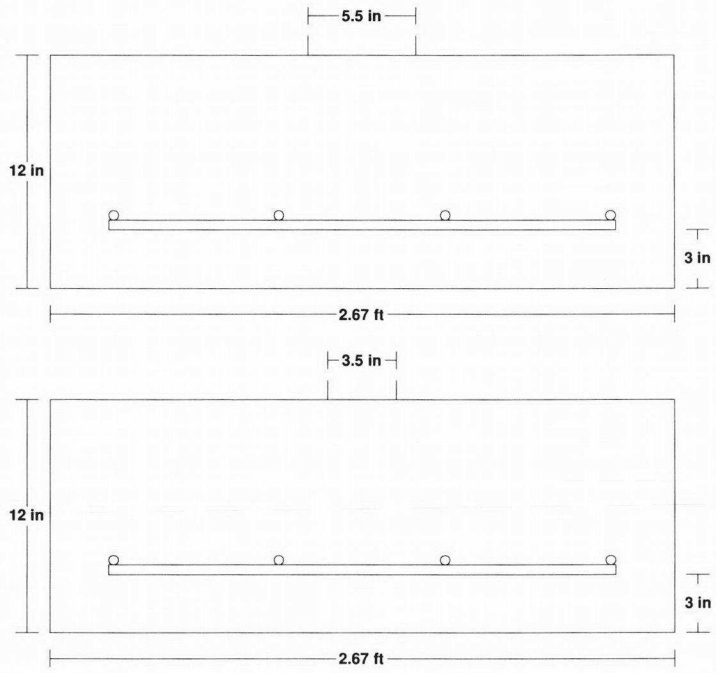

FOOTING LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	9490	lb
Total Load:	PT =	9490	lb
Ultimate Factored Load:	Pu =	13286	lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. =	689	lb

NOTES

Project: Washington5

Location: Front porch column
Column
[2009 International Building Code(2005 NDS)]
3.5 IN x 3.5 IN x 7.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 7.3%

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VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	0	lb
Dead Load:	Vert-DL-Rxn =	9723	lb
Total Load:	Vert-TL-Rxn =	9723	lb

COLUMN DATA

Total Column Length:	7.5	ft
Unbraced Length (X-Axis) Lx:	7.5	ft
Unbraced Length (Y-Axis) Ly:	7.5	ft
Column End Condtion-K (e):	0.8	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Compressive Stress:	Fc = 1350 psi		Fc' = 856 psi	
	Cd=0.90 Cf=1.15 Cp=0.61			
Bending Stress (X-X Axis):	Fbx = 900 psi		Fbx' = 1215 psi	
	Cd=0.90 CF=1.50			
Bending Stress (Y-Y Axis):	Fby = 900 psi		Fby' = 1215 psi	
	Cd=0.90 CF=1.50			
Modulus of Elasticity:	E = 1600 ksi		E' = 1600 ksi	
Min. Mod. of Elasticity:	E_min = 580 ksi		E_min' = 580 ksi	

Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	12.25	in2
Section Modulus (X-X Axis):	Sx =	7.15	in3
Section Modulus (Y-Y Axis):	Sy =	7.15	in3
Slenderness Ratio:	Lex/dx =	20.57	
	Ley/dy =	20.57	

Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Dead Load Only (D)

Actual Compressive Stress:	Fc =	794	psi
Allowable Compressive Stress:	Fc' =	856	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	1215	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	1215	psi
Combined Stress Factor:	**CSF =**	**0.93**	

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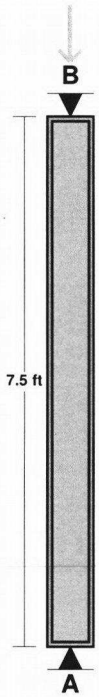

AXIAL LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	9703	lb
Column Self Weight:	CSW =	20	lb
Total Load:	PT =	9723	lb

NOTES

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Project: Washington5

Location: Beam #7 end unit
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 12.0 FT (8 + 4)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 17.5%
Controlling Factor: Moment

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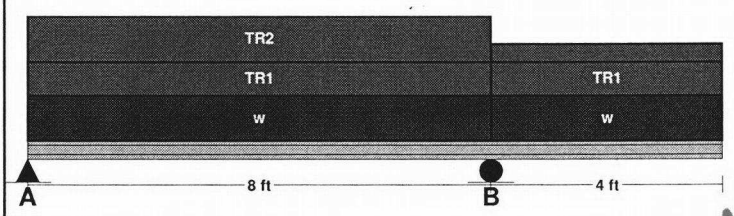

DEFLECTIONS	Center		Right	
Live Load	0.06	IN L/1577	-0.10	IN 2L/986
Dead Load	0.03	in	0.00	in
Total Load	0.09	IN L/1117	-0.10	IN 2L/1004

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	1756 lb	2851 lb
Dead Load	1060 lb	2515 lb
Total Load	2816 lb	5366 lb
Bearing Length	1.29 in	2.45 in

BEAM DATA	Center	Right
Span Length	8 ft	4 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	8 ft	4 ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

UNIFORM LOADS	Center	Right
Uniform Live Load	0 plf	0 plf
Uniform Dead Load	100 plf	100 plf
Beam Self Weight	9 plf	9 plf
Total Uniform Load	109 plf	109 plf

MATERIAL PROPERTIES
#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 990 psi
	Cd=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two
Left Live Load	169 plf	270 plf
Left Dead Load	115 plf	102 plf
Right Live Load	169 plf	270 plf
Right Dead Load	115 plf	102 plf
Load Start	0 ft	0 ft
Load End	8 ft	8 ft
Load Length	8 ft	8 ft

RIGHT SPAN

Load Number	One	Two
Left Live Load	169 plf	50 plf
Left Dead Load	115 plf	19 plf
Right Live Load	169 plf	50 plf
Right Dead Load	115 plf	19 plf
Load Start	0 ft	0 ft
Load End	4 ft	4 ft
Load Length	4 ft	4 ft

Controlling Moment: 5185 ft-lb
3.68 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -3520 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	62.84 in3	73.83 in3
Area (Shear):	29.33 in2	39.38 in2
Moment of Inertia (deflection):	151.7 in4	415.28 in4
Moment:	5185 ft-lb	6091 ft-lb
Shear:	-3520 lb	4725 lb

NOTES

17-7588 5/4/1 53/57/58-RS

SCAN

Project: Washington5

Location: Beam #9 end unit deck door
Multi-Span Roof Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 3.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 13.7%
Controlling Factor: Shear

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DEFLECTIONS

	Center	
Live Load	0.00	IN L/Infinity
Dead Load	0.01	in
Total Load	0.01	IN L/5110

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

REACTIONS

	A	B
Live Load	0 lb	0 lb
Dead Load	3740 lb	1951 lb
Total Load	3740 lb	1951 lb
Bearing Length	1.71 in	0.89 in

BEAM DATA

	Center
Span Length	3 ft
Unbraced Length-Top	2 ft
Unbraced Length-Bottom	3 ft
Roof Pitch	9 :12
Roof Duration Factor	1.15
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 888 psi
	Cd=0.90 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 162 psi
	Cd=0.90	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 3651 ft-lb
1.02 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 3740 lb
At left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	49.33 in3	73.83 in3
Area (Shear):	34.63 in2	39.38 in2
Moment of Inertia (deflection):	14.63 in4	415.28 in4
Moment:	3651 ft-lb	5465 ft-lb
Shear:	3740 lb	4253 lb

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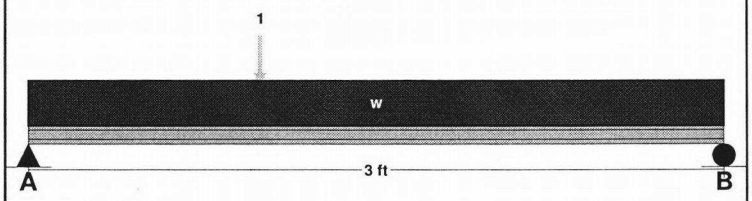

ROOF LOADING

		Center
Roof Live Load	RLL =	25 psf
Roof Dead Load	RDL =	17 psf
Roof Tributary Width Side One	TW1 =	0 ft
Roof Tributary Width Side Two	TW2 =	0 ft
Wall Load	WALL =	100 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	5366 lb
Location	1 ft

BEAM LOADING

	Center
Total Live Load	0 plf
Total Dead Load (Adjusted for Roof Pitch)	100 plf
Beam Self Weight	9 plf
Total Load	109 plf

NOTES

Project: Washington5

Location: Beam #10 garage header
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 9.25 IN x 8.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 95.0%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.06	IN L/1782
Dead Load	0.02	in
Total Load	0.08	IN L/1260

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	765 lb	765 lb
Dead Load	317 lb	317 lb
Total Load	1082 lb	1082 lb
Bearing Length	0.49 in	0.49 in

BEAM DATA

	Center
Span Length	8.5 ft
Unbraced Length-Top	1.33 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 1078 psi
	Cd=1.00 Cl=1.00 CF=1.20	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 2299 ft-lb
4.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -1082 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	25.59 in3	49.91 in3
Area (Shear):	9.01 in2	32.38 in2
Moment of Inertia (deflection):	46.63 in4	230.84 in4
Moment:	2299 ft-lb	4483 ft-lb
Shear:	-1082 lb	3885 lb

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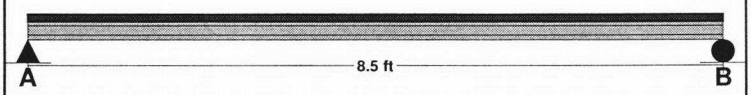

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	4.5 ft	0 ft
Wall Load	WALL =	0 plf	

BEAM LOADING

Beam Total Live Load:	wL =	180 plf
Beam Total Dead Load:	wD =	68 plf
Beam Self Weight:	BSW =	7 plf
Total Maximum Load:	wT =	255 plf

NOTES

Project: Washington5

Location: Beam #20 front carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
(2) 1.5 IN x 11.25 IN x 11.0 FT (9 + 2)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 2.8%
Controlling Factor: Moment

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CAUTIONS

* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS	Center		Right	
Live Load	0.00	IN L/Infinity	0.00	IN 2L/Infinity
Dead Load	-0.06	in	0.09	in
Total Load	-0.06	IN L/1734	0.09	IN 2L/546

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	0 lb	0 lb
Dead Load	-419 lb	2816 lb
Total Load	-419 lb	2816 lb
Uplift (1.5 F.S)	**-419 lb**	**0 lb**
Bearing Length	0.00 in	1.50 in

BEAM DATA	Center	Right
Span Length	9 ft	2 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	9 ft	2 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 793 psi
	Cd=0.90 Cl=0.98 CF=1.00	
Shear Stress:	Fv = 180 psi	Fv' = 162 psi
	Cd=0.90	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: -4068 ft-lb
Over right support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 2331 lb
At left support of span 3 (Right Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	61.55 in3	63.28 in3
Area (Shear):	21.58 in2	33.75 in2
Moment of Inertia (deflection):	156.6 in4	355.96 in4
Moment:	-4068 ft-lb	4182 ft-lb
Shear:	2331 lb	3645 lb

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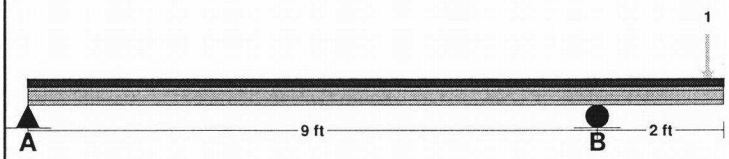

FLOOR LOADING		Center	Right
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width Side One	TW1 =	0 ft	0 ft
Floor Tributary Width Side Two	TW2 =	0 ft	0 ft
Wall Load	WALL =	0 plf	0 plf

POINT LOADS - RIGHT SPAN	
Load Number	One
Live Load	0 lb
Dead Load	2316 lb
Location	1.75 ft

BEAM LOADING	Center	Right
Reduced Floor Live Load	40 psf	40 psf
Total Live Load	0 plf	0 plf
Total Dead Load	0 plf	0 plf
Beam Self Weight	7 plf	7 plf
Total Load	7 plf	7 plf

NOTES

Project: Washington5

Location: Beam #23 over front porch
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 8.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 132.7%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.02	IN L/4327
Dead Load	0.02	in
Total Load	0.04	IN L/2137

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	640	lb	640	lb
Dead Load	709	lb	453	lb
Total Load	1349	lb	1093	lb
Bearing Length	0.62	in	0.50	in

BEAM DATA

	Center	
Span Length	8	ft
Unbraced Length-Top	1.33	ft
Unbraced Length-Bottom	8	ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Bending Stress:	Fb = 900 psi		Fb' = 988 psi	
	Cd=1.00 Cl=1.00 CF=1.10			
Shear Stress:	Fv = 180 psi		Fv' = 180 psi	
	Cd=1.00			
Modulus of Elasticity:	E = 1600 ksi		E' = 1600 ksi	
Min. Mod. of Elasticity:	E_min = 580 ksi		E_min' = 580 ksi	
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi		Fc - ⊥' = 625 psi	

Controlling Moment: 2612 ft-lb
3.2 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 1349 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	31.73 in3	73.83 in3
Area (Shear):	11.24 in2	39.38 in2
Moment of Inertia (deflection):	46.63 in4	415.28 in4
Moment:	2612 ft-lb	6077 ft-lb
Shear:	1349 lb	4725 lb

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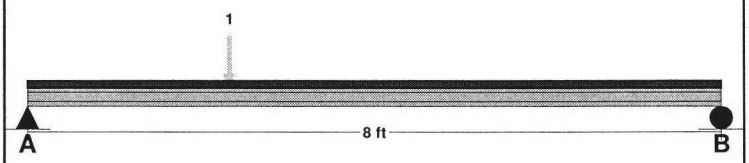

FLOOR LOADING

		Center	
Floor Live Load	FLL =	40	psf
Floor Dead Load	FDL =	15	psf
Floor Tributary Width Side One	TW1 =	2	ft
Floor Tributary Width Side Two	TW2 =	2	ft
Wall Load	WALL =	0	plf

POINT LOADS - CENTER SPAN

Load Number	One	
Live Load	0	lb
Dead Load	613	lb
Location	2.33	ft

BEAM LOADING

	Center	
Reduced Floor Live Load	40	psf
Total Live Load	160	plf
Total Dead Load	60	plf
Beam Self Weight	9	plf
Total Load	229	plf

NOTES

Project: Washington5

Location: Roof Rafter 1
Roof Rafter
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 11.2 FT (11 + 0.2) @ 24 O.C.
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 124.4%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	0.09	IN L/1826	0.00	IN 2L/MAX
Dead Load	0.08	in	0.00	in
Total Load	0.17	IN L/987	0.00	IN 2L/Infinity

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

RAFTER REACTIONS

	LOADS	REACTIONS
Upper Live Load @ A	138 plf	275 lb
Upper Dead Load @ A	117 plf	234 lb
Upper Total Load @ A	254 plf	509 lb
Lower Live Load @ B	143 plf	285 lb
Lower Dead Load @ B	121 plf	242 lb
Lower Total Load @ B	264 plf	527 lb

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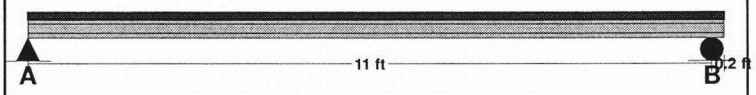

RAFTER SUPPORT DATA

	A	B
Bearing Length	0.54 in	0.56 in

RAFTER DATA

	Interior	Eave
Span Length	11 ft	0.2 ft
Rafter Pitch	9 :12	

Roof sheathing applied to top of joists-top of rafters fully braced.

Roof Duration Factor	1.15
Peak Notch Depth	0.00
Base Notch Depth	0.00

RAFTER LOADING

Uniform Roof Loading

Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	17	psf

Slope Adjusted Spans And Loads

Interior Span:	L-adj =	13.75	ft
Eave Span:	L-Eave-adj =	0.25	ft
Rafter Live Load:	wL-adj =	32	plf
Eave Live Load:	wL-Eave-adj =	32	plf
Rafter Dead Load:	wD-adj =	27	plf
Rafter Total Load:	wT-adj =	59	plf
Eave Total Load:	wT-Eave-adj =	59	plf

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Bending Stress:	Fb =	900 psi	Fb' =	1190 psi
	Cd=1.15 CF=1.00 Cr=1.15			
Shear Stress:	Fv =	180 psi	Fv' =	207 psi
	Cd=1.15			
Modulus of Elasticity:	E =	1600 ksi	E' =	1600 ksi
Min. Mod. of Elasticity:	E_min =	580 ksi	E_min' =	580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	625 psi	Fc - ⊥' =	625 psi

Controlling Moment: 1399 ft-lb
5.504 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -407 lb
11.2 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	14.1 in3	31.64 in3
Area (Shear):	2.95 in2	16.88 in2
Moment of Inertia (deflection):	32.45 in4	177.98 in4
Moment:	1399 ft-lb	3138 ft-lb
Shear:	-407 lb	2329 lb

NOTES

Project: Washington5

Location: Front porch column
Column
[2009 International Building Code(2005 NDS)]
3.5 IN x 5.5 IN x 8.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 9.4%

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VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	0	lb
Dead Load:	Vert-DL-Rxn =	13533	lb
Total Load:	Vert-TL-Rxn =	13533	lb

COLUMN DATA

Total Column Length:	8	ft
Unbraced Length (X-Axis) Lx:	8	ft
Unbraced Length (Y-Axis) Ly:	8	ft
Column End Condtion-K (e):	0.8	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Compressive Stress:	Fc = 1350	psi	Fc' = 776	psi
	Cd=0.90 Cf=1.10 Cp=0.58			
Bending Stress (X-X Axis):	Fbx = 900	psi	Fbx' = 1053	psi
	Cd=0.90 CF=1.30			
Bending Stress (Y-Y Axis):	Fby = 900	psi	Fby' = 1053	psi
	Cd=0.90 CF=1.30			
Modulus of Elasticity:	E = 1600	ksi	E' = 1600	ksi
Min. Mod. of Elasticity:	E_min = 580	ksi	E_min' = 580	ksi

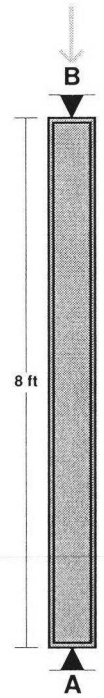
Column Section (X-X Axis):	dx =	5.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	19.25	in2
Section Modulus (X-X Axis):	Sx =	17.65	in3
Section Modulus (Y-Y Axis):	Sy =	11.23	in3
Slenderness Ratio:	Lex/dx =	13.96	
	Ley/dy =	21.94	

Column Calculations (Controlling Case Only):

Controlling Load Case: Axial Dead Load Only (D)

Actual Compressive Stress:	Fc =	703	psi
Allowable Compressive Stress:	Fc' =	776	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	1053	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	1053	psi
Combined Stress Factor:	**CSF =**	**0.91**	

LOADING DIAGRAM



AXIAL LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	13500	lb
Column Self Weight:	CSW =	33	lb
Total Load:	PT =	13533	lb

NOTES

Project: Washington5

Location: Footing C
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 2.67 FT x 2.67 FT x 12.00 IN
Reinforcement: #4 Bars @ 8.00 IN. O.C. E/W / (4) min.
Section Footing Design Adequate

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FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Width:	W =	2.67	ft
Length:	L =	2.67	ft
Depth:	Depth =	12	in
Effective Depth to Top Layer of Steel:	d =	8.25	in

COLUMN AND BASEPLATE SIZE

Column Type:	Wood		
Column Width:	m =	3.5	in
Column Depth:	n =	5.5	in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	1331	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1350	psf
Required Footing Area:	Areq =	7.03	sf
Area Provided:	A =	7.13	sf

Baseplate Bearing:

Bearing Required:	Bear =	13286	lb
Allowable Bearing:	Bear-A =	53178	lb

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	3222	lb
Allowable Beam Shear:	Vc1 =	19825	lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter:	Bo =	51	in
Punching Shear:	Vu2 =	11195	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	71719	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	133650	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	63113	lb
Controlling Allowable Punching Shear:	vc2 =	63113	lb

Bending Calculations:

Factored Moment:	Mu =	53210	in-lb
Nominal Moment Strength:	Mn =	226628	in-lb

Reinforcement Calculations:

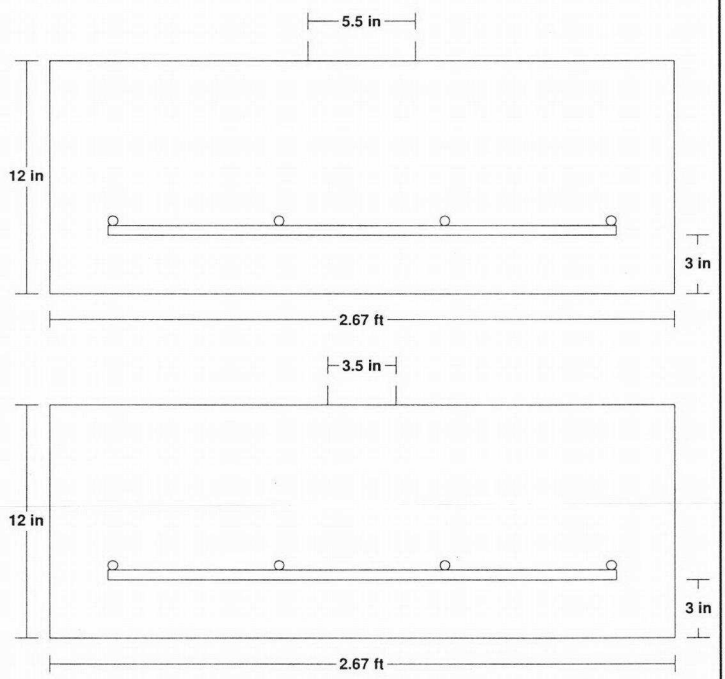
Concrete Compressive Block Depth:	a =	0.46	in
Steel Required Based on Moment:	As(1) =	0.18	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.77	in2
Controlling Reinforcing Steel:	As-reqd =	0.77	in2
Selected Reinforcement:	#4's @ 8.0 in. o.c. e/w (4) Min.		
Reinforcement Area Provided:	As =	0.79	in2

Development Length Calculations:

Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	13.02	in

Note: Plain concrete adequate for bending,
therefore adequate development length not required.

LOADING DIAGRAM



FOOTING LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	9490	lb
Total Load:	PT =	9490	lb
Ultimate Factored Load:	Pu =	13286	lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. =	689	lb

NOTES

Project: Washington5

Location: Front porch column
Column
[2009 International Building Code(2005 NDS)]
3.5 IN x 3.5 IN x 7.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 7.3%

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VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	0	lb
Dead Load:	Vert-DL-Rxn =	9723	lb
Total Load:	Vert-TL-Rxn =	9723	lb

COLUMN DATA

Total Column Length:	7.5	ft
Unbraced Length (X-Axis) Lx:	7.5	ft
Unbraced Length (Y-Axis) Ly:	7.5	ft
Column End Condtion-K (e):	0.8	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES
#2 - Douglas-Fir-Larch

	Base Values			Adjusted	
Compressive Stress:	Fc =	1350	psi	Fc' =	856 psi
	Cd=0.90 Cf=1.15 Cp=0.61				
Bending Stress (X-X Axis):	Fbx =	900	psi	Fbx' =	1215 psi
	Cd=0.90 CF=1.50				
Bending Stress (Y-Y Axis):	Fby =	900	psi	Fby' =	1215 psi
	Cd=0.90 CF=1.50				
Modulus of Elasticity:	E =	1600	ksi	E' =	1600 ksi
Min. Mod. of Elasticity:	E_min =	580	ksi	E_min' =	580 ksi

Column Section (X-X Axis):	dx =	3.5	in
Column Section (Y-Y Axis):	dy =	3.5	in
Area:	A =	12.25	in2
Section Modulus (X-X Axis):	Sx =	7.15	in3
Section Modulus (Y-Y Axis):	Sy =	7.15	in3
Slenderness Ratio:	Lex/dx =	20.57	
	Ley/dy =	20.57	

Column Calculations (Controlling Case Only):
Controlling Load Case: Axial Dead Load Only (D)

Actual Compressive Stress:	Fc =	794	psi
Allowable Compressive Stress:	Fc' =	856	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	1215	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	1215	psi
Combined Stress Factor:	**CSF =**	**0.93**	

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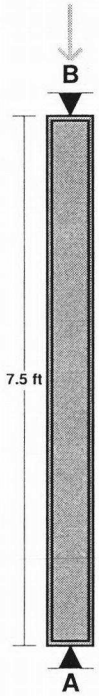

AXIAL LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	9703	lb
Column Self Weight:	CSW =	20	lb
Total Load:	PT =	9723	lb

NOTES

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Project: Washington5

Location: Upper floor rear carrier joists
Floor Joist
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 8.5 FT @ 16 O.C.
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 69.3%
Controlling Factor: Shear

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DEFLECTIONS Center

Live Load	0.04	IN L/2797
Dead Load	0.02	in
Total Load	0.06	IN L/1774

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

	A	B
Live Load	289 lb	697 lb
Dead Load	140 lb	499 lb
Total Load	430 lb	1196 lb
Bearing Length	0.46 in	1.28 in

BEAM DATA Center

Span Length	8.5 ft
Unbraced Length-Top	0 ft
Unbraced Length-Bottom	0 ft

Floor sheathing applied to top of joists-top of joists fully braced.
Floor Duration Factor 1.00

MATERIAL PROPERTIES
#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 1035 psi
	Cd=1.00 CF=1.00 Cr=1.15	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 1258 ft-lb
5.86 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Shear: -1196 lb
8.0 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	14.59 in3	31.64 in3
Area (Shear):	9.97 in2	16.88 in2
Moment of Inertia (deflection):	36.11 in4	177.98 in4
Moment:	1258 ft-lb	2729 ft-lb
Shear:	-1196 lb	2025 lb

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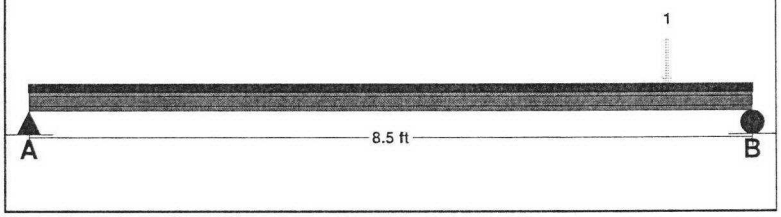

JOIST LOADING

Uniform Floor Loading		Center	
Live Load	LL =	40	psf
Dead Load	DL =	15	psf
Total Load	TL =	55	psf
TL Adj. For Joist Spacing	wT =	73.3	plf
Wall Loading			
Wall One			
Live Load (⊥ to Joists):	L1 =	400	plf
Dead Load (⊥ to Joists)	D1 =	352	plf
Load Location	X1 =	7.5	ft

NOTES

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SCAN

Project: Washington5

Location: Main floor front cantilever joists
Floor Joist
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 11.0 FT (9 + 2) @ 16 O.C.
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 27.4%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	-0.03	IN L/3398	0.04	IN 2L/1076
Dead Load	-0.03	in	0.04	in
Total Load	-0.06	IN L/1878	0.09	IN 2L/548

Live Load Deflection Criteria: L/480 Total Load Deflection Criteria: L/360

REACTIONS

	A	B
Live Load	240 lb	909 lb
Dead Load	-36 lb	803 lb
Total Load	204 lb	1712 lb
Uplift (1.5 F.S)	**-148 lb**	**0 lb**
Bearing Length	0.22 in	1.83 in

BEAM DATA

	Center	Right
Span Length	9 ft	2 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	0 ft	0 ft

Floor sheathing applied to top of joists-top of joists fully braced.
Sheathing/sheetrock applied to bottom of joists-bottom of joists fully braced.
Floor Duration Factor 1.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 1035 psi
	Cd=1.00 CF=1.00 Cr=1.15	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: -2141 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Controlling Shear: 1144 lb
At left support of span 3 (Right Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	24.83 in3	31.64 in3
Area (Shear):	9.53 in2	16.88 in2
Moment of Inertia (deflection):	116.96 in4	177.98 in4
Moment:	-2141 ft-lb	2729 ft-lb
Shear:	1144 lb	2025 lb

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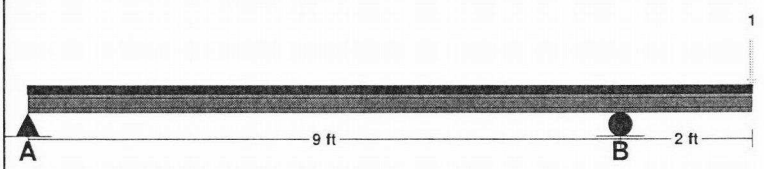

JOIST LOADING

Uniform Floor Loading		Center		Right	
Live Load	LL =	40	psf	40	psf
Dead Load	DL =	15	psf	15	psf
Total Load	TL =	55	psf	55	psf
TL Adj. For Joist Spacing	wT =	73.3	plf	73.3	plf
Wall Loading					
Wall One					
Live Load (⊥ to Joists):	L1 =	0	plf	338	plf
Dead Load (⊥ to Joists)	D1 =	0	plf	410	plf
Load Location	X1 =	0	ft	2	ft

NOTES

Project: Washington5

Location: Beam #1 upper floor
Roof Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 6.0 IN x 6.5 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 27.9%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.15	IN L/534
Dead Load	0.11	in
Total Load	0.25	IN L/309

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1341	lb	1341	lb
Dead Load	976	lb	976	lb
Total Load	2316	lb	2316	lb
Bearing Length	1.02	in	1.02	in

BEAM DATA

Span Length	6.5	ft
Unbraced Length-Top	2	ft
Unbraced Length-Bottom	0	ft
Roof Pitch	4	:12
Roof Duration Factor	1.15	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values			Adjusted		
Bending Stress:	Fb =	2400	psi	*Controlled by:*		
	Fb_cmpr =	1850	psi	Fb' =	2751	psi
	Cd=1.15 Cl=1.00					
Shear Stress:	Fv =	265	psi	Fv' =	305	psi
	Cd=1.15					
Modulus of Elasticity:	E =	1800	ksi	E' =	1800	ksi
Min. Mod. of Elasticity:	E_min =	930	ksi	E_min' =	930	ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650	psi	Fc - ⊥' =	650	psi

Controlling Moment: 3764 ft-lb
3.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -2316 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	16.42 in3	21 in3
Area (Shear):	11.4 in2	21 in2
Moment of Inertia (deflection):	48.93 in4	63 in4
Moment:	3764 ft-lb	4815 ft-lb
Shear:	-2316 lb	4267 lb

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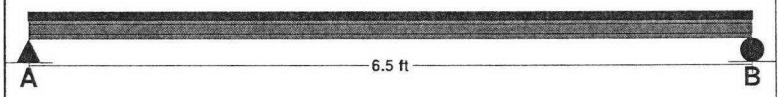

ROOF LOADING

Side One:

Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	17	psf
Tributary Width:	TW =	15.5	ft

Side Two:

Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	17	psf
Tributary Width:	TW =	1	ft
Wall Load:	WALL =	0	plf

SLOPE/PITCH ADJUSTED LENGTHS AND LOADS

Adjusted Beam Length:	Ladj =	6.5	ft
Beam Self Weight:	BSW =	5	plf
Beam Uniform Live Load:	wL =	413	plf
Beam Uniform Dead Load:	wD_adj =	300	plf
Total Uniform Load:	wT =	713	plf

NOTES

Project: Washington5

Location: Beam #2 kitchen header
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 4.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 183.5%
Controlling Factor: Shear

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DEFLECTIONS

	Center	
Live Load	0.01	IN L/9805
Dead Load	0.00	in
Total Load	0.01	IN L/5252

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	383 lb	383 lb
Dead Load	332 lb	332 lb
Total Load	714 lb	714 lb
Bearing Length	0.76 in	0.76 in

BEAM DATA

	Center
Span Length	4.5 ft
Unbraced Length-Top	1.33 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 888 psi
	Cd=1.00 Cl=0.99 CF=1.00	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 803 ft-lb
2.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -714 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	10.85 in3	31.64 in3
Area (Shear):	5.95 in2	16.88 in2
Moment of Inertia (deflection):	8.13 in4	177.98 in4
Moment:	803 ft-lb	2342 ft-lb
Shear:	-714 lb	2025 lb

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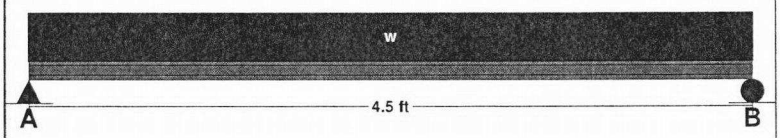

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	4.3 ft	0 ft
Wall Load	WALL =	80 plf	

BEAM LOADING

Beam Total Live Load:	wL =	170 plf
Beam Total Dead Load:	wD =	144 plf
Beam Self Weight:	BSW =	4 plf
Total Maximum Load:	wT =	317 plf

NOTES

Project: Washington5

Location: Beam #3 over kitchen
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 13.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 42.7%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.14	IN L/1152
Dead Load	0.06	in
Total Load	0.19	IN L/800

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	910	lb	910	lb
Dead Load	400	lb	400	lb
Total Load	1310	lb	1310	lb
Bearing Length	0.60	in	0.60	in

BEAM DATA

	Center	
Span Length	13	ft
Unbraced Length-Top	1.33	ft
Unbraced Length-Bottom	13	ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Bending Stress:	Fb = 900	psi	Fb' = 988	psi
	Cd=1.00 Cl=1.00 CF=1.10			
Shear Stress:	Fv = 180	psi	Fv' = 180	psi
	Cd=1.00			
Modulus of Elasticity:	E = 1600	ksi	E' = 1600	ksi
Min. Mod. of Elasticity:	E_min = 580	ksi	E_min' = 580	ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625	psi	Fc - ⊥' = 625	psi

Controlling Moment: 4257 ft-lb
6.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 1310 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	51.72 in3	73.83 in3
Area (Shear):	10.92 in2	39.38 in2
Moment of Inertia (deflection):	129.74 in4	415.28 in4
Moment:	4257 ft-lb	6077 ft-lb
Shear:	1310 lb	4725 lb

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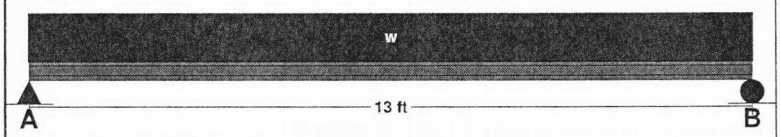

UNIFORM LOADS

	Center	
Uniform Live Load	140	plf
Uniform Dead Load	53	plf
Beam Self Weight	9	plf
Total Uniform Load	202	plf

NOTES

Project: Washington5

Location: Beam #4 under upper front cant
Combination Roof And Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 7.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 8.2%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.05	IN L/1708
Dead Load	0.05	in
Total Load	0.10	IN L/915

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1844	lb	1844	lb
Dead Load	1601	lb	1601	lb
Total Load	3445	lb	3445	lb
Bearing Length	1.57	in	1.57	in

BEAM DATA

	Center	
Span Length	7.5	ft
Unbraced Length-Top	1.33	ft
Roof Pitch	4	:12
Floor Duration Factor	1.00	
Roof Duration Factor	1.15	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

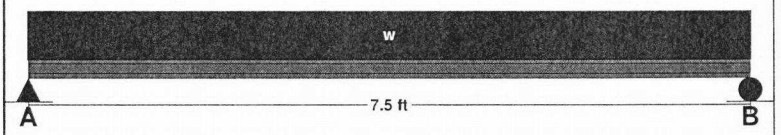
	Base Values		Adjusted	
Bending Stress:	Fb =	900 psi	Fb' =	1136 psi
	Cd=1.15 Cl=1.00 CF=1.10			
Shear Stress:	Fv =	180 psi	Fv' =	207 psi
	Cd=1.15			
Modulus of Elasticity:	E =	1600 ksi	E' =	1600 ksi
Min. Mod. of Elasticity:	E_min =	580 ksi	E_min' =	580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	625 psi	Fc - ⊥' =	625 psi

Controlling Moment: 6459 ft-lb
3.75 ft from left support
Created by combining all dead and live loads.

Controlling Shear: 3445 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	68.25 in3	73.83 in3
Area (Shear):	24.96 in2	39.38 in2
Moment of Inertia (deflection):	108.97 in4	415.28 in4
Moment:	6459 ft-lb	6986 ft-lb
Shear:	3445 lb	5434 lb

LOADING DIAGRAM



ROOF LOADING

		Side 1		Side 2	
Roof Live Load	RLL =	25	psf	25	psf
Roof Dead Load	RDL =	17	psf	17	psf
Roof Tributary Width	RTW =	13.7	ft	2	ft

FLOOR LOADING

		Side 1		Side 2	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width	FTW =	2.5	ft	0	ft
Wall Load	WALL =	100	plf		

BEAM LOADING

Roof Uniform Live Load:	wL-roof =	392	plf
Roof Uniform Dead Load:	wD-roof =	281	plf
Floor Uniform Live Load:	wL-floor =	100	plf
Floor Uniform Dead Load:	wD-floor =	38	plf
Beam Self Weight:	BSW =	9	plf
Combined Uniform Live Load:	wL =	492	plf
Combined Uniform Dead Load:	wD =	427	plf
Combined Uniform Total Load:	wT =	919	plf
Controlling Total Design Load:	wT-cont =	919	plf

NOTES

Project: Washington5

Location: Beam #5 carrier for #4
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 16.5 IN x 13.0 FT (8 + 5)
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 15.4%
Controlling Factor: Moment

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DEFLECTIONS	Center		Right	
Live Load	0.00	IN L/Infinity	0.00	IN 2L/Infinity
Dead Load	-0.05	in	0.28	in
Total Load	-0.05	IN L/1867	0.28	IN 2L/424

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	0	lb	0	lb
Dead Load	-1863	lb	6721	lb
Total Load	-1863	lb	6721	lb
Uplift (1.5 F.S)	**-1863**	**lb**	**0**	**lb**
Bearing Length	0.00	in	2.95	in

BEAM DATA	Center		Right	
Span Length	8	ft	5	ft
Unbraced Length-Top	0	ft	0	ft
Unbraced Length-Bottom	8	ft	5	ft
Floor Duration Factor	1.00			
Notch Depth	0.00			

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

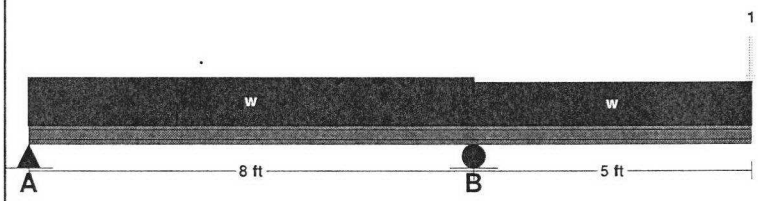
	Base Values			Adjusted		
Bending Stress:	Fb =	2400	psi	*Controlled by:*		
	Fb_cmpr =	1850	psi	Fb_cmpr' =	1614	psi
	Cd=0.90 Cl=0.97					
Shear Stress:	Fv =	265	psi	Fv' =	239	psi
	Cd=0.90					
Modulus of Elasticity:	E =	1800	ksi	E' =	1800	ksi
Min. Mod. of Elasticity:	E_min =	930	ksi	E_min' =	930	ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650	psi	Fc - ⊥' =	650	psi

Controlling Moment: -18506 ft-lb
Over right support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 3958 lb
At left support of span 3 (Right Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	137.56 in3	158.81 in3
Area (Shear):	24.89 in2	57.75 in2
Moment of Inertia (deflection):	741.68 in4	1310.2 in4
Moment:	-18506 ft-lb	21366 ft-lb
Shear:	3958 lb	9182 lb

LOADING DIAGRAM



FLOOR LOADING		Center		Right	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width Side One	TW1 =	0	ft	0	ft
Floor Tributary Width Side Two	TW2 =	0	ft	0	ft
Wall Load	WALL =	100	plf	90	plf

POINT LOADS - RIGHT SPAN		
Load Number	One	
Live Load	0	lb
Dead Load	3445	lb
Location	5	ft

BEAM LOADING	Center		Right	
Reduced Floor Live Load	40	psf	40	psf
Total Live Load	0	plf	0	plf
Total Dead Load	100	plf	90	plf
Beam Self Weight	13	plf	13	plf
Total Load	113	plf	103	plf

NOTES

Project: Washington5

Location: Beam #6 end unit
Combination Roof And Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 10.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 52.8%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.16	IN L/739
Dead Load	0.12	in
Total Load	0.29	IN L/420

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	2194 lb	2194 lb
Dead Load	1663 lb	1663 lb
Total Load	3857 lb	3857 lb
Bearing Length	1.70 in	1.70 in

BEAM DATA Center

Span Length	10	ft
Unbraced Length-Top	1.33	ft
Roof Pitch	9	:12
Floor Duration Factor	1.00	
Roof Duration Factor	1.15	
Camber Adj. Factor	1	
Camber Required	0.12	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

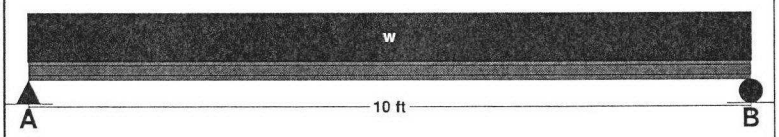
	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2750 psi
	Cd=1.15 Cl=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	305 psi
	Cd=1.15			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 9643 ft-lb
5.0 ft from left support
Created by combining all dead and live loads.

Controlling Shear: 3857 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	42.08 in3	64.31 in3
Area (Shear):	18.98 in2	36.75 in2
Moment of Inertia (deflection):	192.82 in4	337.64 in4
Moment:	9643 ft-lb	14737 ft-lb
Shear:	3857 lb	7466 lb

LOADING DIAGRAM



ROOF LOADING

		Side 1	Side 2
Roof Live Load	RLL =	25 psf	25 psf
Roof Dead Load	RDL =	17 psf	17 psf
Roof Tributary Width	RTW =	6.8 ft	0 ft

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	6.8 ft	0 ft
Wall Load	WALL =	80 plf	

BEAM LOADING

Roof Uniform Live Load:	wL-roof =	169 plf
Roof Uniform Dead Load:	wD-roof =	143 plf
Floor Uniform Live Load:	wL-floor =	270 plf
Floor Uniform Dead Load:	wD-floor =	101 plf
Beam Self Weight:	BSW =	8 plf
Combined Uniform Live Load:	wL =	439 plf
Combined Uniform Dead Load:	wD =	333 plf
Combined Uniform Total Load:	wT =	771 plf
Controlling Total Design Load:	wT-cont =	771 plf

NOTES

Project: Washington5

Location: Beam #7 end unit
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 12.0 FT (8 + 4)
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 59.4%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	0.07	IN L/1442	0.15	IN 2L/656
Dead Load	0.02	in	0.03	in
Total Load	0.09	IN L/1110	0.18	IN 2L/546

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1756	lb	3951	lb
Dead Load	975	lb	2925	lb
Total Load	2731	lb	6876	lb
Bearing Length	1.20	in	3.02	in

BEAM DATA

	Center		Right	
Span Length	8	ft	4	ft
Unbraced Length-Top	0	ft	0	ft
Unbraced Length-Bottom	8	ft	4	ft
Live Load Duration Factor	1.00			
Notch Depth	0.00			

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb_cmpr' =	1818 psi
	Cd=1.00 Cl=0.98			
Shear Stress:	Fv =	265 psi	Fv' =	265 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: -6112 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 3

Controlling Shear: -3820 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	40.35 in3	64.31 in3
Area (Shear):	21.62 in2	36.75 in2
Moment of Inertia (deflection):	185.43 in4	337.64 in4
Moment:	-6112 ft-lb	9742 ft-lb
Shear:	-3820 lb	6493 lb

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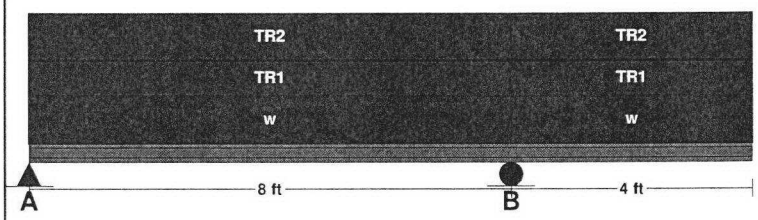

UNIFORM LOADS

	Center		Right	
Uniform Live Load	0	plf	0	plf
Uniform Dead Load	100	plf	100	plf
Beam Self Weight	8	plf	8	plf
Total Uniform Load	108	plf	108	plf

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two
Left Live Load	169 plf	270 plf
Left Dead Load	115 plf	102 plf
Right Live Load	169 plf	270 plf
Right Dead Load	115 plf	102 plf
Load Start	0 ft	0 ft
Load End	8 ft	8 ft
Load Length	8 ft	8 ft

RIGHT SPAN

Load Number	One	Two
Left Live Load	169 plf	270 plf
Left Dead Load	115 plf	102 plf
Right Live Load	169 plf	270 plf
Right Dead Load	115 plf	102 plf
Load Start	0 ft	0 ft
Load End	4 ft	4 ft
Load Length	4 ft	4 ft

NOTES

Project: Washington5

Location: Beam #8 end unit carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 14.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 47.3%
Controlling Factor: Shear

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DEFLECTIONS

	Center	
Live Load	0.11	IN L/1477
Dead Load	0.19	in
Total Load	0.30	IN L/555

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	560	lb	560	lb
Dead Load	541	lb	3847	lb
Total Load	1101	lb	4407	lb
Bearing Length	0.48	in	1.94	in

BEAM DATA

	Center	
Span Length	14	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	14	ft
Floor Duration Factor	1.00	
Camber Adj. Factor	1	
Camber Required	0.19	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values			Adjusted		
Bending Stress:	Fb =	2400	psi	*Controlled by:*		
	Fb_cmpr =	1850	psi	Fb' =	2400	psi
	Cd=1.00					
Shear Stress:	Fv =	265	psi	Fv' =	265	psi
	Cd=1.00					
Modulus of Elasticity:	E =	1800	ksi	E' =	1800	ksi
Min. Mod. of Elasticity:	E_min =	930	ksi	E_min' =	930	ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650	psi	Fc - ⊥' =	650	psi

Controlling Moment: 5140 ft-lb
9.38 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -4407 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	25.7 in3	64.31 in3
Area (Shear):	24.95 in2	36.75 in2
Moment of Inertia (deflection):	145.94 in4	337.64 in4
Moment:	5140 ft-lb	12863 ft-lb
Shear:	-4407 lb	6493 lb

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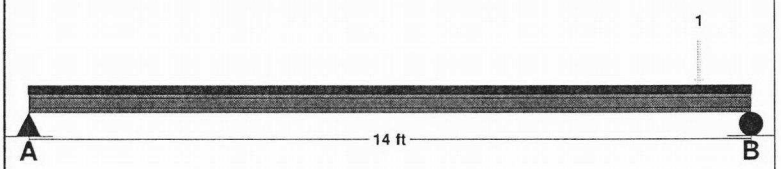

FLOOR LOADING

		Center	
Floor Live Load	FLL =	40	psf
Floor Dead Load	FDL =	15	psf
Floor Tributary Width Side One	TW1 =	1	ft
Floor Tributary Width Side Two	TW2 =	1	ft
Wall Load	WALL =	0	plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	3857 lb
Location	13 ft

BEAM LOADING

	Center	
Reduced Floor Live Load	40	psf
Total Live Load	80	plf
Total Dead Load	30	plf
Beam Self Weight	8	plf
Total Load	118	plf

NOTES

Project: Washington5

Location: Beam #9 end unit deck door
Multi-Span Roof Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 9.0 IN x 3.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 5.6%
Controlling Factor: Shear

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DEFLECTIONS

	Center	
Live Load	0.00	IN L/Infinity
Dead Load	0.02	in
Total Load	0.02	IN L/2319

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

REACTIONS

	A	B
Live Load	0 lb	0 lb
Dead Load	4744 lb	2452 lb
Total Load	4744 lb	2452 lb
Bearing Length	2.09 in	1.08 in

BEAM DATA

	Center
Span Length	3 ft
Unbraced Length-Top	2 ft
Unbraced Length-Bottom	3 ft
Roof Pitch	9 :12
Roof Duration Factor	1.15
Camber Adj. Factor	1
Camber Required	0.02
Notch Depth	0.00

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values	Adjusted
Bending Stress:	Fb = 2400 psi	*Controlled by:*
	Fb_cmpr = 1850 psi	Fb' = 2152 psi
	Cd=0.90 Cl=1.00	
Shear Stress:	Fv = 265 psi	Fv' = 239 psi
	Cd=0.90	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi
Min. Mod. of Elasticity:	E_min = 930 ksi	E_min' = 930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 650 psi	Fc - ⊥' = 650 psi

Controlling Moment: 4646 ft-lb
1.02 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 4744 lb
At left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	25.91 in3	47.25 in3
Area (Shear):	29.84 in2	31.5 in2
Moment of Inertia (deflection):	16.5 in4	212.63 in4
Moment:	4646 ft-lb	8473 ft-lb
Shear:	4744 lb	5009 lb

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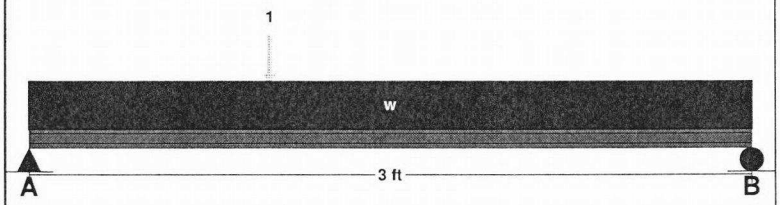

ROOF LOADING

		Center
Roof Live Load	RLL =	25 psf
Roof Dead Load	RDL =	17 psf
Roof Tributary Width Side One	TW1 =	0 ft
Roof Tributary Width Side Two	TW2 =	0 ft
Wall Load	WALL =	100 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	6876 lb
Location	1 ft

BEAM LOADING

	Center
Total Live Load	0 plf
Total Dead Load (Adjusted for Roof Pitch)	100 plf
Beam Self Weight	7 plf
Total Load	107 plf

NOTES

Project: Washington5

Location: Beam #10 garage header
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 8.5 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 162.8%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.03	IN L/3206
Dead Load	0.01	in
Total Load	0.05	IN L/2254

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	765 lb	765 lb
Dead Load	323 lb	323 lb
Total Load	1088 lb	1088 lb
Bearing Length	0.50 in	0.50 in

BEAM DATA

	Center
Span Length	8.5 ft
Unbraced Length-Top	1.33 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 988 psi
	Cd=1.00 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 2312 ft-lb
4.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -1088 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	28.09 in3	73.83 in3
Area (Shear):	9.07 in2	39.38 in2
Moment of Inertia (deflection):	46.63 in4	415.28 in4
Moment:	2312 ft-lb	6077 ft-lb
Shear:	-1088 lb	4725 lb

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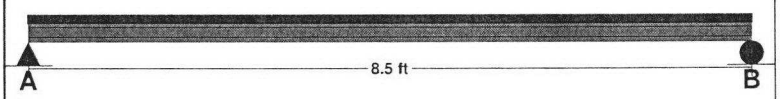

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	4.5 ft	0 ft
Wall Load	WALL =	0 plf	

BEAM LOADING

Beam Total Live Load:	wL =	180 plf
Beam Total Dead Load:	wD =	68 plf
Beam Self Weight:	BSW =	9 plf
Total Maximum Load:	wT =	256 plf

NOTES

Project: Washington5

Location: Beam #11 in front of garage
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 12.0 IN x 11.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 7.6%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.14	IN L/976
Dead Load	0.26	in
Total Load	0.40	IN L/331

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	2461 lb	2461 lb
Dead Load	4321 lb	4321 lb
Total Load	6782 lb	6782 lb
Bearing Length	2.98 in	2.98 in

BEAM DATA

	Center
Span Length	11 ft
Unbraced Length-Top	1.33 ft
Unbraced Length-Bottom	11 ft
Live Load Duration Factor	1.00
Camber Adj. Factor	1
Camber Required	0.26
Notch Depth	0.00

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

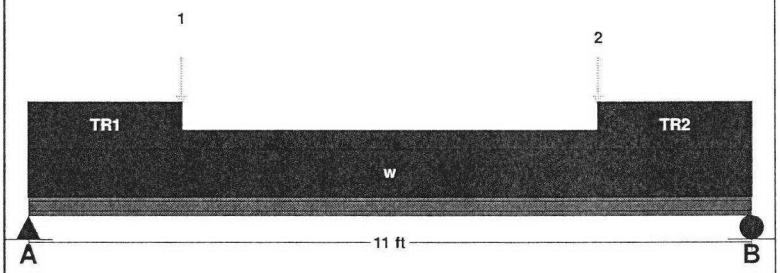
	Base Values	Adjusted
Bending Stress:	Fb = 2400 psi	*Controlled by:*
	Fb_cmpr = 1850 psi	Fb' = 2391 psi
	Cd=1.00 Cl=1.00	
Shear Stress:	Fv = 265 psi	Fv' = 265 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi
Min. Mod. of Elasticity:	E_min = 930 ksi	E_min' = 930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 650 psi	Fc - ⊥' = 650 psi

Controlling Moment: 15556 ft-lb
5.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -6782 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	78.07 in3	84 in3
Area (Shear):	38.39 in2	42 in2
Moment of Inertia (deflection):	365.75 in4	504 in4
Moment:	15556 ft-lb	16738 ft-lb
Shear:	-6782 lb	7420 lb

LOADING DIAGRAM



UNIFORM LOADS

	Center
Uniform Live Load	260 plf
Uniform Dead Load	98 plf
Beam Self Weight	9 plf
Total Uniform Load	367 plf

POINT LOADS - CENTER SPAN

Load Number	One	Two
Live Load	0 lb	0 lb
Dead Load	2816 lb	2816 lb
Location	2.33 ft	8.67 ft

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two	Three
Left Live Load	388 plf	388 plf	40 plf
Left Dead Load	264 plf	264 plf	95 plf
Right Live Load	388 plf	388 plf	40 plf
Right Dead Load	264 plf	264 plf	95 plf
Load Start	0 ft	8.67 ft	2.33 ft
Load End	2.33 ft	11 ft	8.67 ft
Load Length	2.33 ft	2.33 ft	6.34 ft

NOTES

Project: Washington5

Location: Beam #12 at lower stairs
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 8.83 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 2.0%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.08	IN L/1355
Dead Load	0.05	in
Total Load	0.13	IN L/843

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	1678 lb	1678 lb
Dead Load	1020 lb	1020 lb
Total Load	2698 lb	2698 lb
Bearing Length	1.23 in	1.23 in

BEAM DATA

	Center
Span Length	8.83 ft
Unbraced Length-Top	1.33 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 988 psi
	Cd=1.00 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 5955 ft-lb
4.415 ft from left support
Created by combining all dead and live loads.

Controlling Shear: 2698 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	72.35 in3	73.83 in3
Area (Shear):	22.48 in2	39.38 in2
Moment of Inertia (deflection):	118.3 in4	415.28 in4
Moment:	5955 ft-lb	6077 ft-lb
Shear:	2698 lb	4725 lb

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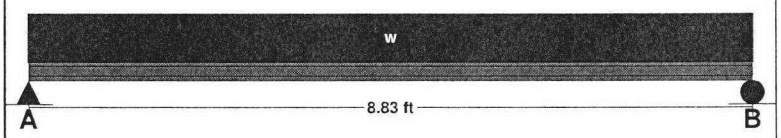

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	0 ft	9.5 ft
Wall Load	WALL =	80 plf	

BEAM LOADING

Beam Total Live Load:	wL =	380 plf
Beam Total Dead Load:	wD =	223 plf
Beam Self Weight:	BSW =	9 plf
Total Maximum Load:	wT =	611 plf

NOTES

Project: Washington5

Location: Beam #13 lower stairs carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 12.0 IN x 7.33 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 25.3%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.01	IN L/7680
Dead Load	0.10	in
Total Load	0.12	IN L/762

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	586	lb	586	lb
Dead Load	3574	lb	3288	lb
Total Load	4161	lb	3875	lb
Bearing Length	1.83	in	1.70	in

BEAM DATA

	Center	
Span Length	7.33	ft
Unbraced Length-Top	1.33	ft
Unbraced Length-Bottom	7.33	ft
Floor Duration Factor	1.00	
Camber Adj. Factor	0	
Camber Required	0	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values			Adjusted		
Bending Stress:	Fb =	2400	psi	*Controlled by:*		
	Fb_cmpr =	1850	psi	Fb' =	2153	psi
	Cd=0.90 Cl=1.00					
Shear Stress:	Fv =	265	psi	Fv' =	265	psi
	Cd=1.00					
Modulus of Elasticity:	E =	1800	ksi	E' =	1800	ksi
Min. Mod. of Elasticity:	E_min =	930	ksi	E_min' =	930	ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650	psi	Fc - ⊥' =	650	psi

Controlling Moment: 12031 ft-lb
3.52 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 4161 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	67.06 in3	84 in3
Area (Shear):	23.55 in2	42 in2
Moment of Inertia (deflection):	158.74 in4	504 in4
Moment:	12031 ft-lb	15070 ft-lb
Shear:	4161 lb	7420 lb

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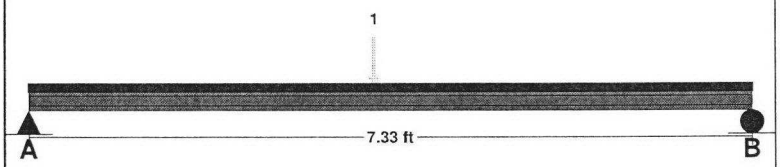

FLOOR LOADING

		Center	
Floor Live Load	FLL =	40	psf
Floor Dead Load	FDL =	15	psf
Floor Tributary Width Side One	TW1 =	4	ft
Floor Tributary Width Side Two	TW2 =	0	ft
Wall Load	WALL =	0	plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	6356 lb
Location	3.5 ft

BEAM LOADING

	Center	
Reduced Floor Live Load	40	psf
Total Live Load	160	plf
Total Dead Load	60	plf
Beam Self Weight	9	plf
Total Load	229	plf

NOTES

Project: Washington5

Location: Beam #14 front edge carrier end unit
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 9.33 FT (7.3 + 2)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 40.8%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	-0.01	IN L/5882	0.03	IN 2L/1880
Dead Load	0.01	in	0.00	in
Total Load	0.01	IN L/7065	0.02	IN 2L/1930

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	0 lb	813 lb
Dead Load	304 lb	1016 lb
Total Load	304 lb	1828 lb
Bearing Length	0.32 in	1.95 in

BEAM DATA

	Center	Right
Span Length	7.33 ft	2 ft
Unbraced Length-Top	1.33 ft	1.33 ft
Unbraced Length-Bottom	7.33 ft	2 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 680 psi
	Cd=1.00 Cl=0.76 CF=1.00	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: -1274 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Controlling Shear: 1274 lb
At left support of span 3 (Right Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	22.47 in3	31.64 in3
Area (Shear):	10.62 in2	16.88 in2
Moment of Inertia (deflection):	34.09 in4	177.98 in4
Moment:	-1274 ft-lb	1794 ft-lb
Shear:	1274 lb	2025 lb

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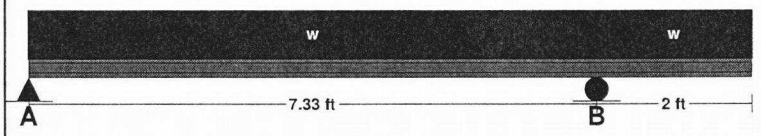

FLOOR LOADING

		Center	Right
Floor Live Load	FLL =	40 psf	65 psf
Floor Dead Load	FDL =	15 psf	32 psf
Floor Tributary Width Side One	TW1 =	0 ft	0 ft
Floor Tributary Width Side Two	TW2 =	0 ft	5.5 ft
Wall Load	WALL =	100 plf	100 plf

BEAM LOADING

	Center	Right
Reduced Floor Live Load	40 psf	65 psf
Total Live Load	0 plf	358 plf
Total Dead Load	100 plf	276 plf
Beam Self Weight	4 plf	4 plf
Total Load	104 plf	637 plf

NOTES

Project: Washington5

Location: Beam #15 front edge carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 9.67 FT (7.7 + 2)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 10.7%
Controlling Factor: Shear

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DEFLECTIONS

	Center		Right	
Live Load	0.00	IN L/MAX	0.01	IN 2L/6862
Dead Load	-0.03	in	0.05	in
Total Load	-0.03	IN L/3100	0.06	IN 2L/862

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	0 lb	497 lb
Dead Load	-83 lb	4742 lb
Total Load	-83 lb	5240 lb
Uplift (1.5 F.S)	**-140 lb**	**0 lb**
Bearing Length	0.00 in	2.40 in

BEAM DATA

	Center	Right
Span Length	7.67 ft	2 ft
Unbraced Length-Top	1.33 ft	1.33 ft
Unbraced Length-Bottom	7.67 ft	2 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 975 psi
	Cd=1.00 Cl=0.98 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: -4267 ft-lb
Over right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Controlling Shear: 4267 lb
At left support of span 3 (Right Span)
Created by combining all dead loads and live loads on span(s) 2, 3

Comparisons with required sections:	Req'd	Provided
Section Modulus:	52.52 in3	73.83 in3
Area (Shear):	35.56 in2	39.38 in2
Moment of Inertia (deflection):	115.72 in4	415.28 in4
Moment:	-4267 ft-lb	5998 ft-lb
Shear:	4267 lb	4725 lb

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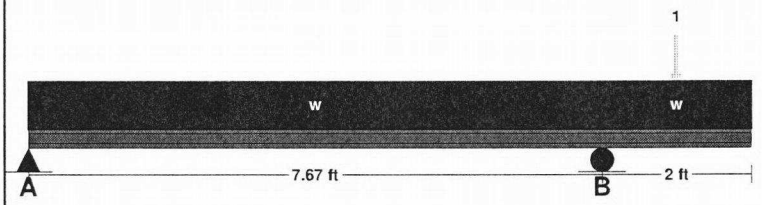

FLOOR LOADING

		Center	Right
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width Side One	TW1 =	0 ft	0 ft
Floor Tributary Width Side Two	TW2 =	0 ft	5.5 ft
Wall Load	WALL =	100 plf	100 plf

POINT LOADS - RIGHT SPAN

Load Number	One
Live Load	0 lb
Dead Load	3445 lb
Location	1 ft

BEAM LOADING

	Center	Right
Reduced Floor Live Load	40 psf	40 psf
Total Live Load	0 plf	220 plf
Total Dead Load	100 plf	183 plf
Beam Self Weight	9 plf	9 plf
Total Load	109 plf	411 plf

NOTES

Project: Washington5

Location: Beam #16 main floor stair beam
Uniformly Loaded Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 11.25 IN x 9.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 13.6%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.07	IN L/1519
Dead Load	0.05	in
Total Load	0.12	IN L/920

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	1440 lb	1440 lb
Dead Load	938 lb	938 lb
Total Load	2378 lb	2378 lb
Bearing Length	1.09 in	1.09 in

BEAM DATA

	Center
Span Length	9 ft
Unbraced Length-Top	1.33 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 988 psi
	Cd=1.00 Cl=1.00 CF=1.10	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 5351 ft-lb
4.5 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -2378 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	65.01 in3	73.83 in3
Area (Shear):	19.82 in2	39.38 in2
Moment of Inertia (deflection):	108.35 in4	415.28 in4
Moment:	5351 ft-lb	6077 ft-lb
Shear:	-2378 lb	4725 lb

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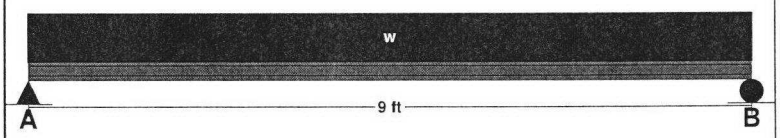

FLOOR LOADING

		Side 1	Side 2
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width	FTW =	8 ft	0 ft
Wall Load	WALL =	80 plf	

BEAM LOADING

Beam Total Live Load:	wL =	320 plf
Beam Total Dead Load:	wD =	200 plf
Beam Self Weight:	BSW =	9 plf
Total Maximum Load:	wT =	529 plf

NOTES

Project: Washington5

Location: Beam #17 over great room
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
(2) 1.5 IN x 11.25 IN x 14.83 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 56.5%
Controlling Factor: Moment

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CAUTIONS

* Laminations are to be fully connected to provide uniform transfer of loads to all members

DEFLECTIONS	Center	
Live Load	0.05	IN L/3320
Dead Load	0.11	in
Total Load	0.17	IN L/1065

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A		B	
Live Load	600	lb	89	lb
Dead Load	680	lb	227	lb
Total Load	1280	lb	316	lb
Bearing Length	0.68	in	0.17	in

BEAM DATA	Center	
Span Length	14.83	ft
Unbraced Length-Top	1.33	ft
Unbraced Length-Bottom	14.83	ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values		Adjusted	
Bending Stress:	Fb =	900 psi	Fb' =	897 psi
	Cd=1.00 Cl=1.00 CF=1.00			
Shear Stress:	Fv =	180 psi	Fv' =	180 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1600 ksi	E' =	1600 ksi
Min. Mod. of Elasticity:	E_min =	580 ksi	E_min' =	580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	625 psi	Fc - ⊥' =	625 psi

Controlling Moment: 3024 ft-lb
3.86 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 1280 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	40.43 in3	63.28 in3
Area (Shear):	10.67 in2	33.75 in2
Moment of Inertia (deflection):	80.21 in4	355.96 in4
Moment:	3024 ft-lb	4733 ft-lb
Shear:	1280 lb	4050 lb

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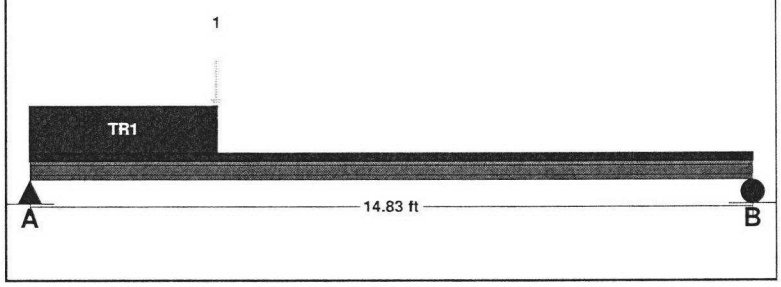

UNIFORM LOADS	Center	
Uniform Live Load	0	plf
Uniform Dead Load	0	plf
Beam Self Weight	7	plf
Total Uniform Load	7	plf

POINT LOADS - CENTER SPAN		
Load Number	One	
Live Load	0	lb
Dead Load	538	lb
Location	3.83	ft

TRAPEZOIDAL LOADS - CENTER SPAN		
Load Number	One	
Left Live Load	180	plf
Left Dead Load	68	plf
Right Live Load	180	plf
Right Dead Load	68	plf
Load Start	0	ft
Load End	3.83	ft
Load Length	3.83	ft

NOTES

Project: Washington5

Location: Beam #18 over end unit lower floor
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 9.5 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 58.4%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.02	IN L/7134
Dead Load	0.15	in
Total Load	0.17	IN L/684

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	252	lb	252	lb
Dead Load	1148	lb	2975	lb
Total Load	1400	lb	3227	lb
Bearing Length	0.62	in	1.42	in

BEAM DATA

	Center	
Span Length	9.5	ft
Unbraced Length-Top	1.33	ft
Unbraced Length-Bottom	9.5	ft
Live Load Duration Factor	1.00	
Camber Adj. Factor	1	
Camber Required	0.15	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2154 psi
	Cd=0.90 Cl=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	239 psi
	Cd=0.90			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 7288 ft-lb
6.93 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: -2975 lb
At right support of span 2 (Center Span)
Created by dead loads only on all span(s).

Comparisons with required sections:

	Req'd	Provided
Section Modulus:	40.6 in3	64.31 in3
Area (Shear):	18.71 in2	36.75 in2
Moment of Inertia (deflection):	118.41 in4	337.64 in4
Moment:	7288 ft-lb	11543 ft-lb
Shear:	-2975 lb	5843 lb

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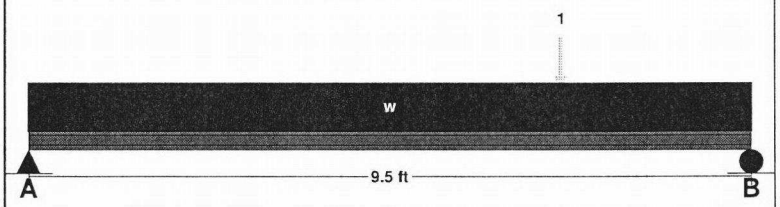

UNIFORM LOADS

	Center	
Uniform Live Load	53	plf
Uniform Dead Load	20	plf
Beam Self Weight	8	plf
Total Uniform Load	81	plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	3857 lb
Location	7 ft

NOTES

Project: Washington5

Location: Beam #19 over lower floor garage
Combination Roof And Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 10.5 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 77.1%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.12	IN L/1077
Dead Load	0.12	in
Total Load	0.24	IN L/533

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A		B	
Live Load	1365	lb	1365	lb
Dead Load	1394	lb	1394	lb
Total Load	2759	lb	2759	lb
Bearing Length	1.21	in	1.21	in

BEAM DATA

	Center	
Span Length	10.5	ft
Unbraced Length-Top	1.33	ft
Roof Pitch	10	:12
Floor Duration Factor	1.00	
Roof Duration Factor	1.15	
Camber Adj. Factor	1	
Camber Required	0.12	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

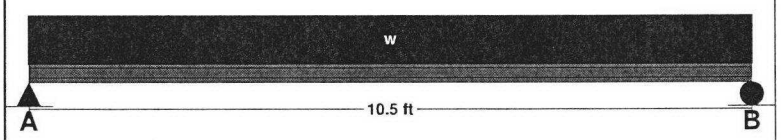
	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	1850 psi	Fb' =	2392 psi
	Cd=1.00 Cl=1.00			
Shear Stress:	Fv =	265 psi	Fv' =	265 psi
	Cd=1.00			
Modulus of Elasticity:	E =	1800 ksi	E' =	1800 ksi
Min. Mod. of Elasticity:	E_min =	930 ksi	E_min' =	930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	650 psi	Fc - ⊥' =	650 psi

Controlling Moment: 7242 ft-lb
5.25 ft from left support
Created by combining all dead and live loads.

Controlling Shear: -2759 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	36.32 in3	64.31 in3
Area (Shear):	15.62 in2	36.75 in2
Moment of Inertia (deflection):	152.05 in4	337.64 in4
Moment:	7242 ft-lb	12821 ft-lb
Shear:	-2759 lb	6493 lb

LOADING DIAGRAM



ROOF LOADING

		Side 1		Side 2	
Roof Live Load	RLL =	25	psf	25	psf
Roof Dead Load	RDL =	17	psf	17	psf
Roof Tributary Width	RTW =	0	ft	1.5	ft

FLOOR LOADING

		Side 1		Side 2	
Floor Live Load	FLL =	40	psf	40	psf
Floor Dead Load	FDL =	15	psf	15	psf
Floor Tributary Width	FTW =	3	ft	3.5	ft
Wall Load	WALL =	160	plf		

BEAM LOADING

Roof Uniform Live Load:	wL-roof =	38	plf
Roof Uniform Dead Load:	wD-roof =	33	plf
Floor Uniform Live Load:	wL-floor =	260	plf
Floor Uniform Dead Load:	wD-floor =	98	plf
Beam Self Weight:	BSW =	8	plf
Combined Uniform Live Load:	wL =	298	plf
Combined Uniform Dead Load:	wD =	299	plf
Combined Uniform Total Load:	wT =	596	plf
Controlling Total Design Load:	wT-cont =	525	plf

NOTES

Project: Washington5

Location: Beam #20 front carrier
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 10.5 IN x 11.0 FT (9 + 2)
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 115.5%
Controlling Factor: Moment

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DEFLECTIONS

	Center		Right	
Live Load	0.00	IN L/Infinity	0.00	IN 2L/Infinity
Dead Load	-0.06	in	0.08	in
Total Load	-0.06	IN L/1854	0.08	IN 2L/582

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	0 lb	0 lb
Dead Load	-416 lb	2820 lb
Total Load	-416 lb	2820 lb
Uplift (1.5 F.S)	**-416 lb**	**0 lb**
Bearing Length	0.00 in	1.24 in

BEAM DATA

	Center	Right
Span Length	9 ft	2 ft
Unbraced Length-Top	0 ft	0 ft
Unbraced Length-Bottom	9 ft	2 ft
Floor Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values	Adjusted
Bending Stress:	Fb = 2400 psi	*Controlled by:*
	Fb_cmpr = 1850 psi	Fb_cmpr' = 1636 psi
	Cd=0.90 Cl=0.98	
Shear Stress:	Fv = 265 psi	Fv' = 239 psi
	Cd=0.90	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi
Min. Mod. of Elasticity:	E_min = 930 ksi	E_min' = 930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 650 psi	Fc - ⊥' = 650 psi

Controlling Moment: -4069 ft-lb
Over right support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 2332 lb
At left support of span 3 (Right Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	29.84 in3	64.31 in3
Area (Shear):	14.67 in2	36.75 in2
Moment of Inertia (deflection):	139.05 in4	337.64 in4
Moment:	-4069 ft-lb	8769 ft-lb
Shear:	2332 lb	5843 lb

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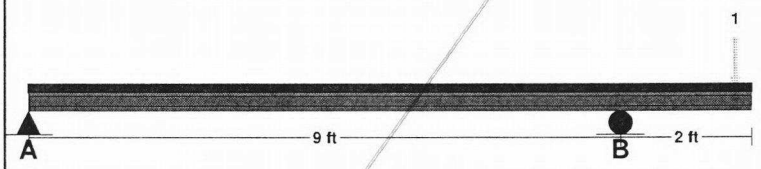

FLOOR LOADING

		Center	Right
Floor Live Load	FLL =	40 psf	40 psf
Floor Dead Load	FDL =	15 psf	15 psf
Floor Tributary Width Side One	TW1 =	0 ft	0 ft
Floor Tributary Width Side Two	TW2 =	0 ft	0 ft
Wall Load	WALL =	0 plf	0 plf

POINT LOADS - RIGHT SPAN

Load Number	One
Live Load	0 lb
Dead Load	2316 lb
Location	1.75 ft

BEAM LOADING

	Center	Right
Reduced Floor Live Load	40 psf	40 psf
Total Live Load	0 plf	0 plf
Total Dead Load	0 plf	0 plf
Beam Self Weight	8 plf	8 plf
Total Load	8 plf	8 plf

NOTES

Project: Washington5

Location: Beam #21 over rear of garage
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
3.5 IN x 12.0 IN x 11.0 FT
24F-V4 - Visually Graded Western Species - Dry Use
Section Adequate By: 39.4%
Controlling Factor: Shear

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DEFLECTIONS Center

Live Load	0.03	IN L/4214
Dead Load	0.27	in
Total Load	0.30	IN L/444

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	962 lb	962 lb
Dead Load	4361 lb	4361 lb
Total Load	5323 lb	5323 lb
Bearing Length	2.34 in	2.34 in

BEAM DATA Center

Span Length	11 ft
Unbraced Length-Top	1.33 ft
Unbraced Length-Bottom	11 ft
Live Load Duration Factor	1.00
Camber Adj. Factor	1
Camber Required	0.27
Notch Depth	0.00

MATERIAL PROPERTIES

24F-V4 - Visually Graded Western Species

	Base Values	Adjusted
Bending Stress:	Fb = 2400 psi	*Controlled by:*
	Fb_cmpr = 1850 psi	Fb' = 2391 psi
	Cd=1.00 Cl=1.00	
Shear Stress:	Fv = 265 psi	Fv' = 265 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1800 ksi	E' = 1800 ksi
Min. Mod. of Elasticity:	E_min = 930 ksi	E_min' = 930 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 650 psi	Fc - ⊥' = 650 psi

Controlling Moment: 11219 ft-lb
5.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: 5323 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	56.3 in3	84 in3
Area (Shear):	30.13 in2	42 in2
Moment of Inertia (deflection):	272.37 in4	504 in4
Moment:	11219 ft-lb	16738 ft-lb
Shear:	5323 lb	7420 lb

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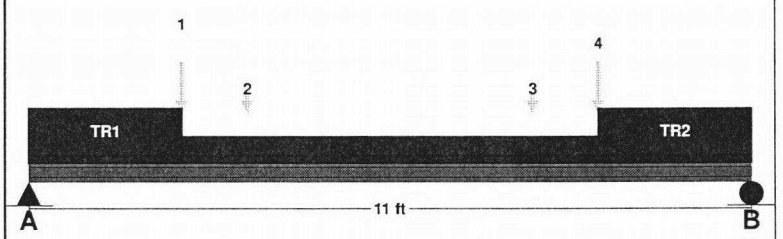

UNIFORM LOADS Center

Uniform Live Load	0 plf
Uniform Dead Load	0 plf
Beam Self Weight	9 plf
Total Uniform Load	9 plf

POINT LOADS - CENTER SPAN

Load Number	One	Two	Three	Four
Live Load	0 lb	0 lb	0 lb	0 lb
Dead Load	2316 lb	714 lb	714 lb	2316 lb
Location	2.33 ft	3.33 ft	7.67 ft	8.67 ft

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two	Three
Left Live Load	413 plf	413 plf	0 plf
Left Dead Load	441 plf	441 plf	80 plf
Right Live Load	413 plf	413 plf	0 plf
Right Dead Load	441 plf	441 plf	80 plf
Load Start	0 ft	8.67 ft	2.33 ft
Load End	2.33 ft	11 ft	8.67 ft
Load Length	2.33 ft	2.33 ft	6.34 ft

NOTES

Project: Washington5

Location: Beam #22 over main floor stairs
Multi-Loaded Multi-Span Beam
[2009 International Building Code(2005 NDS)]
1.5 IN x 11.25 IN x 14.0 FT (2 + 12)
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 55.0%
Controlling Factor: Moment

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DEFLECTIONS

	Left		Center	
Live Load	-0.06	IN 2L/806	0.12	IN L/1244
Dead Load	-0.01	in	0.03	in
Total Load	-0.07	IN 2L/668	0.14	IN L/1019

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	482 lb	521 lb
Dead Load	131 lb	238 lb
Total Load	613 lb	759 lb
Bearing Length	0.65 in	0.81 in

BEAM DATA

	Left	Center
Span Length	2 ft	12 ft
Unbraced Length-Top	0 ft	1.33 ft
Unbraced Length-Bottom	2 ft	12 ft
Live Load Duration Factor	1.00	
Notch Depth	0.00	

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 888 psi
	Cd=1.00 Cl=0.99 CF=1.00	
Shear Stress:	Fv = 180 psi	Fv' = 180 psi
	Cd=1.00	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 1511 ft-lb
8.04 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Controlling Shear: -759 lb
At right support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2

Comparisons with required sections:	Req'd	Provided
Section Modulus:	20.41 in3	31.64 in3
Area (Shear):	6.33 in2	16.88 in2
Moment of Inertia (deflection):	79.43 in4	177.98 in4
Moment:	1511 ft-lb	2342 ft-lb
Shear:	-759 lb	2025 lb

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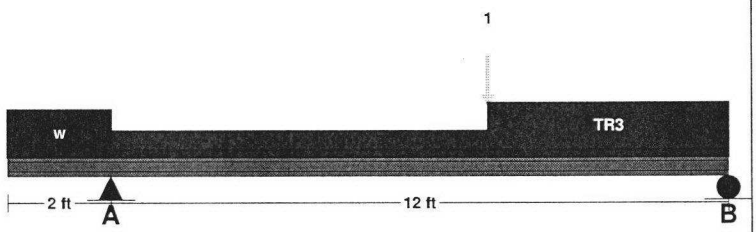

UNIFORM LOADS

	Left	Center
Uniform Live Load	53 plf	0 plf
Uniform Dead Load	13 plf	0 plf
Beam Self Weight	4 plf	4 plf
Total Uniform Load	70 plf	4 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	-200 lb
Location	7.33 ft

TRAPEZOIDAL LOADS - CENTER SPAN

Load Number	One	Two	Three
Left Live Load	53 plf	53 plf	107 plf
Left Dead Load	13 plf	20 plf	80 plf
Right Live Load	53 plf	53 plf	107 plf
Right Dead Load	13 plf	20 plf	80 plf
Load Start	0 ft	4 ft	7.33 ft
Load End	4 ft	7.33 ft	12 ft
Load Length	4 ft	3.33 ft	4.67 ft

NOTES

Project: Washington5

Location: Deck Guardrail
Multi-Span Floor Beam
[2009 International Building Code(2005 NDS)]
1.5 IN x 5.5 IN x 8.0 FT
#2 - Douglas-Fir-Larch - Dry Use
Section Adequate By: 48.7%
Controlling Factor: Moment

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DEFLECTIONS

	Center	
Live Load	0.00	IN L/Infinity
Dead Load	0.12	in
Total Load	0.12	IN L/830

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS

	A	B
Live Load	0 lb	0 lb
Dead Load	107 lb	107 lb
Total Load	107 lb	107 lb
Bearing Length	0.11 in	0.11 in

BEAM DATA

	Center
Span Length	8 ft
Unbraced Length-Top	8 ft
Unbraced Length-Bottom	8 ft
Floor Duration Factor	1.00
Notch Depth	0.00

MATERIAL PROPERTIES

#2 - Douglas-Fir-Larch

	Base Values	Adjusted
Bending Stress:	Fb = 900 psi	Fb' = 978 psi
	Cd=0.90 Cl=0.93 CF=1.30	
Shear Stress:	Fv = 180 psi	Fv' = 162 psi
	Cd=0.90	
Modulus of Elasticity:	E = 1600 ksi	E' = 1600 ksi
Min. Mod. of Elasticity:	E_min = 580 ksi	E_min' = 580 ksi
Comp. ⊥ to Grain:	Fc - ⊥ = 625 psi	Fc - ⊥' = 625 psi

Controlling Moment: 414 ft-lb
4.0 Ft from left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Controlling Shear: 107 lb
At left support of span 2 (Center Span)
Created by dead loads only on all span(s).

Comparisons with required sections:	Req'd	Provided
Section Modulus:	5.09 in3	7.56 in3
Area (Shear):	0.99 in2	8.25 in2
Moment of Inertia (deflection):	6.02 in4	20.8 in4
Moment:	414 ft-lb	616 ft-lb
Shear:	107 lb	891 lb

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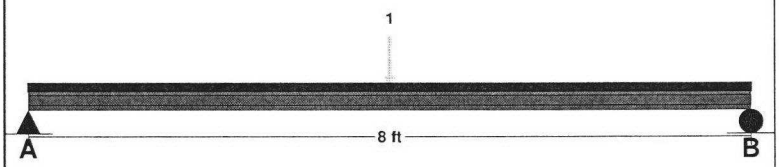

FLOOR LOADING

		Center
Floor Live Load	FLL =	0 psf
Floor Dead Load	FDL =	0 psf
Floor Tributary Width Side One	TW1 =	0 ft
Floor Tributary Width Side Two	TW2 =	0 ft
Wall Load	WALL =	0 plf

POINT LOADS - CENTER SPAN

Load Number	One
Live Load	0 lb
Dead Load	200 lb
Location	4 ft

BEAM LOADING

	Center
Reduced Floor Live Load	0 psf
Total Live Load	0 plf
Total Dead Load	0 plf
Beam Self Weight	2 plf
Total Load	2 plf

NOTES

Project: Washington5

Location: Footing A
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 3.0 FT x 3.0 FT x 12.00 IN
Reinforcement: #4 Bars @ 7.00 IN. O.C. E/W / (5) min.
Section Footing Design Adequate

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FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Width:	W =	3	ft
Length:	L =	3	ft
Depth:	Depth =	12	in
Effective Depth to Top Layer of Steel:	d =	8.25	in

COLUMN AND BASEPLATE SIZE

Column Type:	Wood		
Column Width:	m =	3.5	in
Column Depth:	n =	5.5	in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	1253	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1350	psf
Required Footing Area:	Areq =	8.35	sf
Area Provided:	A =	9.00	sf

Baseplate Bearing:

Bearing Required:	Bear =	15788	lb
Allowable Bearing:	Bear-A =	53178	lb

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	4276	lb
Allowable Beam Shear:	Vc1 =	22275	lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter:	Bo =	51	in
Punching Shear:	Vu2 =	13820	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	71719	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	133650	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	63113	lb
Controlling Allowable Punching Shear:	vc2 =	63113	lb

Bending Calculations:

Factored Moment:	Mu =	71045	in-lb
Nominal Moment Strength:	Mn =	282369	in-lb

Reinforcement Calculations:

Concrete Compressive Block Depth:	a =	0.51	in
Steel Required Based on Moment:	As(1) =	0.24	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.86	in2
Controlling Reinforcing Steel:	As-reqd =	0.86	in2
Selected Reinforcement:	#4's @ 7.0 in. o.c. e/w (5) Min.		
Reinforcement Area Provided:	As =	0.98	in2

Development Length Calculations:

Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	15	in

Note: Plain concrete adequate for bending,
therefore adequate development length not required.

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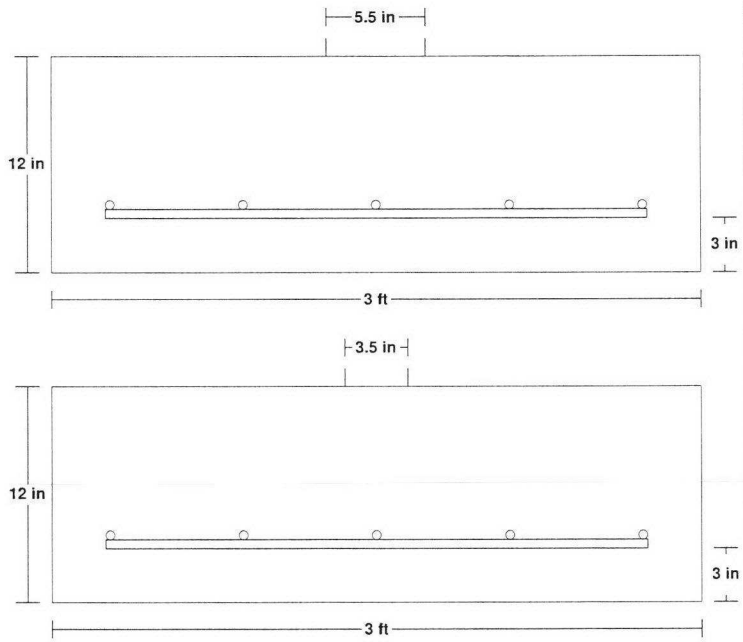

FOOTING LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	11277	lb
Total Load:	PT =	11277	lb
Ultimate Factored Load:	Pu =	15788	lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. =	870	lb

NOTES

Project: Washington5

Location: Footing B
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 3.17 FT x 3.17 FT x 12.00 IN
Reinforcement: #4 Bars @ 7.00 IN. O.C. E/W / (5) min.
Section Footing Design Adequate

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FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Width:	W =	3.17	ft
Length:	L =	3.17	ft
Depth:	Depth =	12	in
Effective Depth to Top Layer of Steel:	d =	8.25	in

COLUMN AND BASEPLATE SIZE

Column Type:	Wood		
Column Width:	m =	3.5	in
Column Depth:	n =	5.5	in

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	1350	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1350	psf
Required Footing Area:	Areq =	10.05	sf
Area Provided:	A =	10.05	sf

Baseplate Bearing:

Bearing Required:	Bear =	18990	lb
Allowable Bearing:	Bear-A =	53178	lb

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	5376	lb
Allowable Beam Shear:	Vc1 =	23537	lb

Punching Shear Calculations (Two Way Shear):

Critical Perimeter:	Bo =	51	in
Punching Shear:	Vu2 =	16869	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	71719	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	133650	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	63113	lb
Controlling Allowable Punching Shear:	vc2 =	63113	lb

Bending Calculations:

Factored Moment:	Mu =	90296	in-lb
Nominal Moment Strength:	Mn =	282855	in-lb

Reinforcement Calculations:

Concrete Compressive Block Depth:	a =	0.49	in
Steel Required Based on Moment:	As(1) =	0.31	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.91	in2
Controlling Reinforcing Steel:	As-reqd =	0.91	in2
Selected Reinforcement:	#4's @ 7.0 in. o.c. e/w (5) Min.		
Reinforcement Area Provided:	As =	0.98	in2

Development Length Calculations:

Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	16.02	in

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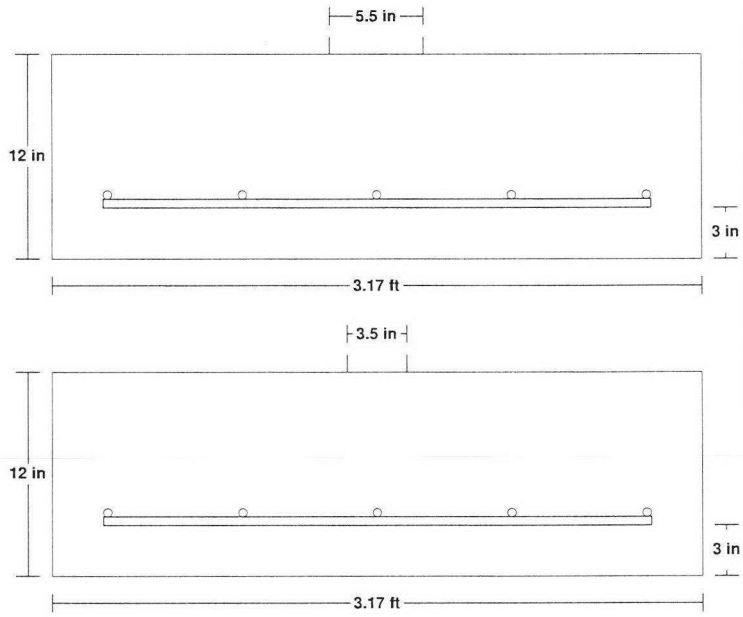

FOOTING LOADING

Live Load:	PL =	0	lb
Dead Load:	PD =	13564	lb
Total Load:	PT =	13564	lb
Ultimate Factored Load:	Pu =	18990	lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. =	971	lb

NOTES

Project: Washington5

Location: Strip footings
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 15.0 IN Wide x 7.0 IN Deep Continuous Footing With 6.0 IN Thick x 12.0 IN Tall Stemwall
Section Footing Design Adequate

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CAUTIONS

* Footing has been designed without reinforcement

FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs =	1500	psf
Concrete Compressive Strength:	F'c =	2500	psi
Reinforcing Steel Yield Strength:	Fy =	40000	psi
Concrete Reinforcement Cover:	c =	3	in

FOOTING SIZE

Width:	W =	15	in
Depth:	Depth =	7	in
Effective Depth to Top Layer of Steel:	d =	5	in

STEMWALL SIZE

Stemwall Width:	6	in
Stemwall Height:	12	in
Stemwall Weight:	150	pcf

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	1389	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1413	psf
Width Required:	Wreq =	1.23	in2

Beam Shear Calculations (One Way Shear):

Beam Shear:	Vu1 =	0	lb
Allowable Beam Shear:	Vc1 =	2200	lb

Transverse Direction:

Bending Calculations:

Factored Moment:	Mu =	1673	in-lb
Nominal Moment Strength:	Mn =	6875	in-lb

NOTES

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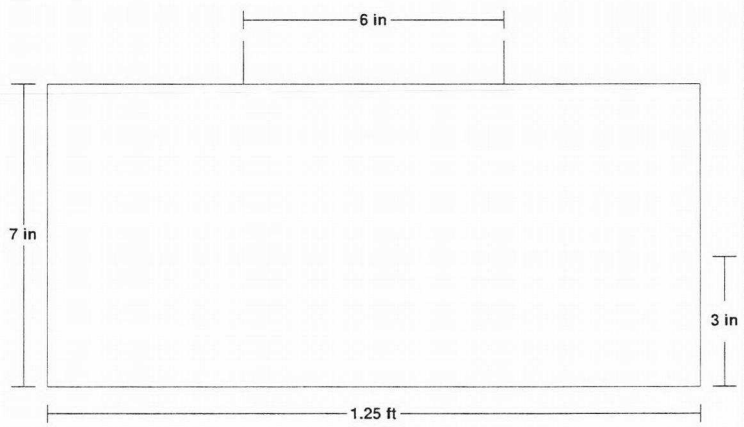

FOOTING LOADING

Live Load:	PL =	989	lb
Dead Load:	PD =	672	lb
Total Load:	PT =	1736	lb
Ultimate Factored Load:	Pu =	2479	lb

LOAD CALCULATOR

	Live Load		Dead Load		Tributary Width	
Roof:	LL =	25 psf	DL =	17 psf	TA =	6.8 ft2
Second Floor:	LL =	40 psf	DL =	15 psf	TA =	10.3 ft2
First Floor:	LL =	40 psf	DL =	15 psf	TA =	10.3 ft2