QUANTUM
CONSULTING ENGINEERS

January 7, 2019

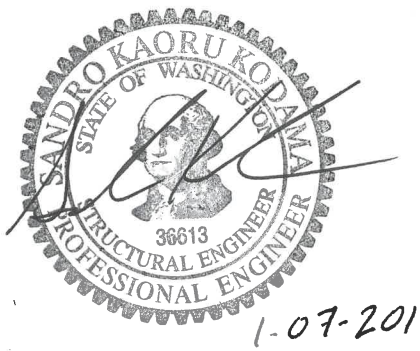
STRUCTURAL CALCULATIONS
(Permit Submittal)

LUNDIN RESIDENCE
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 18689.01

Prepared for:
Stuart Silk Architects
2400 North 45th Street
Seattle, Wa 98103

Prepared by:
QUANTUM CONSULTING ENGINEERS
1511 Third Avenue, Suite 323
Seattle, WA 98101
TEL 206.957.3900
FAX 206.957.3901



1-07-2019

QUANTUM | CONSULTING ENGINEERS
1511 Third Avenue, Suite 323
Seattle, WA 98101
TEL 206.957.3900
FAX 206.957.3901

LUNDIN RESIDENCE
4041 WEST MERCER WAY
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 18689.01

TABLE OF CONTENTS

LUNDIN RESIDENCE
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 18689.01

DESIGN CRITERIA

QUANTUM | CONSULTING ENGINEERS

STRUCTURAL DESIGN CRITERIA

LUNDIN RESIDENCE
4041 WEST MERCER WAY
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 18689.01

CODE CRITERIA:

BUILDING CODE..... 2015 INTERNATIONAL BUILDING CODE
BUILDING DEPARTMENT.....CITY OF MERCER ISLAND
WIND CRITERIA ..... 110 MPH; EXPOSURE "C"
.....RISK CATEGORY = II
.....K_{ZT}= 1.00
SEISMIC ZONE..... SDC = D
..... SITE CLASS = D
..... R = 6.5
..... I_E = 1.0
..... S_S = 1.41, S_1 = 0.55
..... S_{DS} = 0.94, S_{D1} = 0.55
ROOF SNOW (ADDITIONAL 5 PSF WET SNOW INCLUDED) .....30 PSF
FLOOR LIVE LOAD .....40 PSF

SOILS CRITERIA:

ALLOWABLE BEARING PRESSURE.....3,000 PSF
COEFFICIENT OF FRICTION (FACTOR OF SAFETY OF 1.5 INCLUDED).....0.30
MINIMUM FOOTING WIDTH ..... CONTINUOUS: 18" MIN., ISOLATED: 24" MIN.
FROST DEPTH .....18" MIN.
SOILS CONSULTANT ..... PANGEO INCORPORATED
SOILS REPORT NUMBER..... 18-282
SOILS REPORT DATE..... .....OCTOBER 12, 2018
ACTIVE SOIL PRESSURE (RESTRAINED / UNRESTRAINED) .....50 PCF / 50 PCF
SEISMIC SURCHARGE PRESSURE (RESTRAINED / UNRESTRAINED)..... 7H PSF / 7H PSF
PASSIVE SOIL PRESSURE (FACTOR OF SAFETY OF 1.5 INCLUDED).....300 PCF

MATERIALS CRITERIA:

CONCRETE (28 DAY STRENGTH):

FOUNDATION/S.O.G.....F'C=2,500 PSI

REINFORCING STEEL:

GRADE 60 (#5 BAR OR LARGER)..... .....FY=60,000 PSI
GRADE 40 (#4 BAR OR SMALLER)..... .....FY=40,000 PSI

WOOD FRAMING:

2X, 3X, & 4X FRAMING MBRS.....HF#2 OR DF#2
6X FRAMING MBRS.....DF#1
GLULAM BEAMS ..... 24F-V4 (V8 @ CONT. AND CANT. MBRS)
PARALLAM BEAMS.....2.2 E PSL
LSL MEMBERS – BEAMS & HEADERS.....1.55 E LSL
WOOD SHTG..... APA RATED

STRUCTURAL DESIGN CRITERIA

LUNDIN RESIDENCE
4041 WEST MERCER WAY
MERCER ISLAND, WA 98040

QUANTUM JOB NUMBER: 18689.01

ASSEMBLY WEIGHTS

ROOF LOADS				**COMMENTS**
MEMBRANE ROOFING		1.0	PSF	
RIGID INSULATION		2.0	PSF	
5/8" SHEATHING		2.0	PSF	
ROOF JOISTS @ 16"O.C.		3.2	PSF	
INSULATION		1.0	PSF	
LIGHTS, DUCTS		1.0	PSF	
5/8" GWB		2.8	PSF	
MISCELLANEOUS		1.0	PSF	
PV PANELS		4.0	PSF	
	ROOF DL	18.0	PSF	SL = 30 PSF

FLOOR LOAD				
HARDWOOD FLOORING		4.0	PSF	
2-LAYERS OF 1/2 SHEATHING		3.4	PSF	
2" GYPCRETE		18.0	PSF	
3/4" SHEATHING		2.5	PSF	
FLOOR JOISTS @ 16"O.C.		2.8	PSF	
LIGHTS, DUCTS		1.0	PSF	
5/8 GWB		2.8	PSF	
INSULATION		1.0	PSF	
MISCELLANEOUS		0.5	PSF	
	FLOOR DL	36.0	PSF	LL = 40 PSF

GARAGE FLOOR LOAD				
4" TOPPING SLAB		48.3	PSF	
1-1/8" PLYWOOD SHEATHING		3.8	PSF	
WOOD JOISTS @ 16"O.C.		5.3	PSF	
INSULATION		1.0	PSF	
5/8" GWB		2.8	PSF	
LIGHTS, DUCTS		1.0	PSF	
MISCELLANEOUS		0.8	PSF	
	FLOOR DL	63.0	PSF	LL = 40 PSF

EXTERIOR WALL LOADS

WOOD SIDING		2.0	PSF
1/2" PLYWOOD SHEATHING		1.5	PSF
2X6 STUDS @ 16" O.C.		2.0	PSF
INSULATION		1.0	PSF
5/8" GWB		2.8	PSF
MISCELLANEOUS		1.7	PSF
	ROOF DL	11.0	PSF

INTERIOR WALL LOAD

5/8" GWB		2.8	PSF
2X6 STUDS @ 16" O.C.		1.7	PSF
INSULATION		1.0	PSF
5/8" GWB		2.8	PSF
MISCELLANEOUS		0.7	PSF
	WALL DL	9.0	PSF

TERRACE FLOOR LOAD

2" CONCRETE PAVERS ON PEDESTALS		24.2	PSF	
WATER-PROOFING MEMBRANE		1.0	PSF	
3/4" PLYWOOD SHEATHING		2.5	PSF	
2X SLEEPERS @ 16" O.C.		1.2	PSF	
3/4" PLYWOOD SHEATHING		2.5	PSF	
DECK JOISTS @ 16" O.C.		2.8	PSF	
INSULATION		1.0	PSF	
LIGHTS, DUCTS		1.0	PSF	
5/8" GWB		2.8	PSF	
MISCELLANEOUS		1.0	PSF	
	FLOOR DL	40.0	PSF	LL = 60 PSF

⚠ This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

ATC Hazards by Location

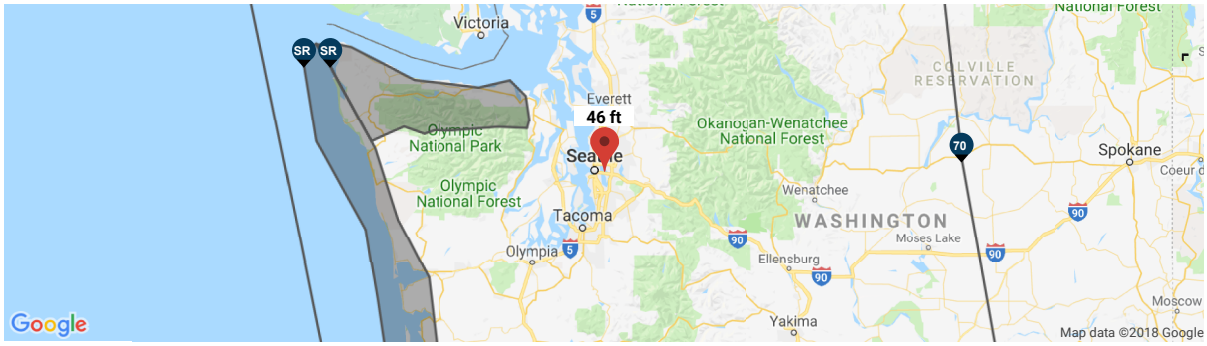
Search Information

Coordinates: 47.57302222, -122.239575

Timestamp: 2018-12-05T00:45:08.497Z

Hazard Type: Wind

Map Results



Text Results

ASCE 7-16

MRI 10-Year	68 mph
MRI 25-Year	74 mph
MRI 50-Year	79 mph
MRI 100-Year	83 mph
Risk Category I	92 mph
Risk Category II	98 mph
Risk Category III	105 mph
Risk Category IV	109 mph

ASCE 7-10

MRI 10-Year	72 mph
MRI 25-Year	79 mph
MRI 50-Year	85 mph
MRI 100-Year	91 mph
Risk Category I	100 mph
Risk Category II	110 mph
Risk Category III-IV	115 mph

Kzt = 1.0
Wind exp. "C"

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

USGS Design Maps Summary Report

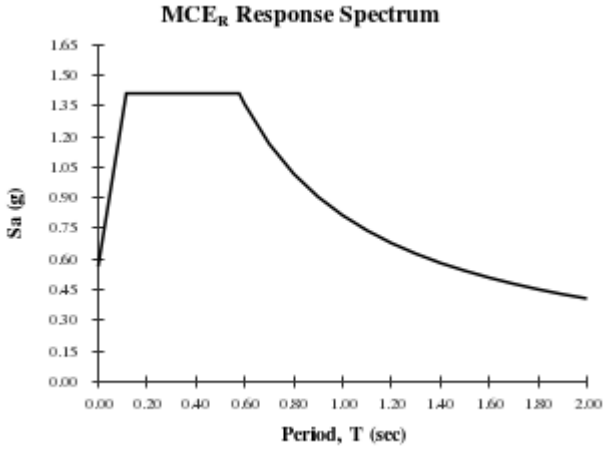
User–Specified Input

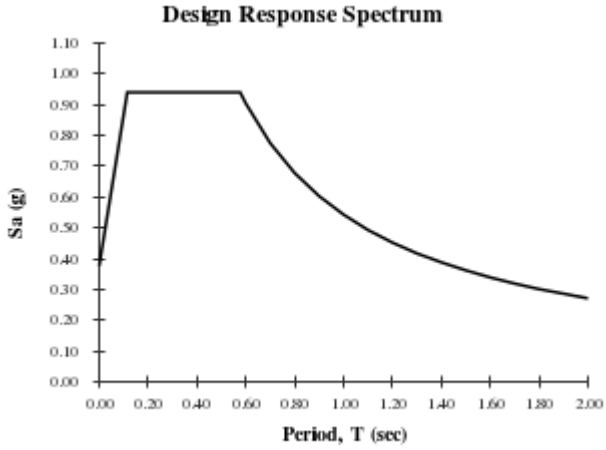
Report Title	Seismic design parameters Wed December 5, 2018 00:41:23 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	47.57302°N, 122.23958°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S =	1.410 g	S_{MS} =	1.410 g	S_{DS} =	0.940 g
S_1 =	0.543 g	S_{M1} =	0.814 g	S_{D1} =	0.543 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

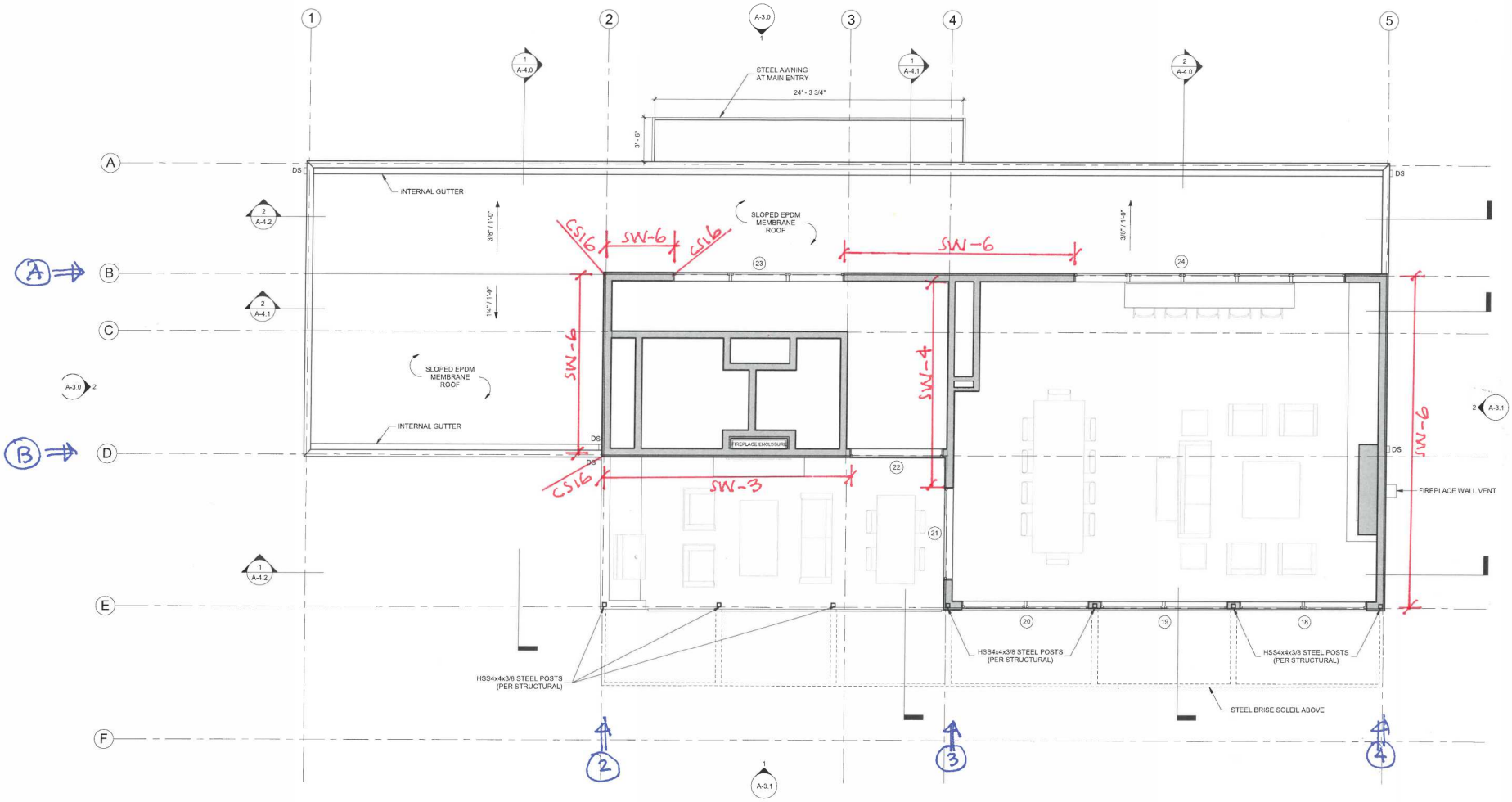




LUNDIN RESIDENCE
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 18689.01

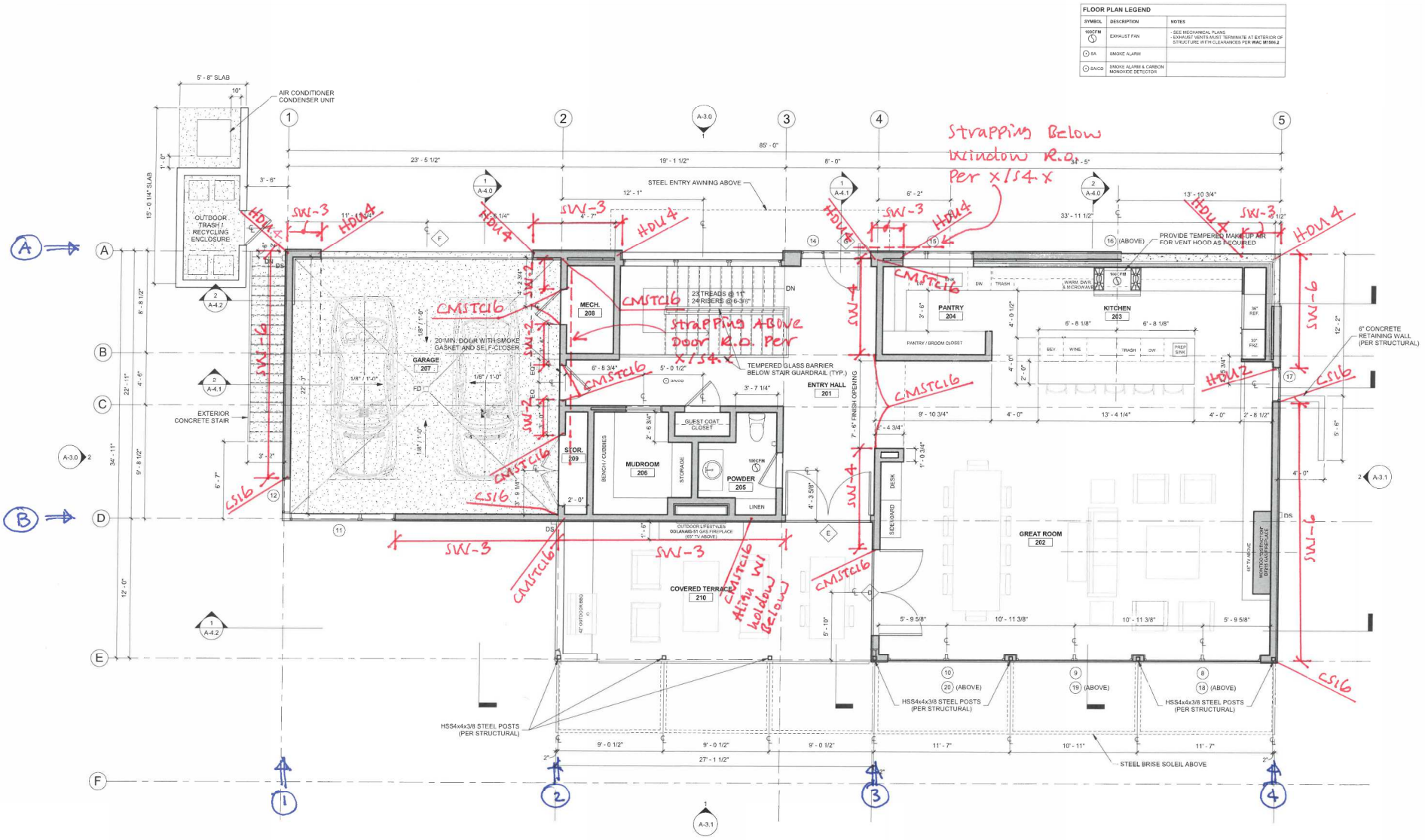
LATERAL CALCULATIONS



1 CLERESTORY PLAN
1/4" = 1'-0"

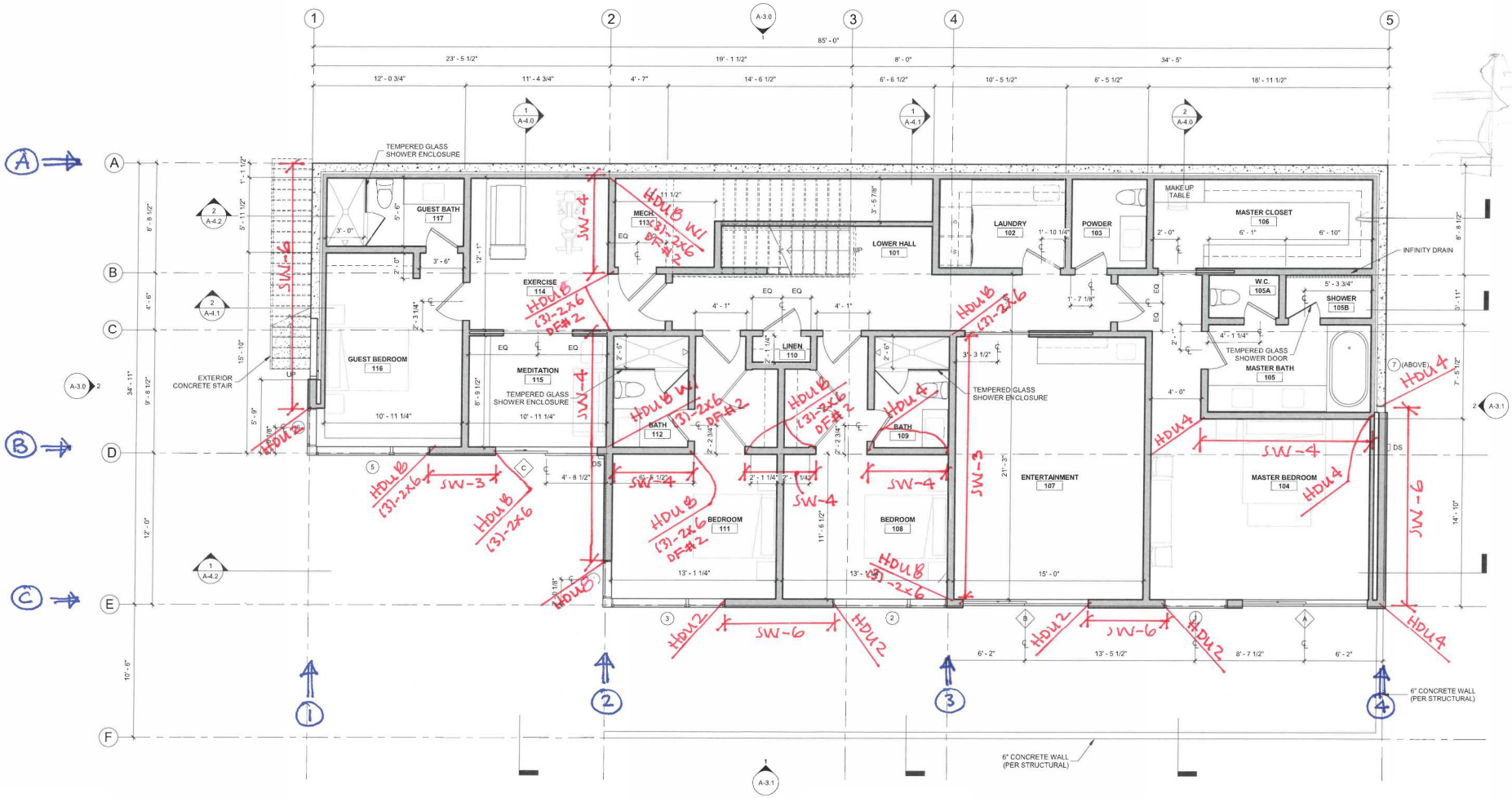
Clerestory Shear Wall
1/8" = 1'-0"

B-2



1 MAIN FLOOR PLAN
1/4" = 1'-0"

B-3



1 LOWER FLOOR PLAN
1/4" = 1'-0"

Lower Floor shear wall
1/8" = 1'-0"

B-4

Wind Loads Criteria

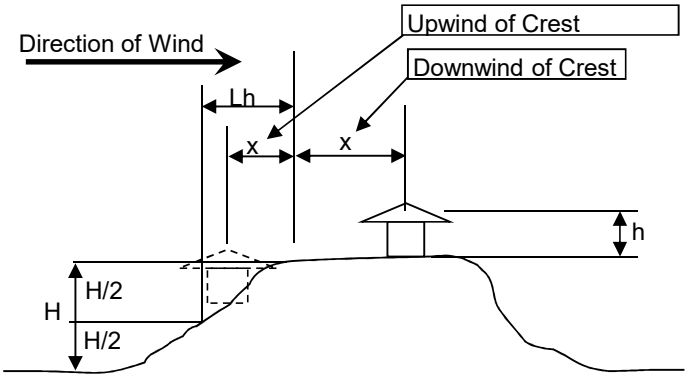
ASCE 7-10

Wind Load Criteria

Risk Category:	II	Table 1.5-1	Roof Type:	Flat Roof
Basic Wind Speed:	110	Figure 26.5.1	Roof Slope:	0.0:12
Exposure Category:	C	Section 26.7.3	Mean Roof HT:	28.0 ft
Wall Ht:	29.5 ft		Parapet:	Yes

Wind Topographic Factor, K_{zt}:

per Section 26.8



Terrain Type:	Per Local Jurisdiction
Direction:	Upwind of Crest

L_h:	200 ft	*DIST UPWIND OF CREST TO HALF HT OF HILL OR ESCARP.*
H:	200 ft	*HT. OF HILL OR ESCARP. RELATIVE TO THE UPWIND TERRAIN*
x:	50 ft	*DIST. (UPWIND OR DOWNWIND) FROM THE CREST TO THE BUILDING*
h:	28.0 ft	*MEAN ROOF HT ABOVE LOCAL GROUND LEVEL*

K_{zt}:	NA	*EQUATION 26.8-1*
K_{zt}:	1.00	*MANUALLY INPUT*

Wind Loads - Main Wind Force Resisting System

ASCE 7-10 Chapter 27 Part 2 - Enclosed Simple Diaphragm, h<160ft

Wind Load Criteria

Risk Category:	**II**	Table 1.5-1
Basic Wind Speed:	**110 mph**	Figure 26.5.1
Exposure Category:	**C**	Section 26.7.3
K_{zt}:	**1.00**	Section 26.8

L/B Ratio:

Building Type:	Class 1
Wall Height:	29.5 ft
Short Dimension:	**35.0 ft**
Long Dimension:	**85.0 ft**
Transverse Wind L/B:	0.412
Longitudinal Wind L/B:	2.4

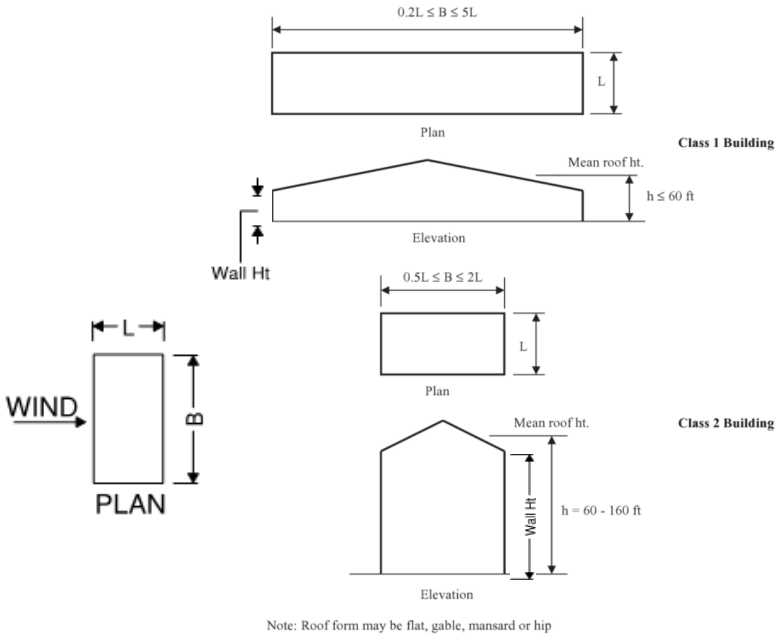


FIGURE 27.5-1

Wall Pressures:

	Transverse Wind Direction		Longitudinal Wind Direction	
P_h:	**28.5 psf**		**24.6 psf**	
P_o:	**26.9 psf**		**22.9 psf**	
P:	**64.1 psf**	(Parapet)	**55.4 psf**	(Parapet)

*Values from ASCE table 27.6-1

*All Values Ultimate (multiply x0.6 for ASD)

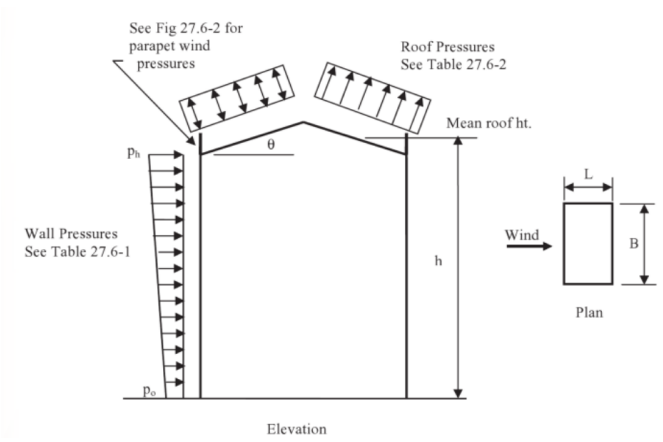


FIGURE 27.6-1

Wind Loads - Main Wind Force Resisting System (Cont.)

ASCE 7-10 Chapter 27 Part 2 - Enclosed Simple Diaphragm, h<160ft

Roof Pressure:

Slope: 0.0:12
Mean Roof HT: 28.0 ft

	Zone (PSF)				
Load Case	1	2	3	4	5
1	**NA**	**NA**	**-27.0**	**-24.0**	**-19.7**
2	**NA**	**NA**	**0.0**	**0.0**	**0.0**

*Values from Table 27.6-2
*All Values Ultimate (multiply x0.6 for ASD)

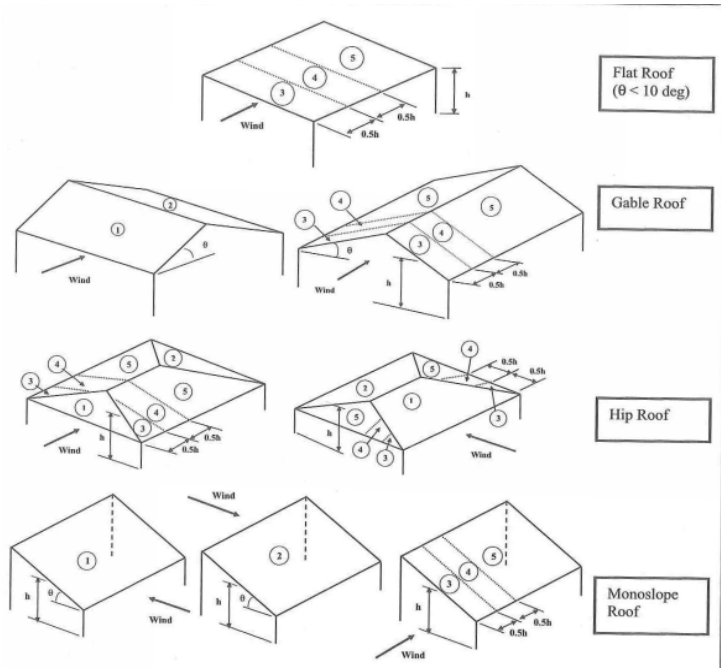


Table 27.6-2

Roof Overhang (PSF)

P_{ovh}: -20.2 psf

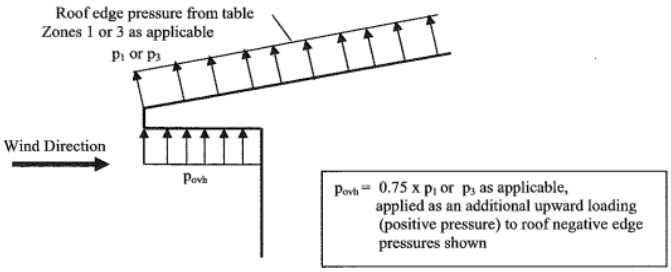


Figure 27.6-3

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	4
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wind Load	Checked	Sandro	Date	

Wind Forces (East-West): Roof Angle 0

	ZONE AREA (SF)					ZONE PRESSURE (PSF)					
LEVEL	1	2	3	4	5	1	2	3	4	5	FORCE (K)
PARAPET	128.0					55.4					7.09
UPPER	655.0					24.6					16.11
LOW ROOF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
MAIN	1159					23.75					27.53
									BASE SHEAR:		50.73

Wind Forces (North-South): Roof Angle 0

	ZONE AREA (SF)					ZONE PRESSURE (PSF)					
LEVEL	1	2	3	4	5	1	2	3	4	5	FORCE (K)
HIGH ROOF	53.0					64.1					3.40
UPPER	277.0					28.5					7.89
LOW ROOF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
MAIN	479					27.7					13.27
									BASE SHEAR:		24.56

Seismic Base Shear for the Equivalent Lateral Force Procedure

Per IBC 2015 & ASCE 7-10

Structure:	Lundin Residence		
Address:	4041 West Mercer Way, Mercer Island, WA 98040		
Latitude:	47.5730	Longitude:	-122.2396

Structure Classification

Risk Category :	II	per ASCE Table 1.5-1

Seismic Force-Resisting System:	Light-Framed Wood Walls Sheathed with Structural Panels	
R:	6 1/2	per ASCE Table 12.2-1
Ω_o:	2 1/2	per ASCE Table 12.2-1
C_d:	4	per ASCE Table 12.2-1
h_n (ft):	28.00	height above the base to the highest level of the structure

Site Ground Motion

Reg. Structure 5 Stories or Less:	Yes	Ss (max) = 1.5	Per ASCE 12.8.1.3	
S_1 (g-sec):	0.550	S_S (g-sec):	1.410	
Site Class:	D	Assumed Value		per ASCE Table 20.3-1
S_{D1} (g-sec):	0.550	S_{DS} (g-sec):	0.940	per ASCE 11.4.4
Seismic Design Category:	D	per ASCE 11.6		
I_E:	1.00	per ASCE Table 1.5-2		

Fundamental Period per ASCE 12.8.2

Period Method:	Approximate Fundamental Period	
Structure Type:	All Other Structural Systems	
T_L (sec):	6.00	ASCE Figures 22-12 through 22-16
Ta (sec):	0.24	Ct * hnx per ASCE Eq. 12.8-7
T_{use} (sec):	0.24	<= TL

Equivalent Lateral Force Procedure Design Base Shear per ASCE 12.8

C_s:	0.14	= S_{DS} / (R/I_E) per ASCE Eq. 12.8-2
$C_{s\text{-}max}$:	0.35	= S_{D1} / (T_a*R/I_E) for T <= T_L per ASCE Eq. 12.8-3
$C_{s\text{-}max}$:	9	= S_{D1}*T_L / (T_a^2*R/I_E) for T > T_L per ASCE Eq. 12.8-4
$C_{s\text{-}min}$:	0.04	per ASCE Eq. 12.8-5
$C_{s\text{-}min}$:	--	= 0.5S_1 / (R/I_E) for S_1 => 0.6g per ASCE Eq. 12.8-6
$C_{s\text{-}use}$:	0.145	

V : 0.145 W = $C_{S\text{-}use}$ * W per ASCE Eq. 12.8-1

Vert. Distribution of Seismic Forces for the Equiv. Lateral Force Procedure

Per IBC 2015 & ASCE 7-10

Structure: **Lundin Residence**

Seismic Parameters

I_E:	1.00	per ASCE Table 1.5-2
S_{DS} (g-sec):	0.94	per ASCE 11.4.4
Period (Sec):	0.24	per ASCE 12.8.2.1
k:	1.00	per ASCE 12.8.3

Vertical Distribution of Seismic Forces per ASCE 12.8.3

$F_x = C_{vx}V$ per ASCE Eq. 12.8-11

$C_{vx} = (w_x h_x^k)/(\Sigma w_i h_i^k)$ per ASCE Eq. 12.8-12

Level	h_x (ft)	w_x (k)	% of W_{total}	$w_x * h_x^k$	C_{vx} (%)	F_x (k)	V_x (k)
Roof	28.00	76.70	33.3%	2147.60	52.8%	17.59	
Upper Floor	12.50	153.80	66.7%	1922.50	47.2%	15.75	17.59
							33.33

Total WT (k): 230.50 Sum: 4070.10

$C_{s\text{-}use}$: 0.145

V (k): **33.33** per ASCE 12.8.1

Vertical Distribution of Seismic Diaphragm Forces per ASCE 12.10.1.1

$F_{px} = (SF_i/Sw_i) * w_{px}$ per ASCE Eq 12.10-1

$F_{px\text{-}max} = 0.4*S_{DS}*I_E*w_{px}$ per per ASCE 12.10.1.1

$F_{px\text{-}min} = 0.2*S_{DS}*I_E*w_{px}$ per per ASCE 12.10.1.1

Level	w_{px} (k)	Σw_i (k)	F_x (k)	ΣF_i (k)	F_{px} (k)	Notes
Roof	76.70	76.70	17.59	17.59	17.59	
Upper Floor	153.80	230.50	15.75	33.33	28.91	= Fp-min

Seismic Weights Calculation

Quantum Consulting Engineers
Lundin Residence
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job # 18689.01

Upper Floor

	Roof		Steel Awning		Upper Floor Exterior Walls			Upper Floor Interior Walls		
Weight	**Area**	**q_{DL}**	**Area**	**q_{DL}**	**Length**	**Height**	**q_{DL}**	**Length**	**Height**	**q_{DL}**
kip	*ft^2*	*psf*	*ft^2*	*psf*	*ft*	*ft*	*psf*	*ft*	*ft*	*psf*
76.7	2711	18	455	12	170	8.8	11	102	7.3	8

Main Floor

	Floor		Garage Floor		Upper Floor Exterior Walls			Upper Floor Interior Walls		
Weight	**Area**	**q_{DL}**	**Area**	**q_{DL}**	**Length**	**Height**	**q_{DL}**	**Length**	**Height**	**q_{DL}**
kip	*ft^2*	*psf*	*ft^2*	*psf*	*ft*	*ft*	*psf*	*ft*	*ft*	*psf*
153.8	1832	36	541	63	170	8.8	11	102	7.3	8

Main Floor Exterior Walls			Main Floor Interior Walls			Covered Terrace	
Length	**Height**	**q_{DL}**	**Length**	**Height**	**q_{DL}**	**Area**	**q_{DL}**
ft	*ft*	*psf*	*ft*	*ft*	*psf*	*ft^2*	*psf*
170	5.5	11	185	5.5	8	324	40

Shearwall Load Distribution

Quantum Consulting Engineers
Lundin Residence
4041 West Mercer Way
Mercer Island, WA 98040

Blue cells indicate inputs!!

Quantum Job # 18689.01

Upper Floor:

Wind Load W = 23200 lb (E- W loading direction)
11290 lb (N-S loading direction)

Seismic Load E = 17590 lb (E- W loading direction)
17590 lb (N-S loading direction)

Total diaphragm area A = 2711 sf

East - West Direction

Shearwall lines	Trib. Area (sf)	Perc. %	Wind (lb)	Seismic (lb)
1	270	10	**2311**	**1752**
2	743	27	**6358**	**4821**
3	1076	40	**9208**	**6981**
4	622	23	**5323**	**4036**
2 (Clerestory)	358	13	**3064**	**2323**
		0	**0**	**0**
		0	**0**	**0**

North - South Direction

Shearwall lines	Trib. Area	Perc. %	Wind (lb)	Seismic (lb)
A	956	35	**3981**	**6203**
B (Main house)	1485	55	**6184**	**9635**
B (Garage)	270	10	**1124**	**1752**
		0	**0**	**0**
A (Clerestory)	431	16	**1795**	**2796**
		0	**0**	**0**

Main Floor:

Wind Load W = 27530 lb (E- W loading direction)
13270 lb (N-S loading direction)

Seismic Load E = 15750 lb (E- W loading direction)
15750 lb (N-S loading direction)

Total diaphragm area A = 2711 sf

East - West Direction

Shearwall lines	Trib. Area (sf)	Perc. %	Wind (lb)	Seismic (lb)	Upper Fl. Wind (lb)	Upper Fl. Seismic (lb)	Total Wind (lb)	Total Seismic (lb)
1	270	10	2742	1569	2311	1752	**5052**	**3320**
2	743	27	7545	4317	6358	4821	**13904**	**9137**
3	1076	40	10927	6251	9208	6981	**20135**	**13233**
4	622	23	6316	3614	5323	4036	**11639**	**7649**
		0	0	0	3064	2323	**3064**	**2323**
		0	0	0	0	0	**0**	**0**
		0	0	0	0	0	**0**	**0**

North - South Direction

Shearwall lines	Trib. Area (sf)	Perc. %	Wind (lb)	Seismic (lb)	Upper Fl. Wind (lb)	Upper Fl. Seismic (lb)	Total Wind (lb)	Total Seismic (lb)
A	978	36	4787	5682	3981	6203	**8768**	**11885**
B (Main house)	1094	40	5355	6356	6184	9635	**11539**	**15991**
B (Garage)	270	10	1322	1569	1124	1752	**2446**	**3320**
C	369	14	1806	2144	0	0	**1806**	**2144**
		0	0	0	1795	2796	**1795**	**2796**
		0	0	0	0	0	**0**	**0**

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 1
Location: Main Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	2,311	Strength Leve	Seismic (lb):	1,701	Strength Level		House?:	Yes

Shear Wall Line Information — **Loads Over Length of the Wall** — **Loads Tributary to End 1** — **Loads Tributary to End 2**

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	19.30	10.50	0.54	HF #2	0.43	x6	Interstory	2316								
							Interstory									
							Base									
							Base									

l_{sw} (ft) = **19.30**

Depth of Floor Framing at Interstory SW Segments (in) = 16.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-6	x6	2	CS16 (1705)
			2	
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	88	1.00	0.93	95	120	40%	0.93	92	**95**	**SW-6**	**416**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	19.30	19.30	0.00%	**OK**	No		
			NA		No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controll-ing Comp. Load (lb)	Controll-ing Lateral Load
1.00	648	0	648	754	0	754	100	0	0	100	0	0	854	666	854	666	**854**	**Wind**
		0			0													
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)

C_D = 1.60 **C_M =** 1.00 **C_t =** 1.00 c = 0.8 **C_b =** 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	22.09	470000	792	0.3167	725	5977	405	405	3341	3341	**2**
															2
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controll-ing Ten. Load (lb)	Controll-ing Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-648	-754	1158	1158	-60	-105	-60	32	**-105**	**Seismic**	CS16 (1705)	**-1705**	**OK**
											No Strap		
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 2
Location: Clerestory

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	3,064	Strength Leve	Seismic (lb):	2,255	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	14.20	3.50	0.25	HF #2	0.43	x6	Interstory	710								
							Interstory									
							Base									
							Base									

l_{sw} (ft) = **14.20**

Depth of Floor Framing at Interstory SW Segments (in) = 12.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-6	x6	2	CS16 (1705)
			2	
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	159	1.00	0.93	171	216	40%	0.93	166	**171**	**SW-6**	**416**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	14.20	14.20	0.00%	**OK**	No		
			NA		No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controll-ing Comp. Load (lb)	Controll-ing Lateral Load
1.00	389	0	389	453	0	453	42	0	0	42	0	0	495	382	495	382	**495**	**Wind**
		0			0													
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	6.82	470000	8311	0.9352	2140	17652	405	405	3341	3341	**2**
															2
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controll-ing Ten. Load (lb)	Controll-ing Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-389	-453	355	355	-240	-223	-240	-181	**-240**	**Wind**	CS16 (1705)	**-1705**	**OK**
											No Strap		
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 2
Location: Main Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	6,358	Strength Leve	Seismic (lb):	4,681	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{seg} (ft)	h_{sw} (ft)	h_{sw}/l_{seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	3.00	8.50	2.83	HF #2	0.43	x6	Interstory	297								
2	3.50	8.50	2.43	HF #2	0.43	x6	Interstory	327								
3	2.70	8.50	3.15	HF #2	0.43	x6	Interstory	265								
							Base									

l_{sw} (ft) = **9.20**

Depth of Floor Framing at Interstory SW Segments (in) = 16.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-2	x6	2	CMSTC16 (4585)
2	SW-2	x6	2	CMSTC16 (4585)
3	SW-2	x6	2	CMSTC16 (4585)
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	509	0.71	0.93	775	691	40%	0.93	531	**775**	**SW-2**	**1024**	**OK**	**Seismic**
2.00	509	0.82	0.93	664	691	40%	0.93	531	**664**	**SW-2**	**1024**	**OK**	**Seismic**
3.00	509	0.64	0.93	861	691	40%	0.93	531	**861**	**SW-2**	**1024**	**OK**	**Seismic**
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	3.00	3.00	0.00%	**OK**	No		
2.00	3.50	3.50	0.00%	**OK**	No		
3.00	2.70	2.70	0.00%	**OK**	No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controlling Comp. Load (lb)	Controlling Lateral Load
1.00	3027	0	3027	3525	0	3525	83	0	0	83	0	0	3607	2726	3607	2726	**3607**	**Wind**
2.00	3027	0	3027	3525	0	3525	78	0	0	78	0	0	3602	2721	3602	2721	**3602**	**Wind**
3.00	3027	0	3027	3525	0	3525	82	0	0	82	0	0	3606	2725	3606	2725	**3606**	**Wind**
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)

C_D = 1.60 **C_M =** 1.00 **C_t =** 1.00 c = 0.8 **C_b =** 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	17.55	470000	1255	0.4668	1068	8811	405	405	3341	3341	**2**
2.00	5.50	1.10	1300	2288	17.55	470000	1255	0.4668	1068	8811	405	405	3341	3341	**2**
3.00	5.50	1.10	1300	2288	17.55	470000	1255	0.4668	1068	8811	405	405	3341	3341	**2**
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16-15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16-16	Controlling Ten. Load (lb)	Controlling Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-3027	-3525	149	149	-3435	-2958	-3435	-2940	**-3435**	**Wind**	CMSTC16 (4585)	**-4585**	**OK**
2.00	-3027	-3525	164	164	-3426	-2951	-3426	-2931	**-3426**	**Wind**	CMSTC16 (4585)	**-4585**	**OK**
3.00	-3027	-3525	133	133	-3445	-2965	-3445	-2950	**-3445**	**Wind**	CMSTC16 (4585)	**-4585**	**OK**
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 3
Location: Main Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	9,208	Strength Leve	Seismic (lb):	6,779	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	8.00	10.50	1.31	HF #2	0.43	x6	Interstory	912								
2	8.60	14.50	1.69	HF #2	0.43	x6	Interstory	1256								
							Base									
							Base									

l_{sw} (ft) = **16.60**

Depth of Floor Framing at Interstory SW Segments (in) = 16.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-4	x6	2	CMSTC16 (4585)
2	SW-4	x6	2	CMSTC16 (4585)
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	408	1.00	0.93	439	555	40%	0.93	426	**439**	**SW-4**	**608**	**OK**	**Seismic**
2.00	408	1.00	0.93	439	555	40%	0.93	426	**439**	**SW-4**	**608**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	8.00	8.00	0.00%	**OK**	No		
2.00	8.60	8.60	0.00%	**OK**	No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controll-ing Comp. Load (lb)	Controll-ing Lateral Load
1.00	3002	0	3002	3495	0	3495	95	0	0	95	0	0	3590	2716	3590	2716	**3590**	**Wind**
2.00	4145	0	4145	4826	0	4826	122	0	0	122	0	0	4948	3741	4948	3741	**4948**	**Wind**
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	21.91	470000	805	0.3213	735	6066	405	405	3341	3341	**2**
2.00	5.50	1.10	1300	2288	30.64	470000	412	0.1727	395	3260	405	405	3341	3260	**2**
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controll-ing Ten. Load (lb)	Controll-ing Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-3002	-3495	456	456	-3221	-2788	-3221	-2734	**-3221**	**Wind**	CMSTC16 (4585)	**-4585**	**OK**
2.00	-4145	-4826	628	628	-4449	-3851	-4449	-3776	**-4449**	**Wind**	CMSTC16 (4585)	**-4585**	**OK**
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 4
Location: Main Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	5,323	Strength Leve	Seismic (lb):	3,919	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	22.30	14.50	0.65	HF #2	0.43	x6	Interstory	3568								
2	8.50	7.50	0.88	HF #2	0.43	x6	Base	765								
							Base									
							Base									

l_{sw} (ft) = **30.80**

Depth of Floor Framing at Interstory SW Segments (in) = 16.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-6	x6	2	CS16 (1705)
2	SW-6	x6	2	HDU2 (3075DF,2215HF)
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	127	1.00	0.93	137	173	40%	0.93	133	**137**	**SW-6**	**416**	**OK**	**Seismic**
2.00	127	1.00	0.93	137	173	40%	0.93	133	**137**	**SW-6**	**416**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	22.30	22.30	0.00%	**OK**	No		
2.00	8.50	8.50	0.00%	**OK**	No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controlling Comp. Load (lb)	Controlling Lateral Load
1.00	1291	0	1291	1504	0	1504	133	0	0	133	0	0	1637	1261	1637	1261	**1637**	**Wind**
2.00	668	0	668	778	0	778	75	0	0	75	0	0	853	658	853	658	**853**	**Wind**
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	30.82	470000	407	0.1708	391	3223	405	405	3341	3223	**2**
2.00	5.50	1.10	1300	2288	15.55	470000	1599	0.5579	1276	10531	405	405	3341	3341	**2**
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controlling Ten. Load (lb)	Controlling Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-1291	-1504	1784	1784	-433	-456	-433	-245	**-456**	**Seismic**	CS16 (1705)	**-1705**	**OK**
2.00	-668	-778	383	383	-548	-489	-548	-444	**-548**	**Wind**	HDU2 (3075DF,2215HF)	**-2215**	**OK**
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 1
Location: Lower Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	5,052	Strength Leve	Seismic (lb):	3,273	Strength Level		House?:	Yes

Shear Wall Line Information — **Loads Over Length of the Wall** — **Loads Tributary to End 1** — **Loads Tributary to End 2**

SW Segment Mark	l_{seg} (ft)	h_{sw} (ft)	h_{sw}/l_{seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	19.30	11.00	0.57	HF #2	0.43	x6	Base	7295								
							Base									
							Base									
							Base									

l_{sw} (ft) = **19.30**

Depth of Floor Framing at Interstory SW Segments (in) = 0.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-6	x6	2	No HD
			2	
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	170	1.00	0.93	182	262	40%	0.93	201	**201**	**SW-6**	**416**	**OK**	**Wind**
						40%				**SW-6**			
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	19.30	19.30	0.00%	**OK**	No		
			NA		No		
			NA		No		
			NA		No		

Determine Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controll-ing Comp. Load (lb)	Controll-ing Lateral Load
1.00	1306	105	1411	1728	60	1788	315	0	0	315	0	0	2103	1656	2103	1656	**2103**	**Wind**
		0			0													
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 **C_M =** 1.00 **C_t =** 1.00 c = 0.8 **C_b =** 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	23.18	470000	719	0.2904	665	5482	405	405	3341	3341	**2**
															2
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controll-ing Ten. Load (lb)	Controll-ing Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-1411	-1788	3648	3648	401	298	401	730	**298**	**Seismic**	No HD	**0**	**OK**
											No HD		
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 2
Location: Lower Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	13,904	Strength Leve	Seismic (lb):	9,006	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{seg} (ft)	h_{sw} (ft)	h_{sw}/l_{seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	7.50	11.00	1.47	DF #2	0.50	x6	Base	3495								
2	9.00	11.00	1.22	DF #2	0.50	x6	Base	4194								
3	8.50	11.00	1.29	HF #2	0.43	x6	Base	1150								
							Base									

l_{sw} (ft) = **25.00**

Depth of Floor Framing at Interstory SW Segments (in) = 0.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-4	x6	3	(3) Studs (7870DF, 5665HF)
2	SW-4	x6	3	(3) Studs (7870DF, 5665HF)
3	SW-4	x6	2	HDU5 (5645DF, 4065HF)
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	360	1.00	1.00	360	556	40%	1.00	397	**397**	**SW-4**	**608**	**OK**	**Wind**
2.00	360	1.00	1.00	360	556	40%	1.00	397	**397**	**SW-4**	**608**	**OK**	**Wind**
3.00	360	1.00	0.93	387	556	40%	0.93	427	**427**	**SW-4**	**608**	**OK**	**Wind**
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	7.50	7.50	0.00%	**OK**	No		
2.00	9.00	9.00	0.00%	**OK**	No		
3.00	8.50	8.50	0.00%	**OK**	No		
			NA		No		

Determine Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controlling Comp. Load (lb)	Controlling Lateral Load
1.00	2774	4543	7317	3671	3909	7580	388	0	0	388	0	0	7968	6073	7968	6073	**7968**	**Wind**
2.00	2774	4543	7317	3671	3909	7580	388	0	0	388	0	0	7968	6073	7968	6073	**7968**	**Wind**
3.00	2774	0	2774	3671	0	3671	113	0	0	113	0	0	3783	2866	3783	2866	**3783**	**Wind**
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1350	2376	23.00	580000	901	0.3434	816	6731	625	625	5156	5156	**3**
2.00	5.50	1.10	1350	2376	23.00	580000	901	0.3434	816	6731	625	625	5156	5156	**3**
3.00	5.50	1.10	1300	2288	23.00	470000	730	0.2946	674	5561	405	405	3341	3341	**2**
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controlling Ten. Load (lb)	Controlling Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-7317	-7580	1748	1748	-6531	-6498	-6531	-6291	**-6531**	**Wind**	HDU8 (3) Studs (7870DF, 5665HF)	**-7870**	**OK**
2.00	-7317	-7580	2097	2097	-6321	-6335	-6321	-6086	**-6335**	**Seismic**	HDU8 (3) Studs (7870DF, 5665HF)	**-7870**	**OK**
3.00	-2774	-3671	575	575	-3326	-2505	-3326	-2436	**-3326**	**Wind**	HDU5 (5645DF, 4065HF)	**-4065**	**OK**
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 3
Location: Lower Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	20,135	Strength Leve	Seismic (lb):	13,042	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	20.50	11.00	0.54	HF #2	0.43	x6	Base	2788								
							Base									
							Base									
							Base									

l_{sw} (ft) = **20.50**

Depth of Floor Framing at Interstory SW Segments (in) = 0.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-3	x6	3	(3) Studs (7870DF, 5665HF)
			2	
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	636	1.00	0.93	684	982	40%	0.93	754	**754**	**SW-3**	**784**	**OK**	**Wind**
						40%				**SW-6**			
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	20.50	20.50	0.00%	**OK**	No		
			NA		No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controll-ing Comp. Load (lb)	Controll-ing Lateral Load
1.00	4899	0	4899	6482	0	6482	113	0	0	113	0	0	6596	4975	6596	4975	**6596**	**Wind**
		0			0													
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)

C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	23.00	470000	730	0.2946	674	5561	405	405	3341	3341	**3**
															2
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controll-ing Ten. Load (lb)	Controll-ing Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-4899	-6482	1394	1394	-5646	-4246	-5646	-4081	**-5646**	**Wind**	HDU8 (3) Studs (7870DF, 5665HF)	**-5665**	**OK**
											No HD		
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: 4
Location: Lower Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	11,639	Strength Leve	Seismic (lb):	7,539	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	16.00	11.00	0.69	HF #2	0.43	x6	Base	2144								
2	13.00	11.00	0.85	HF #2	0.43	x6	Base	3000								
							Base									
							Base									

l_{sw} (ft) = **29.00**

Depth of Floor Framing at Interstory SW Segments (in) = 0.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-6	x6	2	HDU4 (4565DF, 3285HF)
2	SW-6	x6	2	HDU2 (3075DF,2215HF)
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	260	1.00	0.93	280	401	40%	0.93	308	**308**	**SW-6**	**416**	**OK**	**Wind**
2.00	260	1.00	0.93	280	401	40%	0.93	308	**308**	**SW-6**	**416**	**OK**	**Wind**
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	16.00	16.00	0.00%	**OK**	No		
2.00	13.00	13.00	0.00%	**OK**	No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controlling Comp. Load (lb)	Controlling Lateral Load
1.00	2002	456	2458	2649	433	3082	112	0	0	112	0	0	3194	2423	3194	2423	**3194**	**Wind**
2.00	2002	0	2002	2649	0	2649	192	0	0	192	0	0	2841	2179	2841	2179	**2841**	**Wind**
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 **C_M =** 1.00 **C_t =** 1.00 c = 0.8 **C_b =** 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	23.18	470000	719	0.2904	665	5482	405	405	3341	3341	**2**
2.00	5.50	1.10	1300	2288	23.18	470000	719	0.2904	665	5482	405	405	3341	3341	**2**
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controlling Ten. Load (lb)	Controlling Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-2458	-3082	1072	1072	-2439	-1956	-2439	-1829	**-2439**	**Wind**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**
2.00	-2002	-2649	1500	1500	-1749	-1299	-1749	-1121	**-1749**	**Wind**	HDU2 (3075DF,2215HF)	**-2215**	**OK**
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: A
Location: Clerestory

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	1,795	Strength Leve	Seismic (lb):	2,715	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{seg} (ft)	h_{sw} (ft)	h_{sw}/l_{seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	5.30	3.50	0.66	HF #2	0.43	x6	Interstory	742								
2	18.00	3.50	0.19	HF #2	0.43	x6	Interstory	2520								
						x6	Base									
							Base									

l_{sw} (ft) = **23.30**

Depth of Floor Framing at Interstory SW Segments (in) = 14.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-6	x6	2	CS16 (1705)
2	SW-6	x6	2	No Strap
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	117	1.00	0.93	125	77	40%	0.93	59	**125**	**SW-6**	**416**	**OK**	**Seismic**
2.00	117	1.00	0.93	125	77	40%	0.93	59	**125**	**SW-6**	**416**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	5.30	5.30	0.00%	**OK**	No		
2.00	18.00	18.00	0.00%	**OK**	No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controlling Comp. Load (lb)	Controlling Lateral Load
1.00	285	0	285	162	0	162	117	0	0	117	0	0	418	342	418	342	**418**	**Seismic**
2.00	285	0	285	162	0	162	117	0	0	117	0	0	418	342	418	342	**418**	**Seismic**
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	6.82	470000	8311	0.9352	2140	17652	405	405	3341	3341	**2**
2.00	5.50	1.10	1300	2288	6.82	470000	8311	0.9352	2140	17652	405	405	3341	3341	**2**
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controlling Ten. Load (lb)	Controlling Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-285	-162	371	371	61	-112	61	-68	**-112**	**Seismic**	CS16 (1705)	**-1705**	**OK**
2.00	-285	-162	1260	1260	594	305	594	454	**305**	**Seismic**	No Strap	**0**	**OK**
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: A
Location: Main Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	3,981	Strength Leve	Seismic (lb):	6,023	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{seg} (ft)	h_{sw} (ft)	h_{sw}/l_{seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	3.30	4.50	1.36	HF #2	0.43	x6	Base	371								
2	2.70	7.00	2.59	HF #2	0.43	x6	Base	474								
3	7.50	10.50	1.40	HF #2	0.43	x6	Base	1294								
4	2.90	9.50	3.28	HF #2	0.43	x6	Base	843								

l_{sw} (ft) = **16.40**

Depth of Floor Framing at Interstory SW Segments (in) = 0.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-3	x6	2	HDU4 (4565DF, 3285HF)
2	SW-3	x6	2	HDU4 (4565DF, 3285HF)
3	SW-3	x6	2	HDU4 (4565DF, 3285HF)
4	SW-3	x6	2	HDU4 (4565DF, 3285HF)

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	367	1.00	0.93	395	243	40%	0.93	186	**395**	**SW-3**	**784**	**OK**	**Seismic**
2.00	367	0.77	0.93	512	243	40%	0.93	186	**512**	**SW-3**	**784**	**OK**	**Seismic**
3.00	367	1.00	0.93	395	243	40%	0.93	186	**395**	**SW-3**	**784**	**OK**	**Seismic**
4.00	367	0.61	0.93	647	243	40%	0.93	186	**647**	**SW-3**	**784**	**OK**	**Seismic**

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	3.30	3.30	0.00%	**OK**	No		
2.00	2.70	2.70	0.00%	**OK**	No		
3.00	7.50	7.50	0.00%	**OK**	No		
4.00	2.90	2.90	0.00%	**OK**	No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controlling Comp. Load (lb)	Controlling Lateral Load
1.00	1157	0	1157	655	0	655	94	0	0	94	0	0	1263	971	1263	971	**1263**	**Seismic**
2.00	1800	0	1800	1020	0	1020	146	0	0	146	0	0	1965	1510	1965	1510	**1965**	**Seismic**
3.00	2699	0	2699	1529	0	1529	144	0	0	144	0	0	2862	2182	2862	2182	**2862**	**Seismic**
4.00	2442	0	2442	1384	0	1384	242	0	0	242	0	0	2716	2098	2716	2098	**2716**	**Seismic**

Determine Number of Shear Wall End Compression Studs (ASD)

C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	8.82	470000	4968	0.8801	2014	16612	405	405	3341	3341	**2**
2.00	5.50	1.10	1300	2288	14.27	470000	1897	0.6230	1425	11760	405	405	3341	3341	**2**
3.00	5.50	1.10	1300	2288	21.91	470000	805	0.3213	735	6066	405	405	3341	3341	**2**
4.00	5.50	1.10	1300	2288	19.73	470000	993	0.3855	882	7277	405	405	3341	3341	**2**

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16-15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16-16	Controlling Ten. Load (lb)	Controlling Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-1157	-655	186	186	-544	-1070	-544	-1048	**-1070**	**Seismic**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**
2.00	-1800	-1020	237	237	-877	-1689	-877	-1660	**-1689**	**Seismic**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**
3.00	-2699	-1529	647	647	-1141	-2396	-1141	-2320	**-2396**	**Seismic**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**
4.00	-2442	-1384	422	422	-1131	-2245	-1131	-2195	**-2245**	**Seismic**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: B
Location: Main Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	6,184	Strength Leve	Seismic (lb):	9,356	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	16.50	14.50	0.88	HF #2	0.43	x6	Interstory	6630								
							Base									
							Base									
							Base									

l_{sw} (ft) = **16.50**

Depth of Floor Framing at Interstory SW Segments (in) = 16.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-3	x6	2	CMSTC16 (4585)
			2	
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	567	1.00	0.93	610	375	40%	0.93	288	**610**	**SW-3**	**784**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	16.50	16.50	0.00%	**OK**	No		
			NA		No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controlling Comp. Load (lb)	Controlling Lateral Load
1.00	5755	0	5755	3261	0	3261	335	0	0	335	0	0	6134	4684	6134	4684	**6134**	**Seismic**
		0			0													
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	30.64	470000	412	0.1727	395	3260	405	405	3341	3260	**2**
															2
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controlling Ten. Load (lb)	Controlling Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-5755	-3261	3315	3315	-1272	-4203	-1272	-3810	**-4203**	**Seismic**	CMSTC16 (4585)	**-4585**	**OK**
											No HD		
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: B
Location: Main Floor (Garage)

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	1,124	Strength Leve	Seismic (lb):	1,701	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	14.00	10.50	0.75	HF #2	0.43	x6	Interstory	3885								
							Base									
							Base									
							Base									

l_{sw} (ft) = **14.00**

Depth of Floor Framing at Interstory SW Segments (in) = 16.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-6	x6	2	No Strap
			2	
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	122	1.00	0.93	131	80	40%	0.93	62	**131**	**SW-6**	**416**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	14.00	14.00	0.00%	**OK**	No		
			NA		No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controll-ing Comp. Load (lb)	Controll-ing Lateral Load
1.00	893	0	893	506	0	506	231	0	0	231	0	0	1155	924	1155	924	**1155**	**Seismic**
		0			0													
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)
C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	22.09	470000	792	0.3167	725	5977	405	405	3341	3341	**2**
															2
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controll-ing Ten. Load (lb)	Controll-ing Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-893	-506	1943	1943	660	17	660	247	**17**	**Seismic**	No Strap	**0**	**OK**
											No HD		
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: B
Location: Lower Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	11,539	Strength Leve	Seismic (lb):	15,724	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{seg} (ft)	h_{sw} (ft)	h_{sw}/l_{seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	6.50	11.00	1.69	DF #2	0.50	x6	Base	3692								
2	5.60	11.00	1.96	DF #2	0.50	x6	Base	3181								
3	6.50	11.00	1.69	HF #2	0.43	x6	Base	3692								
4	13.50	11.00	0.81	HF #2	0.43	x6	Base	7506								

l_{sw} (ft) = **32.10**

Depth of Floor Framing at Interstory SW Segments (in) = 0.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-4	x6	3	(3) Studs (7870DF, 5665HF)
2	SW-4	x6	3	(3) Studs (7870DF, 5665HF)
3	SW-4	x6	2	HDU4 (4565DF, 3285HF)
4	SW-4	x6	2	HDU4 (4565DF, 3285HF)

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	490	1.00	1.00	490	359	40%	1.00	257	**490**	**SW-4**	**608**	**OK**	**Seismic**
2.00	490	1.00	1.00	490	359	40%	1.00	257	**490**	**SW-4**	**608**	**OK**	**Seismic**
3.00	490	1.00	0.93	527	359	40%	0.93	276	**527**	**SW-4**	**608**	**OK**	**Seismic**
4.00	490	1.00	0.93	527	359	40%	0.93	276	**527**	**SW-4**	**608**	**OK**	**Seismic**

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	6.50	6.50	0.00%	**OK**	No		
2.00	5.60	5.60	0.00%	**OK**	No		
3.00	6.50	6.50	0.00%	**OK**	No		
4.00	13.50	13.50	0.00%	**OK**	No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controll-ing Comp. Load (lb)	Controll-ing Lateral Load
1.00	3772	4203	7975	2373	1272	3645	473	0	0	473	0	0	8510	6501	8510	6501	**8510**	**Seismic**
2.00	3772	4203	7975	2373	1272	3645	473	0	0	473	0	0	8510	6501	8510	6501	**8510**	**Seismic**
3.00	3772	0	3772	2373	0	2373	473	0	0	473	0	0	4307	3349	4307	3349	**4307**	**Seismic**
4.00	3772	0	3772	2373	0	2373	463	0	0	463	0	0	4296	3338	4296	3338	**4296**	**Seismic**

Determine Number of Shear Wall End Compression Studs (ASD)

C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1350	2376	23.00	580000	901	0.3434	816	6731	625	625	5156	5156	**3**
2.00	5.50	1.10	1350	2376	23.00	580000	901	0.3434	816	6731	625	625	5156	5156	**3**
3.00	5.50	1.10	1300	2288	23.00	470000	730	0.2946	674	5561	405	405	3341	3341	**2**
4.00	5.50	1.10	1300	2288	23.00	470000	730	0.2946	674	5561	405	405	3341	3341	**2**

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16-15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16-16	Controll-ing Ten. Load (lb)	Controll-ing Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-7975	-3645	1846	1846	-2537	-7110	-2537	-6891	**-7110**	**Seismic**	HDU8 (3) Studs (7870DF, 5665HF)	**-7870**	**OK**
2.00	-7975	-3645	1591	1591	-2690	-7230	-2690	-7041	**-7230**	**Seismic**	HDU8 (3) Studs (7870DF, 5665HF)	**-7870**	**OK**
3.00	-3772	-2373	1846	1846	-1265	-2907	-1265	-2688	**-2907**	**Seismic**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**
4.00	-3772	-2373	3753	3753	-121	-2014	-121	-1569	**-2014**	**Seismic**	HDU4 (4565DF, 3285HF)	**-3285**	**OK**

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: B
Location: Lower Floor (Garage)

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	2,446	Strength Leve	Seismic (lb):	3,273	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{Seg} (ft)	h_{sw} (ft)	h_{SW}/l_{Seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
								Loads Over Length of the Wall			Loads Tributary to End 1			Loads Tributary to End 2		
1	5.00	11.00	2.20	HF #2	0.43	x6	Base	760								
				HF #2		x6	Base									
				HF #2		x6	Base									
				HF #2		x6	Base									

l_{sw} (ft) = **5.00**

Depth of Floor Framing at Interstory SW Segments (in) = 0.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-3	x6	3	HDU8 (3) Studs (7870DF, 5665HF)
			2	
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	655	0.91	0.93	774	489	40%	0.93	376	**774**	**SW-3**	**784**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	5.00	5.00	0.00%	**OK**	No		
			NA		No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controll-ing Comp. Load (lb)	Controll-ing Lateral Load
1.00	5040	0	5040	3229	0	3229	127	0	0	127	0	0	5184	3919	5184	3919	**5184**	**Seismic**
		0			0													
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)

C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	23.00	470000	730	0.2946	674	5561	405	405	3341	3341	**3**
															2
															2
															2

Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controll-ing Ten. Load (lb)	Controll-ing Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-5040	-3229	380	380	-3001	-4862	-3001	-4817	**-4862**	**Seismic**	HDU8 (3) Studs (7870DF, 5665HF)	**-5665**	**OK**
											No HD		
											No HD		
											No HD		

QUANTUM | CONSULTING ENGINEERS

1511 Third Avenue, Suite 323 T. 206.957.3900
Seattle, WA 98101 F. 206.957.3901

Project	Lundin Residence	Job #	18689.01	Page	1 of 1
Client	David & Jaymee Lundin	By	Qing	Date	01/07/19
Subject	Wood Shear Wall	Checked	Sandro	Date	1/7/2019

Base Floor Wood Shear Wall Design
Per IBC 2015, ASCE 7-10, SDPWS-2015, & NDS 2015

Structure: Lundin Residence
Shear Wall Line: C
Location: Lower Floor

Shear Wall Line Loading:

Lateral Loads		Tributary Width		Total Width		Total Wind		Total Seis
Wind (lb):	1,806	Strength Leve	Seismic (lb):	2,148	Strength Level		House?:	Yes

Shear Wall Line Information

SW Segment Mark	l_{seg} (ft)	h_{sw} (ft)	h_{sw}/l_{seg}	Wall Framing Species	Specific Gravity G	Wall Depth	Interstory of Base?	Loads Over Length of the Wall: Wall DL (lb) Wall	Wall LL (lb) Wall	Wall SL (lb) Wall	Loads Tributary to End 1: Wall DL (lb) End 1	Wall LL (lb) End 1	Wall SL (lb) End 1	Loads Tributary to End 2: Wall DL (lb) End 2	Wall LL (lb) End 2	Wall SL (lb) End 2
1	8.50	11.00	1.29	HF #2	0.43	x6	Base	2873								
2	6.00	11.00	1.83	HF #2	0.43	x6	Base	804								
				HF #2		x6	Base									
				HF #2		x6	Base									

I_{sw} (ft) = **14.50**

Depth of Floor Framing at Interstory SW Segments (in) = 0.00

Shear Wall Summary

SW Segment Mark	Shear Wall Type	Wall Depth	# of End Studs	Holdown
1	SW-6	x6	2	HDU2 (3075DF,2215HF)
2	SW-6	x6	2	HDU2 (3075DF,2215HF)
			2	
			2	

Shear Wall Schedule (LRFD) ϕ_D = 0.8

Shear Wall Type	Sheathing Grade, Sheathing Thickness, & Nail Size	Panel Edge Nail Spacing (in)	Nominal Seismic SW Capacity (plf)	LRFD Seismic SW Capacity (plf)	Sheathing Shear Stiffness, G_a (lb/in)
SW-6	APA Rated, 15/32", 8d Common	6	**520**	**416**	**10**
SW-4	APA Rated, 15/32", 8d Common	4	**760**	**608**	**13**
SW-3	APA Rated, 15/32", 8d Common	3	**980**	**784**	**15**
SW-2	APA Rated, 15/32", 8d Common	2	**1280**	**1024**	**20**
2SW-4	APA Rated, 15/32", 8d Common	4	**1520**	**1216**	**26**
2SW-3	APA Rated, 15/32", 8d Common	3	**1960**	**1568**	**30**
2SW-2	APA Rated, 15/32", 8d Common	2	**2560**	**2048**	**40**

Determine Shear Wall Type (LRFD)

SW Segment Mark	Seismic Shear (plf)	Seismic Aspect Ratio Reduction	Species Reduction	Adjusted Seismic Shear (plf)	Wind Shear (plf)	Allowable Shear Increase	Species Reduction	Adjusted Wind Shear (plf)	Req'd Shear (plf)	Shear Wall Type	Shear Wall Capacity (plf)	Check	Controlling Shear
1.00	148	1.00	0.93	159	125	40%	0.93	96	**159**	**SW-6**	**416**	**OK**	**Seismic**
2.00	148	1.00	0.93	159	125	40%	0.93	96	**159**	**SW-6**	**416**	**OK**	**Seismic**
						40%				**SW-6**			
						40%				**SW-6**			

Determine Shear Wall Overturning Moment Lever Arm

SW Segment Mark	Assumed M_{OT} Lever Arm (ft)	Actual M_{OT} Lever Arm (ft)	% Different	Status	Override Lever Arm?	User Input M_{OT} Lever Arm (ft)	% Different
1.00	8.50	8.50	0.00%	**OK**	No		
2.00	6.00	6.00	0.00%	**OK**	No		
			NA		No		
			NA		No		

Determine Controlling Shear Wall End Axial Compression Load (ASD) Sds = 0.94

SW Segment Mark	Seismic Comp. (lb)	ASD Seismic Comp. Above (lb)	Seismic Comp. Total (lb)	Wind Comp. (lb)	ASD Wind Comp. Above (lb)	Wind Comp. Total (lb)	End 1 Dead (lb)	End 1 Live (lb)	End 1 Snow (lb)	End 2 Dead (lb)	End 2 Live (lb)	End 2 Snow (lb)	End 1 Eq. 16-12		End 2 Eq. 16-12	End 2 Max Eq. 16-13 & 16-14	Controlling Comp. Load (lb)	Controlling Lateral Load
1.00	1141	0	1141	822	0	822	282	0	0	282	0	0	1459	1165	1459	1165	**1459**	**Seismic**
2.00	1141	0	1141	822	0	822	112	0	0	112	0	0	1267	978	1267	978	**1267**	**Seismic**
		0			0													
		0			0													

Determine Number of Shear Wall End Compression Studs (ASD)

C_D = 1.60 C_M = 1.00 C_t = 1.00 c = 0.8 C_b = 1.00

SW Segment Mark	d (in)	C_F	F_c (psi)	F'_c (psi)	l_e/d	E'_{min} (psi)	F_{cE} (psi)	C_P	F'_c (psi)	P'_c (lb)	$F_{c\perp}$ (psi)	$F'_{c\perp}$ (psi)	$P'_{c\perp}$ (lb)	P_{All} per Stud (lb)	# of End Studs Req'd
1.00	5.50	1.10	1300	2288	23.18	470000	719	0.2904	665	5482	405	405	3341	3341	**2**
2.00	5.50	1.10	1300	2288	23.18	470000	719	0.2904	665	5482	405	405	3341	3341	**2**
															2
															2

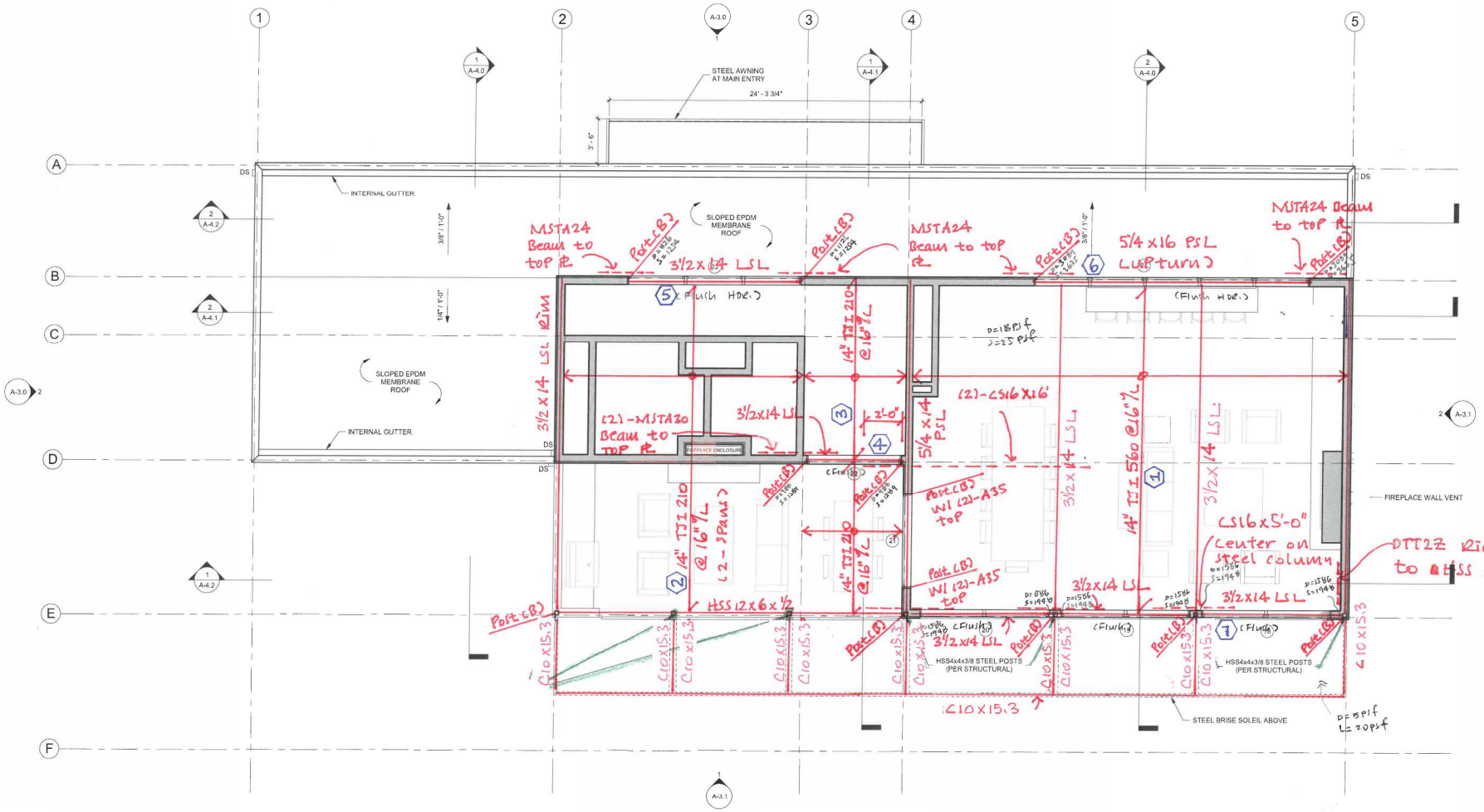
Determine Controlling Shear Wall End Axial Tension Load and Required Holdown (ASD)

SW Segment Mark	Seismic Ten. Total (lb)	Wind Ten. Total (lb)	End 1 Dead (lb)	End 2 Dead (lb)	End 1 Eq. 16 15	End 1 Eq. 16-16	End 2 Eq. 16-15	End 2 Eq. 16 16	Controlling Ten. Load (lb)	Controlling Lateral Load	Holdown	Holdown Capacity (lb)	Status
1.00	-1141	-822	1437	1437	40	-468	40	-298	**-468**	**Seismic**	HDU2 (3075DF,2215HF)	**-2215**	**OK**
2.00	-1141	-822	402	402	-581	-952	-581	-905	**-952**	**Seismic**	HDU2 (3075DF,2215HF)	**-2215**	**OK**
											No HD		
											No HD		

LUNDIN RESIDENCE
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 18689.01

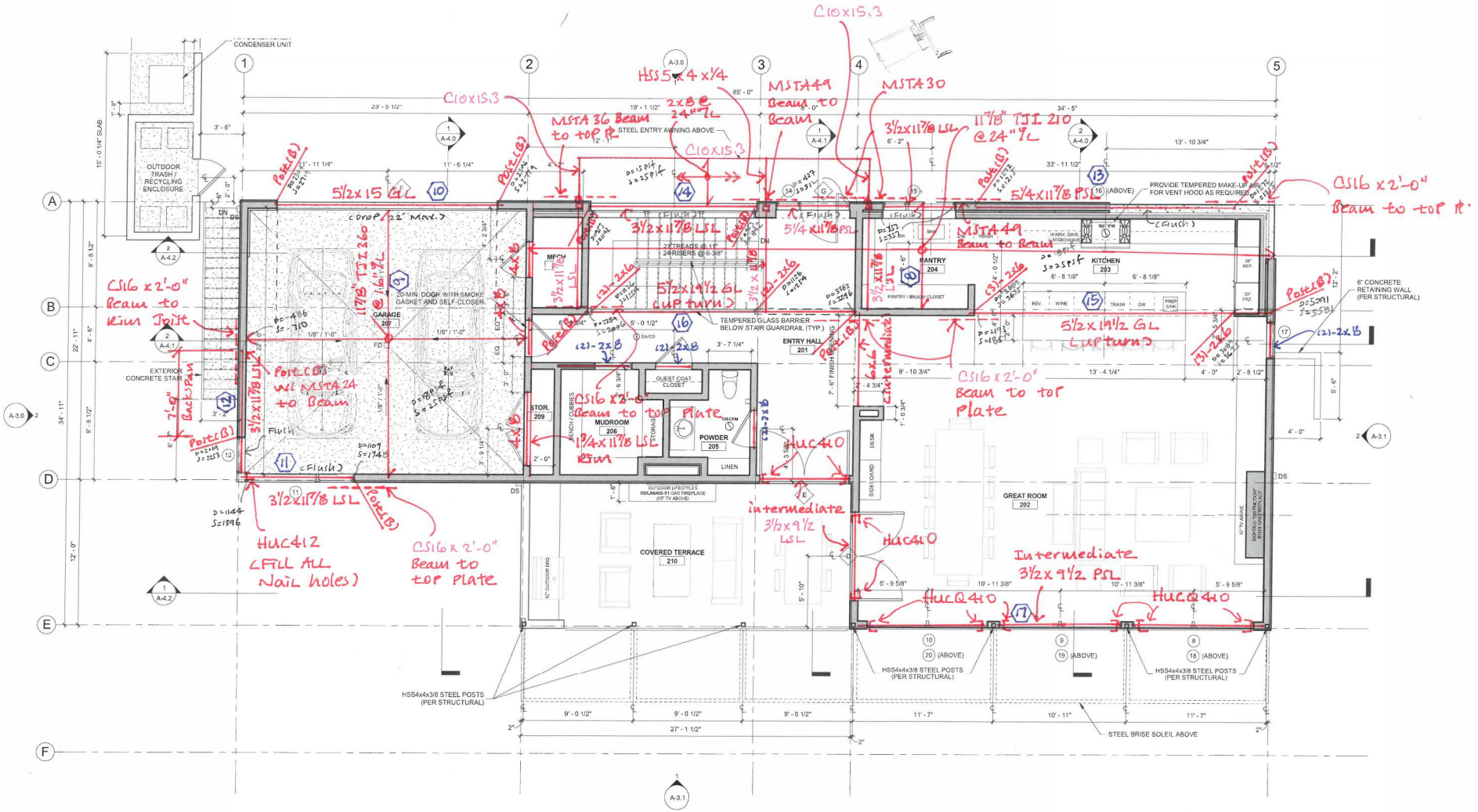
GRAVITY CALCULATIONS



1 CLERESTORY PLAN
1/4" = 1'-0"

Upper Roof Framing
1/8" = 1'-0"

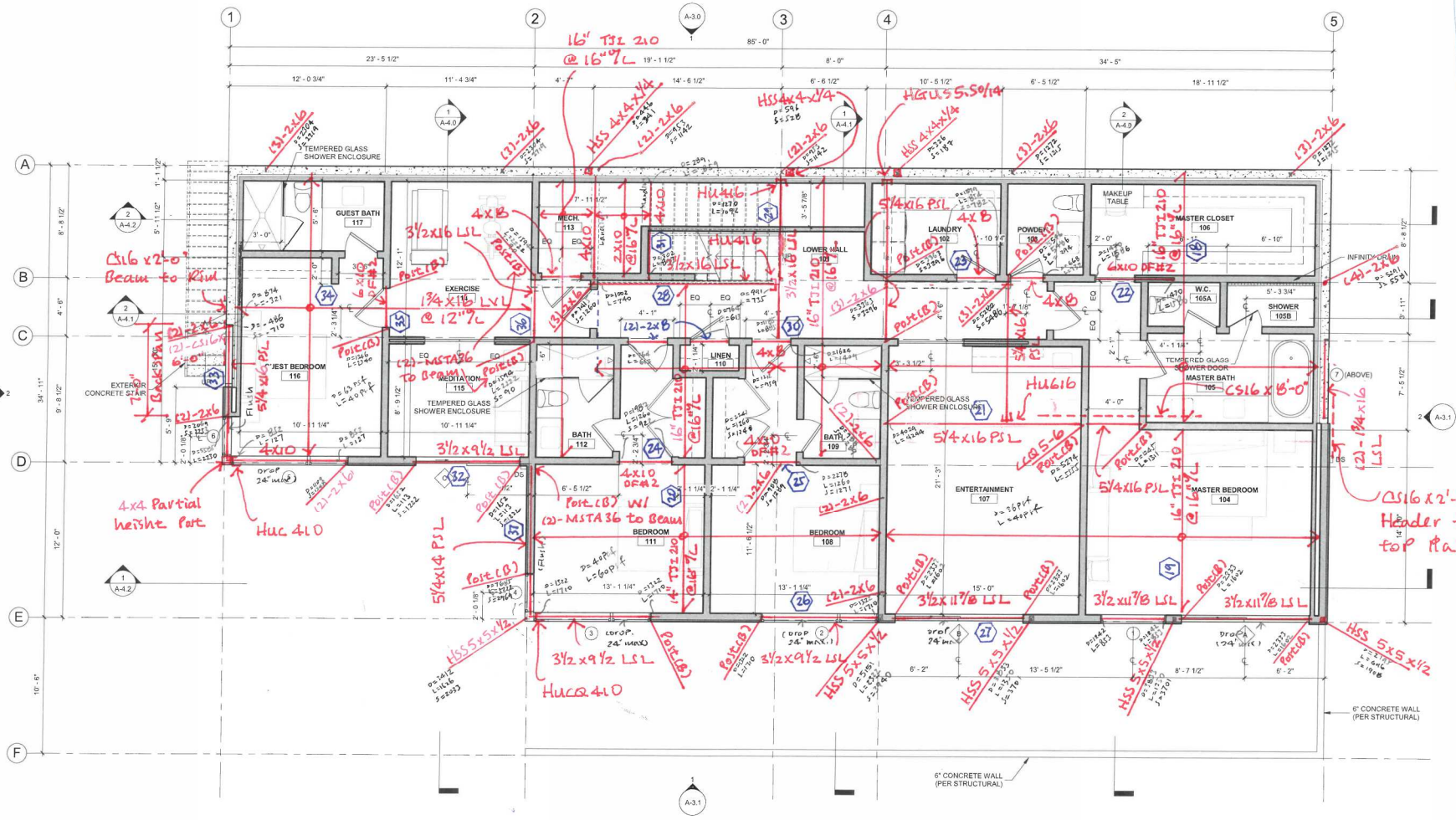
C-2



1 MAIN FLOOR PLAN
1/4" = 1'-0"

C-3

Low Roof Framing
1/8" = 1'-0"



1 LOWER FLOOR PLAN
1/4" = 1'-0"

Main Floor Framing
6 1/8" = 1'-0"

C-4

Design Loads:

Roof:
Dead = 18 psf
Snow = 30 psf

Floor:
Dead = 36 psf
Live = 40 psf

Garage Floor:
Dead = 63 psf
Live = 40 psf

Covered Terrace Floor:
Dead = 40 psf
Live = 60 psf

Wall:
Dead = 11 psf (EXT.)
= 9 psf (int.)

Upper Roof Framing:

①. L = 25'-2"				
Roof	16" o/c	18 psf	30 psf	Fully
②. L = 25'-2" ( )				
Roof	16" o/c	18 psf	30 psf	Fully
③. L = 13'-2"				
Roof	16" o/c	18 psf	30 psf	Fully
④. L = 7'-4"				
Roof	13'-2"	18 psf	30 psf	Fully
⑤. L = 13.5'				
Roof	7'-2"	18 psf	30 psf	Fully
Wall	1'-6"	11 psf	—	Fully
⑥. L = 21'-4"				
Roof	13'-2"	18 psf	30 psf	Fully
Wall	1'-6"	11 psf	—	Fully
⑦. L = 11.25'				
Roof	13'-2"	18 psf	30 psf	Fully
Wall	1.5'	11 psf	—	Fully

QUANTUM | CONSULTING ENGINEERS
1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

Lundin residence — project
12-10-18 — date
18639.01 — project no.
Qing — designer
G-1 — sheet
David & Jaymee Lundin — client
Sandro — checked by

Low Roof Framing:

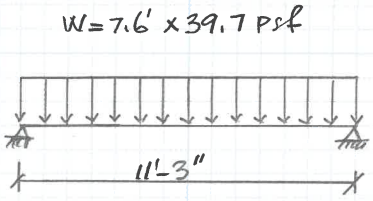
(8). L = 8'-2"				
Roof	24" @	18 psf	30psf	Full
(9). L = 22'-0"				
Roof	16" @	18psf	30psf	Full
(10). L = 18'-2"				
Roof	11.5'	18psf	30psf	Full
Wall	1.5'	11 psf	—	Full
(11). L = 9'				
Roof	11.5'	18psf	30psf	Full
Wall	1.5'	11 psf	—	Full
(12). L = 10.5' (A10 A9)				
Roof	8"	18psf	30psf	Full
Wall	1.5'	11 psf	—	Full
Point Load	—	1144#	S=1675#	@10.5'
(13). L = 21'-4"				
Roof	4.4'	18psf	30psf	Full
Wall	1.5'	11 psf	—	Full
(14). L = 14'				
Roof	4.4'	18psf	30 psf	Full
Wall	1.5'	11 psf	—	Full
Awning	1.9'	12psf	30psf	Full
(15). L = 24'-1"				
Roof	13'-2"	18psf	30 psf	21'-4" → 24'-1"
Wall	1.5'	11 psf	—	21'-4" → 24'-1"
Wall	3.5'	11 psf	—	Full
Roof	4.4'	18psf	30psf	Full
Point Load	—	3089#	S=4361	@21'-4"
(16). L = 22'				
Roof	7'-2"	18psf	30psf	13'-9" → 22'
Wall	1.5'	11 psf	—	13'-9" → 22'
Wall	3.5'	11 psf	—	Full
~~Low Roof~~	~~4.4'~~	~~18 psf~~	~~30psf~~	~~Full~~
Point Load	—	1126#	S=1505#	@13'-9"

QUANTUM | CONSULTING ENGINEERS

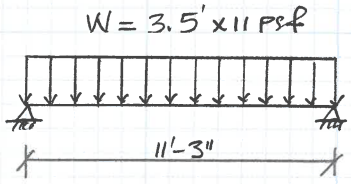
1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

Lundin residence — project
12-10-18 — date
18689.01 — project no.
Qing — designer
G-2 — sheet
David & Jaymee Lundin — client
Sandro — checked by

(7). Wind Beam @ Great room!



Wind Load



Gravity Load

Interaction Equations:

$$\frac{f_b}{f_b'} + \frac{f_b}{f_b'} \le 1.0 \Rightarrow \frac{1772\ psi}{2900\ psi} + \frac{139\ psi}{2854\ psi} = 0.66 < 1.0 \quad ok$$

↑ wind ↑ Gravity

$$\frac{f_v}{f_v'} + \frac{f_v}{f_v'} \le 1.0 \Rightarrow \frac{43.6\ psi}{290\ psi} + \frac{8.41\ psi}{290\ psi} = 0.18 < 1.0 \quad ok$$

↑ wind ↑ Gravity

* Use 3½ x 9½ PSL Flat @ great room

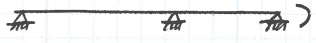
* see Enercal Attached

QUANTUM | CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

Lundin Residence (project)		12-11-18 (date)	1868.01 (project no.)
		Qing (designer)	G-3 (sheet)
David & Jaymee Lundin (client)		Sandro (checked by)	

Main Floor Framing:

(18). L= 18'-11" (C )

Floor	16"℄	36psf	40psf	Fum
Point Load	—	610 #	S=700#	@ 11'-1"

(19). L= 14'-4"

Floor	16"℄	36psf	40psf	Fum

(20). L= 11.5'

Floor	16"℄	40psf	60psf	Fum

(21). L= 15'

Floor	13'-4"	36psf	40psf	Fum

(22). L= 6'

Floor	12.2'	36psf	40psf	Fum

(23). L= 3'-0"

Roof	13'-2"	18psf	30psf	Fum
Wall	5'	11 psf	—	Fum
Low Roof	4.7'	18 psf	30psf	Fum
Wall	10'	9 psf	—	Fum
Floor	12.2'	36psf	40psf	Fum

(24). L= 4'

Roof	16.4'	18psf	30psf	Fum
Wall	14.5'	11 psf	—	Fum
Floor	5'	36psf	40psf	Fum
Terrace	6'	40psf	60psf	Fum

(25). L= 4'

Roof	16.4'	18psf	30psf	0'→2'-9"
Wall	14.5'	11 psf	—	Fum
Floor	5'	36psf	40psf	Fum
Terrace	6'	40psf	60psf	Fum
Point Load	—	988#	S=1547#	@2'-9"

QUANTUM | CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

Lundin Residence (project)		12-11-18 (date)	18689.01 (project no.)
		Qing (designer)	G-4 (sheet)
David & Jaymee Lundin (client)		Sandro (checked by)	

(26). L = 9'-0"

Guardrail	3.5'	8psf	–	Full
Terrace	6'	40psf	60psf	Full

(27). L = 9'-10"

Wall	14.5'	11 psf	–	Full
Floor	7.75'	36psf	40psf	Full

(28). L = 14'-0"

Guardrail	3.5'	8psf	–	Full
Floor	2.5'	36psf	40psf	Full

(29). L = 12.5'

Guardrail	3.5'	8psf	–	4'-9" → 9'
Floor	8"	36psf	40psf	Full
	8"	36psf	40psf	0' → 4'-9"
stair	5'	36psf	40psf	9' → 12.5'
Point Load	–	991 #	L = 735#	@ 4'-9"

(30). L = 3'-0"

Wall	14.5'	9 psf	–	0' → 2'
Floor	8.75'	36 psf	40psf	0' → 2'
	13.9'	36psf	40 psf	2' → 3'
Point Load	–	1185#	L = 885#	@ 2'

(31). L = 7'

stair	5'-8"	12psf	40psf	Full

(32). L = 8'-0"

Roof	11.5'	18psf	30 psf	Full
Wall	11.75'	11 psf	–	Full
Garage	8"	63psf	40psf	Full

(33). L = 10.5' 

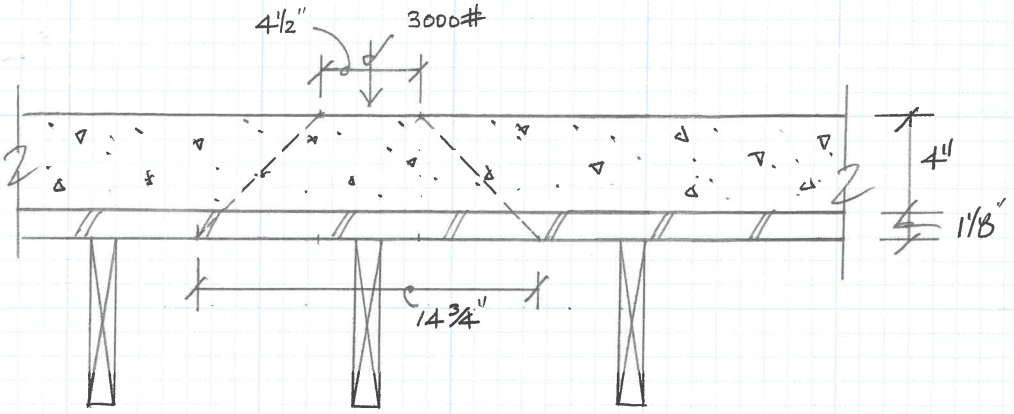
Wall	10'	11 psf	–	Full
Floor	6.3'	63psf	40psf	Full
Point Load	–	852 #	127 #	@ 10.5'

QUANTUM | CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

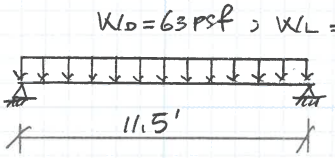
Lundin Residence (project)	12-11-18 (date)	1B689.01 (project no.)
	Qing (designer)	G-5 (sheet)
David & Jaymee Lundin (client)	Sandro (checked by)	

(34). L = 11.5' (Garage Joist)



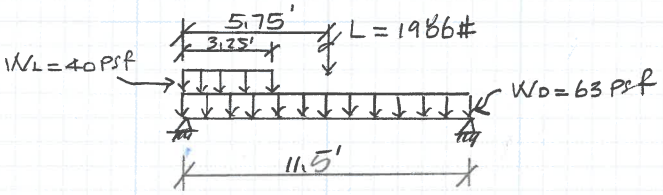
P = 3000 # / (14¾" x 14¾") / 144 = 1986 psf

Case #1 (NO Car)



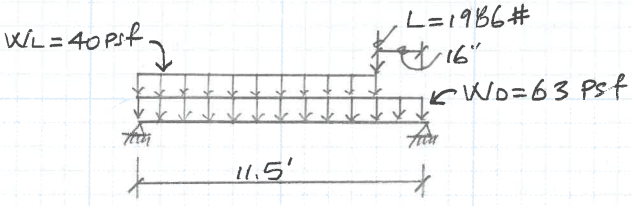
1¾ x 16 LVL @ 12" o/c

Case #2 (Car @ Mid Point)



1¾ x 16 LVL @ 12" o/c

Case #3 (Car @ end Point)



1¾ x 16 LVL @ 12" o/c

(35). L = 3'

Floor	12'	63 psf	40 psf	Full
Point Load	—	—	3000#	@ 1.5'

QUANTUM | CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

Lundin Residence (project)	12-11-18 (date)	18689.01 (project no.)	
	Qing (designer)	G-6 (sheet)	
David & Jaymee Lundin (client)	Sandro (checked by)		

(36). L = 4.5'

Upper Roof	8"	18 psf	30psf	Fun
Wall	5'	11 psf	—	Fun
Low Roof	8"	18 psf	30psf	Fun
Wall	10'	9 psf	—	Fun
Floor	8"	36psf	40psf	Fun
Garage	6'	63psf	40psf	Fun
Point Load	—	—	3000 #	@ 2.75'
overturning	—	—	W = 3445# E = 2½ x 2965#	@ 6" 3'-7"

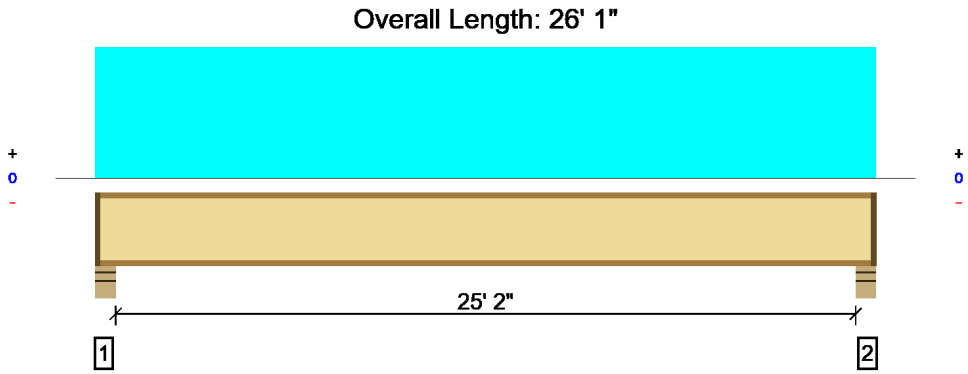
(37). L = 12' C 

Wall	3.5'	11 psf	—	Fun
Floor	8"	40psf	60psf	Fun
Point Load	—	4734 #	L = 3336# S = 2033#	@ 12'

QUANTUM | CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

Lundin Residence (project)	12-11-18 (date)	18689.01 (project no.)
	Qing (designer)	G-7 (sheet)
David & Jaymee Lundin (client)	Sandro (checked by)	



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	827 @ 4 1/2"	1984 (3.50")	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	805 @ 5 1/2"	2749	Passed (29%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	5134 @ 13' 1/2"	12966	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.442 @ 13' 1/2"	0.844	Passed (L/687)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.708 @ 13' 1/2"	1.267	Passed (L/430)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 25' 10" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.00"	1.75"	313	522	835	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	4.00"	1.75"	313	522	835	1 1/2" Rim Board

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

Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 26' 1"	16"	18.0	30.0	Roof

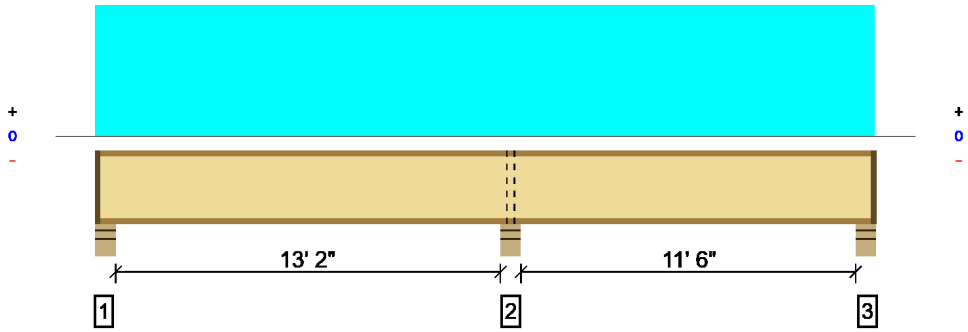
Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE

Overall Length: 26' 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1015 @ 13' 10 1/4"	2950 (5.25")	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	493 @ 13' 7 1/2"	2237	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-1296 @ 13' 10 1/4"	5164	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.051 @ 6' 6 3/16"	0.449	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.078 @ 6' 5 1/8"	0.674	Passed (L/999+)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 2" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.00"	1.75"	135	237	372	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	5.50"	3.50"	381	634	1015	Blocking
3 - Stud wall - HF	5.50"	4.00"	1.75"	110	203	313	1 1/2" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

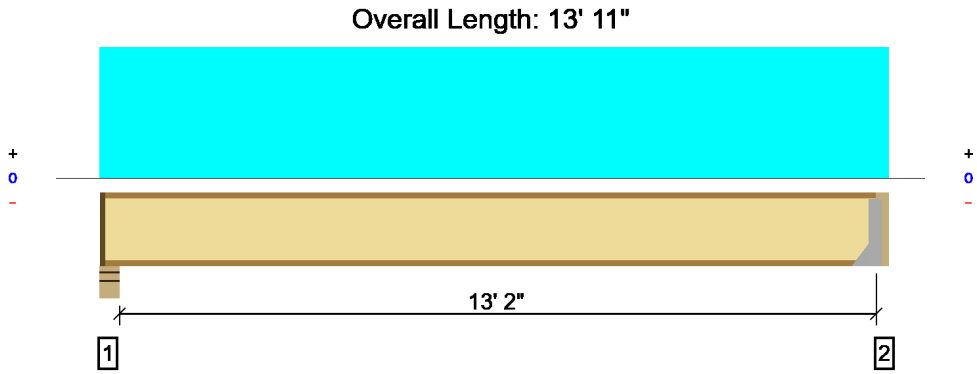
Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 26' 1/2"	16"	18.0	30.0	Roof

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	424 @ 13' 7 1/2"	1156 (1.75")	Passed (37%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	424 @ 13' 7 1/2"	2237	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1404 @ 7'	5164	Passed (27%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.073 @ 7'	0.442	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.117 @ 7'	0.663	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 13' 6" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.00"	1.75"	168	280	448	1 1/2" Rim Board
2 - Hanger on 14" LSL beam	3.50"	Hanger[1]	1.75" / - [2]	166	277	443	See note [1]

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Connector: Simpson Strong-Tie Connectors						
Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
2 - Face Mount Hanger	IUS2.06/14	2.00"	N/A	12-10d	2-Strong-Grip	None

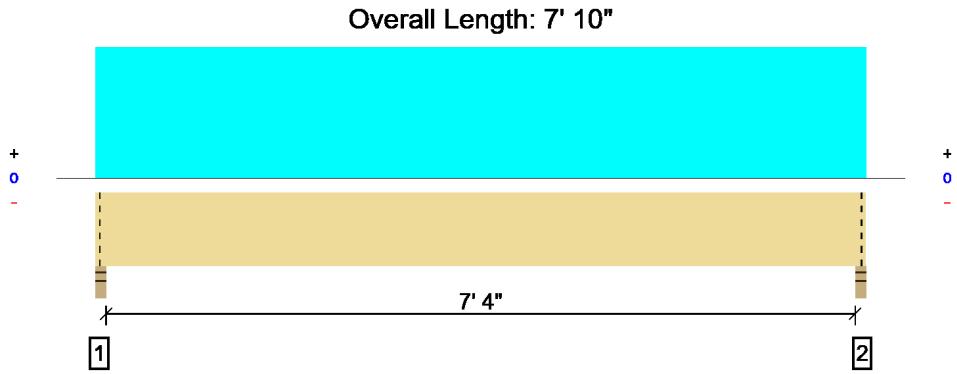
Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 13' 11"	16"	18.0	30.0	Roof

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2535 @ 1 1/2"	4253 (3.00")	Passed (60%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1618 @ 1' 5"	11646	Passed (14%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4653 @ 3' 11"	25116	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.032 @ 3' 11"	0.253	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.053 @ 3' 11"	0.379	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 7' 10" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 10" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.79"	988	1547	2535	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.79"	988	1547	2535	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

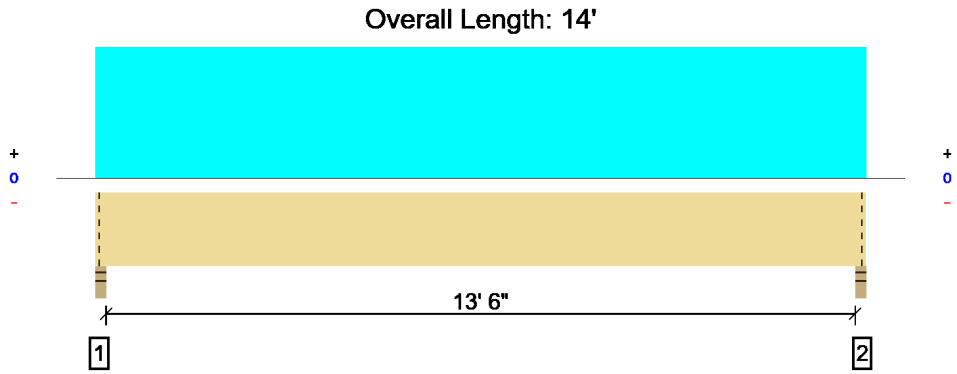
Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 7' 10"	N/A	15.3		
1 - Uniform (PSF)	0 to 7' 10" (Top)	13' 2"	18.0	30.0	Roof

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2631 @ 1 1/2"	4253 (3.00")	Passed (62%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2098 @ 1' 5"	11646	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	8882 @ 7'	25116	Passed (35%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.155 @ 7'	0.458	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.271 @ 7'	0.688	Passed (L/610)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.86"	1126	1505	2631	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.86"	1126	1505	2631	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

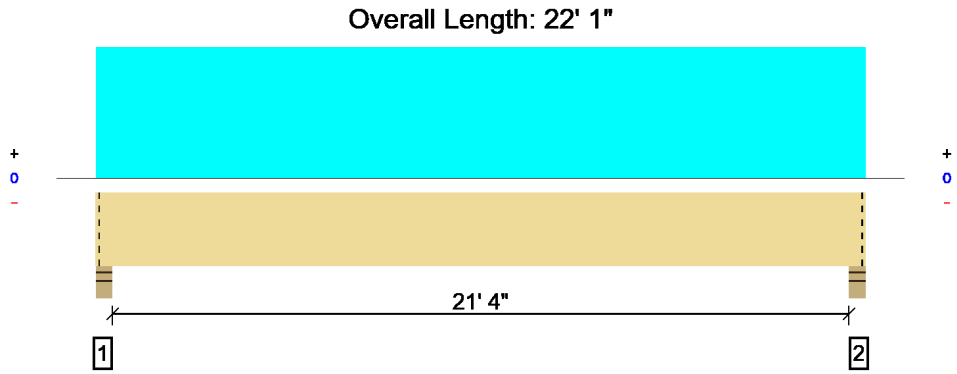
Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14'	N/A	15.3		
1 - Uniform (PSF)	0 to 14' (Top)	7' 2"	18.0	30.0	Roof
2 - Uniform (PSF)	0 to 14' (Top)	1' 6"	11.0	-	Wall

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7450 @ 3"	9568 (4.50")	Passed (78%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6298 @ 1' 8 1/2"	18676	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	39291 @ 11' 1/2"	60297	Passed (65%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.518 @ 11' 1/2"	0.719	Passed (L/500)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.885 @ 11' 1/2"	1.079	Passed (L/293)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 22' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 22' 1" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	4.50"	4.50"	3.50"	3089	4361	7450	Blocking
2 - Stud wall - HF	4.50"	4.50"	3.50"	3089	4361	7450	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 22' 1"	N/A	26.3		
1 - Uniform (PSF)	0 to 22' 1" (Top)	13' 2"	18.0	30.0	Roof
2 - Uniform (PSF)	0 to 22' 1" (Top)	1' 6"	11.0	-	Wall

Weyerhaeuser Notes

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

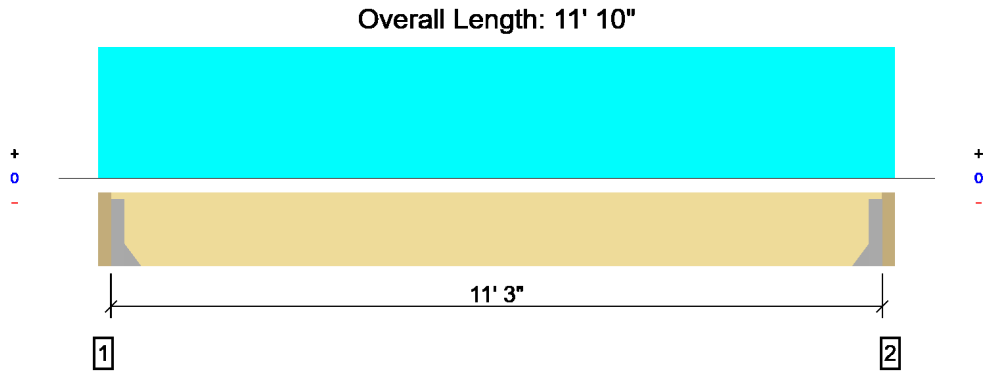
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

SUSTAINABLE FORESTRY INITIATIVE

MEMBER REPORT *Upper roof framing, 7*

1 piece(s) 3 1/2" x 14" 1.55E TimberStrand® LSL

PASSED



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3734 @ 3 1/2"	4725 (1.50")	Passed (79%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2960 @ 1' 5 1/2"	11646	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	10502 @ 5' 11"	25116	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.134 @ 5' 11"	0.375	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.225 @ 5' 11"	0.563	Passed (L/601)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 11' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 11' 3" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 14" LSL beam	3.50"	Hanger[1]	1.50"	1586	2337	3923	See note [1]
2 - Hanger on 14" LSL beam	3.50"	Hanger[1]	1.50"	1586	2337	3923	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Connector: Simpson Strong-Tie Connectors

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
1 - Face Mount Hanger	HHUS410	3.00"	N/A	30-10d	10-10d	None
2 - Face Mount Hanger	HHUS410	3.00"	N/A	30-10d	10-10d	None

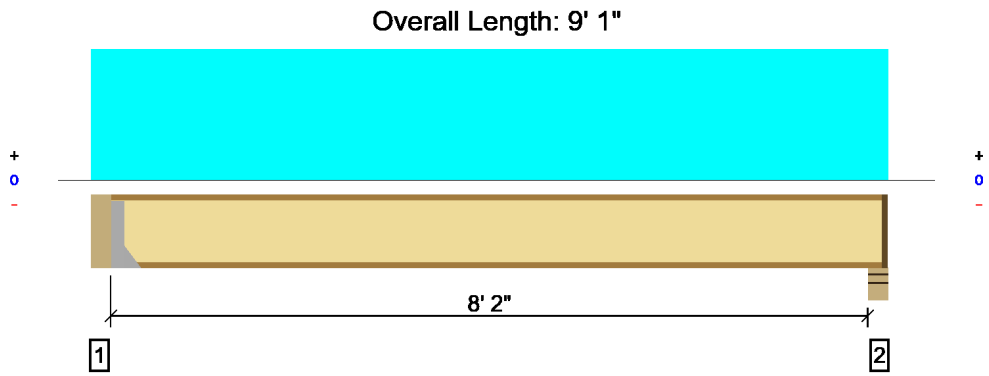
Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 11' 6 1/2"	N/A	15.3		
1 - Uniform (PSF)	0 to 11' 10" (Top)	13' 2"	18.0	30.0	Roof
2 - Uniform (PSF)	0 to 11' 10" (Top)	1' 6"	11.0	-	Wall

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	396 @ 5 1/2"	1156 (1.75")	Passed (34%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	396 @ 5 1/2"	1903	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	817 @ 4' 7"	4364	Passed (19%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.029 @ 4' 7"	0.275	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.046 @ 4' 7"	0.412	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 6" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 11 7/8" GLB beam	5.50"	Hanger[1]	1.75" / - [2]	165	275	440	See note [1]
2 - Stud wall - HF	5.50"	4.00"	1.75"	162	270	432	1 1/2" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Connector: Simpson Strong-Tie Connectors

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
1 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10d	2-Strong-Grip	None

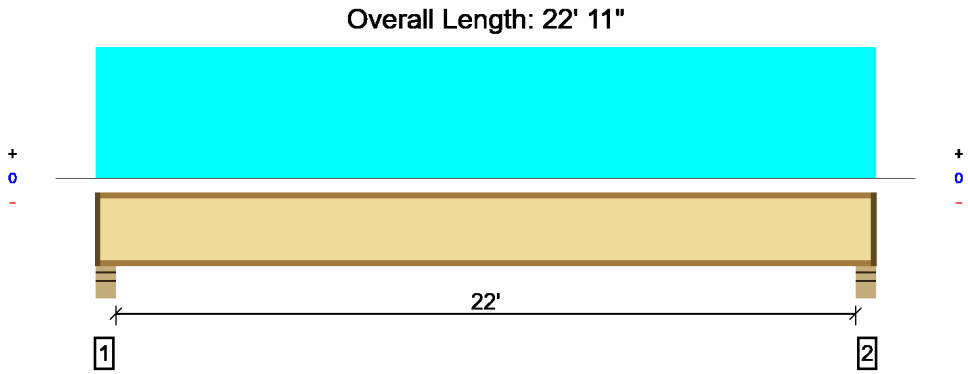
Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 9' 1"	24"	18.0	30.0	Roof

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	725 @ 4 1/2"	1731 (3.50")	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Shear (lbs)	704 @ 5 1/2"	1961	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3931 @ 11' 5 1/2"	7107	Passed (55%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.563 @ 11' 5 1/2"	0.739	Passed (L/473)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.900 @ 11' 5 1/2"	1.108	Passed (L/295)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 8" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 22' 8" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	5.50"	4.00"	1.75"	275	458	733	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	4.00"	1.75"	275	458	733	1 1/2" Rim Board

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

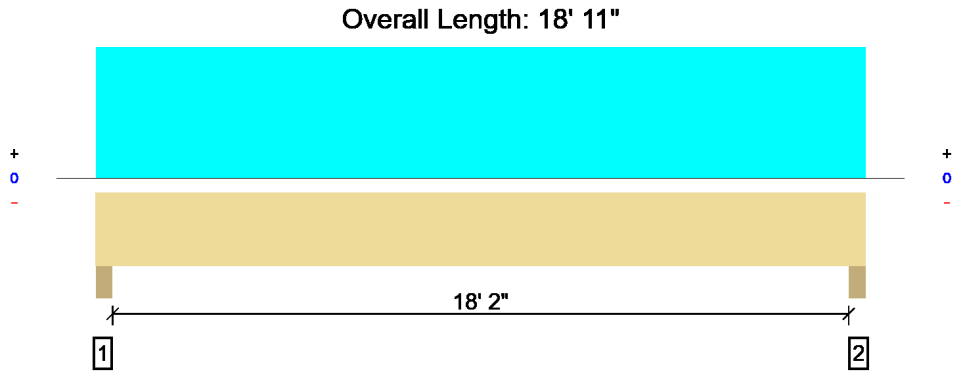
Loads	Location (Side)	Spacing	Dead (0.90)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 22' 11"	16"	18.0	30.0	Roof

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5567 @ 3"	16088 (4.50")	Passed (35%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	4610 @ 1' 7 1/2"	16761	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	24953 @ 9' 5 1/2"	46673	Passed (53%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.321 @ 9' 5 1/2"	0.614	Passed (L/689)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.547 @ 9' 5 1/2"	0.921	Passed (L/404)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 18' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 18' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.98 that was calculated using length L = 18' 5".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	4.50"	4.50"	1.56"	2304	3263	5567	None
2 - Trimmer - HF	4.50"	4.50"	1.56"	2304	3263	5567	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 18' 11"	N/A	20.0		
1 - Uniform (PSF)	0 to 18' 11" (Top)	11' 6"	18.0	30.0	Roof
2 - Uniform (PSF)	0 to 18' 11" (Top)	1' 6"	11.0	-	Wall

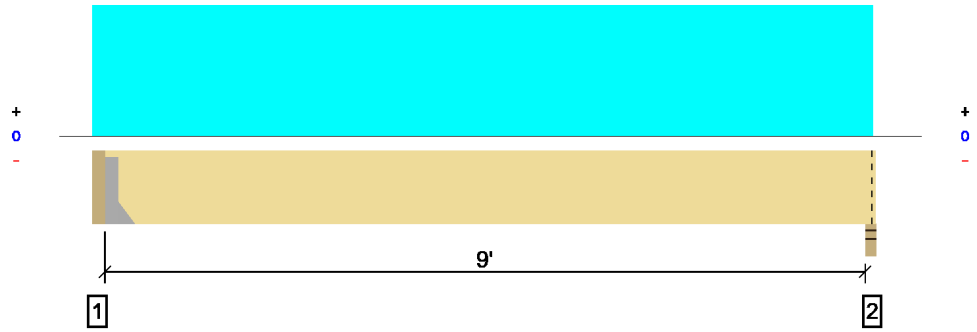
Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE

Overall Length: 9' 6 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2726 @ 9' 5"	4253 (3.00")	Passed (64%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2078 @ 1' 3 3/8"	9878	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6052 @ 4' 10 1/4"	18346	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.084 @ 4' 10 1/4"	0.304	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.141 @ 4' 10 1/4"	0.456	Passed (L/774)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 9' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 3" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 11 7/8" LSL beam	3.50"	Hanger[1]	1.50"	1144	1675	2819	See note [1]
2 - Stud wall - HF	3.00"	3.00"	1.92"	1109	1617	2726	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Connector: Simpson Strong-Tie Connectors

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
1 - Face Mount Hanger	HHUS48	3.00"	N/A	22-10d	8-10d	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	3 1/2" to 9' 6 1/2"	N/A	13.0		
1 - Uniform (PSF)	0 to 9' 6 1/2" (Top)	11' 6"	18.0	30.0	Roof
2 - Uniform (PSF)	0 to 9' 6 1/2" (Top)	1' 6"	11.0	-	Wall

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE

FORTE® MEMBER REPORT *Low roof framing, 12*

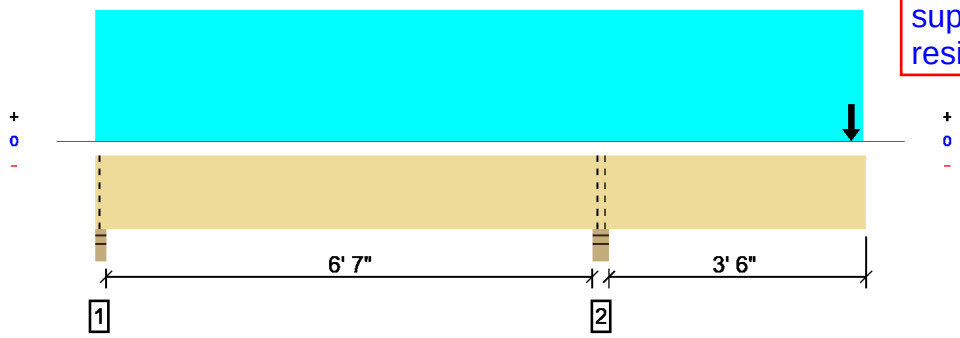
1 piece(s) 3 1/2" x 11 7/8" 1.55E TimberStrand® LSL

FAILED

This product failed due to an excessive uplift of -1299 lbs at support located at 1 1/2".

Connection at backspan support is provided to resist uplift.

Overall Length: 10' 8 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4741 @ 7' 1/4"	6379 (4.50")	Passed (74%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2973 @ 8' 2 3/8"	9878	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-10226 @ 7' 1/4"	18346	Passed (56%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.195 @ 10' 8 1/2"	0.246	Passed (2L/454)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.330 @ 10' 8 1/2"	0.369	Passed (2L/268)	--	1.0 D + 1.0 S (Alt Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 9" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	-470	-829	-1299	Blocking
2 - Stud wall - HF	4.50"	4.50"	3.34"	2058	2683	4741	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

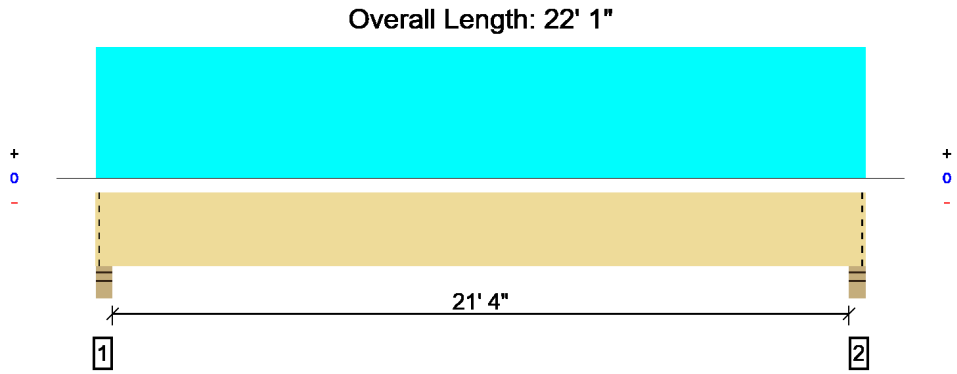
Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 10' 8 1/2"	N/A	13.0		
1 - Uniform (PSF)	0 to 10' 8 1/2" (Top)	8"	18.0	30.0	Roof
2 - Uniform (PSF)	0 to 10' 8 1/2" (Top)	1' 6"	11.0	-	Wall
3 - Point (lb)	10' 6" (Top)	N/A	1144	1675	Point load

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2729 @ 3"	9568 (4.50")	Passed (29%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2392 @ 1' 4 3/8"	13861	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	14393 @ 11' 1/2"	34332	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.413 @ 11' 1/2"	0.719	Passed (L/627)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.773 @ 11' 1/2"	1.079	Passed (L/335)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 22' 1" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 22' 1" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	4.50"	4.50"	1.50"	1272	1458	2730	Blocking
2 - Stud wall - HF	4.50"	4.50"	1.50"	1272	1458	2730	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

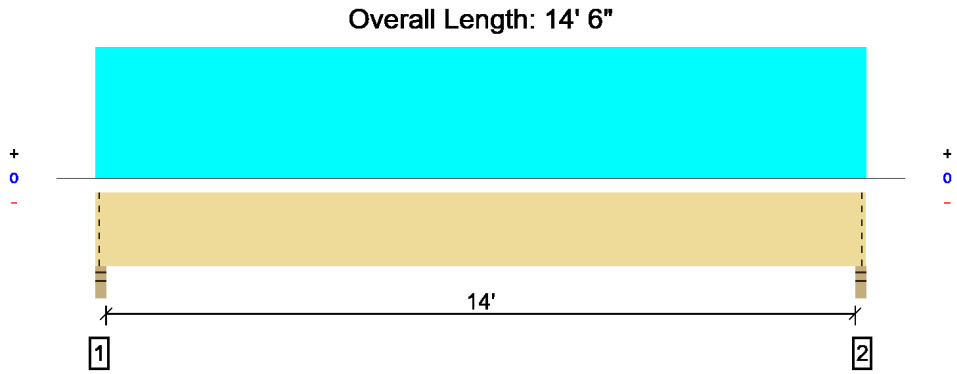
Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 22' 1"	N/A	19.5		
1 - Uniform (PSF)	0 to 22' 1" (Top)	4' 4 13/16"	18.0	30.0	Roof
2 - Uniform (PSF)	0 to 22' 1" (Top)	1' 6"	11.0	-	Wall

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2324 @ 1 1/2"	4253 (3.00")	Passed (55%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1926 @ 1' 2 7/8"	9878	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	8135 @ 7' 3"	18346	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.249 @ 7' 3"	0.475	Passed (L/687)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.422 @ 7' 3"	0.712	Passed (L/405)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 6" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.64"	953	1370	2323	Blocking
2 - Stud wall - HF	3.00"	3.00"	1.64"	953	1370	2323	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 6"	N/A	13.0		
1 - Uniform (PSF)	0 to 14' 6" (Top)	4' 4 13/16"	18.0	30.0	Roof
2 - Uniform (PSF)	0 to 14' 6" (Top)	1' 6"	11.0	-	Wall
3 - Uniform (PSF)	0 to 14' 6" (Top)	1' 10 13/16"	12.0	30.0	Awning

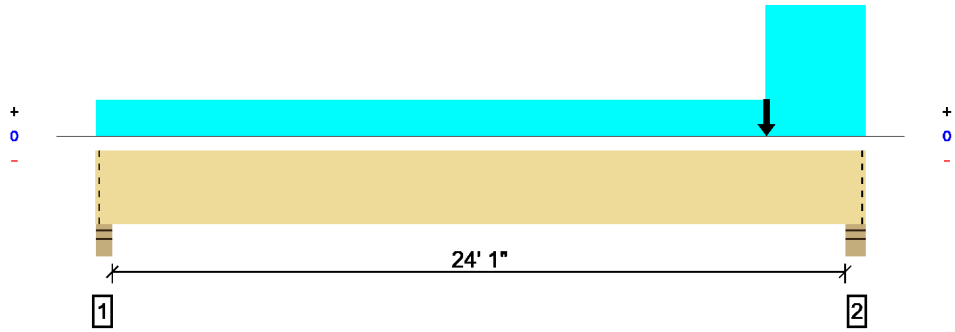
Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE

Overall Length: 24' 11"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	11987 @ 24' 7"	12251 (5.50")	Passed (98%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	10062 @ 22' 10"	21790	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	34238 @ 16' 1/8"	74724	Passed (46%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.317 @ 13' 2 1/2"	0.811	Passed (L/920)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.605 @ 13' 1 7/16"	1.217	Passed (L/482)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 24' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 24' 11" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.93 that was calculated using length L = 24' 4".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	4.50"	4.50"	1.98"	2193	2221	4414	Blocking
2 - Stud wall - HF	5.50"	5.50"	5.38"	5291	6696	11987	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

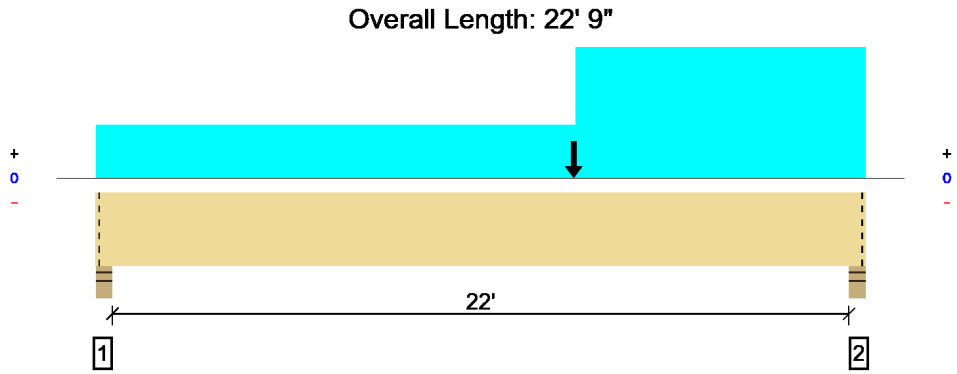
Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 24' 11"	N/A	26.1		
1 - Uniform (PSF)	21' 8 1/2" to 24' 11" (Top)	13' 2"	18.0	30.0	Roof
2 - Uniform (PSF)	21' 8 1/2" to 24' 11" (Top)	1' 6"	11.0	-	Wall
3 - Uniform (PSF)	0 to 24' 11" (Top)	3' 6"	11.0	-	Wall
4 - Uniform (PSF)	0 to 24' 11" (Top)	4' 4 13/16"	18.0	30.0	Lower roof
5 - Point (lb)	21' 8 1/2" (Top)	N/A	3089	4361	Point load

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7319 @ 22' 6"	10024 (4.50")	Passed (73%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	6046 @ 20' 9"	21790	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Pos Moment (Ft-lbs)	37647 @ 14' 1 1/2"	75395	Passed (50%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.269 @ 11' 10 7/8"	0.742	Passed (L/993)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.506 @ 11' 10 5/16"	1.112	Passed (L/528)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch: 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Top Edge Bracing (Lu): Top compression edge must be braced at 22' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 22' 9" o/c unless detailed otherwise.
- Critical positive moment adjusted by a volume factor of 0.94 that was calculated using length L = 22' 3".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Stud wall - HF	4.50"	4.50"	2.11"	2289	2407	4696	Blocking
2 - Stud wall - HF	4.50"	4.50"	3.29"	3363	3956	7319	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 22' 9"	N/A	26.1		
1 - Uniform (PSF)	14' 1 1/2" to 22' 9" (Top)	7' 2"	18.0	30.0	Roof
2 - Uniform (PSF)	14' 1 1/2" to 22' 9" (Top)	1' 6"	11.0	-	Wall
3 - Uniform (PSF)	0 to 22' 9" (Top)	3' 6"	11.0	-	Wall
4 - Uniform (PSF)	0 to 22' 9" (Top)	4' 4 13/16"	18.0	30.0	Lower roof
5 - Point (lb)	14' 1 1/2" (Top)	N/A	1126	1505	Point load

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 7 JAN 2019, 12:02PM

Wood Beam

File = M:\Stuart Silk\18689 - Lundin Residence\Calculations\Gravity\Wind Beam.ec6 .
Software copyright ENERCALC, INC. 1983-2018, Build:10.18.9.24 .

Lic. # : KW-06005835 — Licensee : QUANTUM CONSULTING ENGINEERS

Description : Wind beam at gread room - wind (Beam 17)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

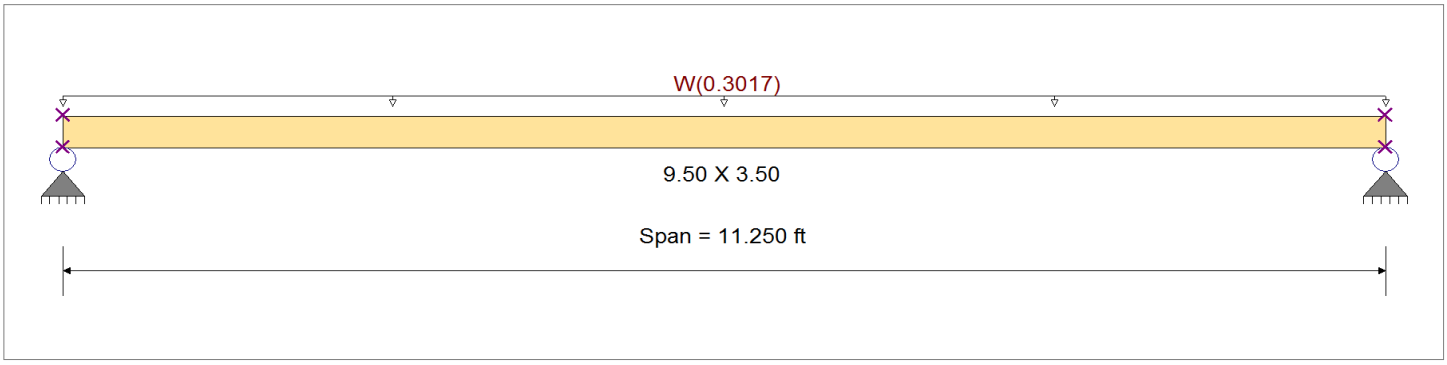
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

Beam Bracing : Completely Unbraced

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	32.210 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : W = 0.3017 , Tributary Width = 1.0 ft, (Wind)

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	0.382 : 1	Maximum Shear Stress Ratio	=	0.094 : 1
Section used for this span		9.50 X 3.50	Section used for this span		9.50 X 3.50
fb : Actual	=	1,771.80 psi	fv : Actual	=	43.59 psi
FB : Allowable	=	4,640.00 psi	Fv : Allowable	=	464.00 psi
Load Combination		+D+0.60W+H	Load Combination		+D+0.60W+H
Location of maximum on span	=	5.625 ft	Location of maximum on span	=	10.963 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	1.611 in	Ratio =	83 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.967 in	Ratio =	139 <360.0
Max Upward Total Deflection	0.000 in	Ratio =	0 <360.0

See following deflection calculation. Per IBC 2015, table 1604.3, footnote f, the wind load is permitted to be taken as 0.42 times the "component and cladding" loads for the purpose of determining deflection limits.

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			0.90	1.000	1.00	1.00	1.00	1.00	1.00			2610.00	0.00	0.00	261.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.00	1.000	1.00	1.00	1.00	1.00	1.00			2900.00	0.00	0.00	290.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.25	1.000	1.00	1.00	1.00	1.00	1.00			3625.00	0.00	0.00	362.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.15	1.000	1.00	1.00	1.00	1.00	1.00			3335.00	0.00	0.00	333.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.25	1.000	1.00	1.00	1.00	1.00	1.00			3625.00	0.00	0.00	362.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.15	1.000	1.00	1.00	1.00	1.00	1.00			3335.00	0.00	0.00	333.50

Wood Beam

File = M:\Stuart Silk\18689 - Lundin Residence\Calculations\Gravity\Wind Beam.ec6 .
Software copyright ENERCALC, INC. 1983-2018, Build:10.18.9.24 .

Description : Wind beam at gread room - wind (Beam 17)

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.382	0.094	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.86	1,771.80	4640.00	0.97	43.59	464.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.60	1.000	1.00	1.00	1.00	1.00	1.00			4640.00	0.00	0.00	464.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.286	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.15	1,328.85	4640.00	0.72	32.69	464.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.286	0.070	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.15	1,328.85	4640.00	0.72	32.69	464.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.60	1.000	1.00	1.00	1.00	1.00	1.00			4640.00	0.00	0.00	464.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.382	0.094	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.86	1,771.80	4640.00	0.97	43.59	464.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.60	1.000	1.00	1.00	1.00	1.00	1.00			4640.00	0.00	0.00	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	1.6111	5.666		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.697	1.697
Overall MINimum	1.697	1.697
+D+H		
+D+L+H		
+D+Lr+H		
+D+S+H		
+D+0.750Lr+0.750L+H		
+D+0.750L+0.750S+H		
+D+0.60W+H	1.018	1.018
+D+0.70E+H		
+D+0.750Lr+0.750L+0.450W+H	0.764	0.764
+D+0.750L+0.750S+0.450W+H	0.764	0.764
+D+0.750L+0.750S+0.5250E+H		
+0.60D+0.60W+0.60H	1.018	1.018
+0.60D+0.70E+0.60H		
D Only		
Lr Only		
L Only		
S Only		
W Only	1.697	1.697
E Only		
H Only		

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 7 JAN 2019, 12:02PM

Wood Beam

File = M:\Stuart Silk\18689 - Lundin Residence\Calculations\Gravity\Wind Beam.ec6 .
Software copyright ENERCALC, INC. 1983-2018, Build:10.18.9.24 .

Lic. # : KW-06005835 — Licensee : QUANTUM CONSULTING ENGINEERS

Description : Wind beam at gread room - deflection (Beam 17)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

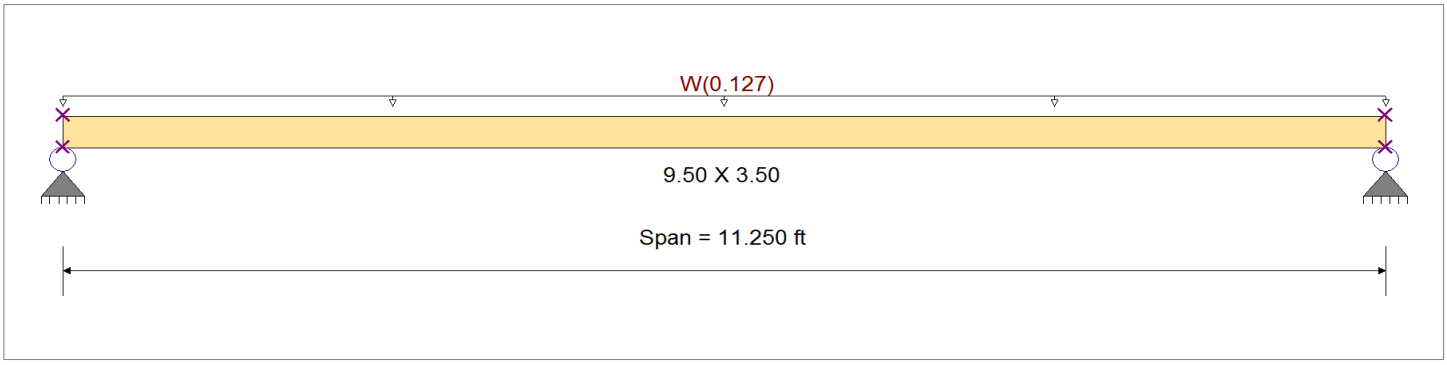
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

Beam Bracing : Completely Unbraced

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	32.210 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : W = 0.1270 , Tributary Width = 1.0 ft, (Wind)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.161 : 1	Maximum Shear Stress Ratio	=	0.040 : 1
Section used for this span		9.50 X 3.50	Section used for this span		9.50 X 3.50
fb : Actual	=	745.84 psi	fv : Actual	=	18.35 psi
FB : Allowable	=	4,640.00 psi	Fv : Allowable	=	464.00 psi
Load Combination		+D+0.60W+H	Load Combination		+D+0.60W+H
Location of maximum on span	=	5.625 ft	Location of maximum on span	=	10.963 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.678 in	Ratio =	199	>=180.
Max Upward Transient Deflection	0.000 in	Ratio =	0	<180.0
Max Downward Total Deflection	0.407 in	Ratio =	331	>=180.
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			0.90	1.000	1.00	1.00	1.00	1.00	1.00			2610.00	0.00	0.00	261.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.00	1.000	1.00	1.00	1.00	1.00	1.00			2900.00	0.00	0.00	290.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.25	1.000	1.00	1.00	1.00	1.00	1.00			3625.00	0.00	0.00	362.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.15	1.000	1.00	1.00	1.00	1.00	1.00			3335.00	0.00	0.00	333.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.25	1.000	1.00	1.00	1.00	1.00	1.00			3625.00	0.00	0.00	362.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.15	1.000	1.00	1.00	1.00	1.00	1.00			3335.00	0.00	0.00	333.50

Wood Beam

File = M:\Stuart Silk\18689 - Lundin Residence\Calculations\Gravity\Wind Beam.ec6 .
Software copyright ENERCALC, INC. 1983-2018, Build:10.18.9.24 .

Description : Wind beam at gread room - deflection (Beam 17)

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.161	0.040	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.21	745.84	4640.00	0.41	18.35	464.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.60	1.000	1.00	1.00	1.00	1.00	1.00			4640.00	0.00	0.00	464.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.121	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.90	559.38	4640.00	0.31	13.76	464.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.121	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.90	559.38	4640.00	0.31	13.76	464.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.60	1.000	1.00	1.00	1.00	1.00	1.00			4640.00	0.00	0.00	464.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.161	0.040	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.21	745.84	4640.00	0.41	18.35	464.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1			1.60	1.000	1.00	1.00	1.00	1.00	1.00			4640.00	0.00	0.00	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.6782	5.666		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.714	0.714
Overall MINimum	0.714	0.714
+D+H		
+D+L+H		
+D+Lr+H		
+D+S+H		
+D+0.750Lr+0.750L+H		
+D+0.750L+0.750S+H		
+D+0.60W+H	0.429	0.429
+D+0.70E+H		
+D+0.750Lr+0.750L+0.450W+H	0.321	0.321
+D+0.750L+0.750S+0.450W+H	0.321	0.321
+D+0.750L+0.750S+0.5250E+H		
+0.60D+0.60W+0.60H	0.429	0.429
+0.60D+0.70E+0.60H		
D Only		
Lr Only		
L Only		
S Only		
W Only	0.714	0.714
E Only		
H Only		

Wood Beam

File = M:\Stuart Silk\18689 - Lundin Residence\Calculations\Gravity\Wind Beam.ec6 .
Software copyright ENERCALC, INC. 1983-2018, Build:10.18.9.24 .

Description : Wind beam at great room - gravity (Beam 17)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

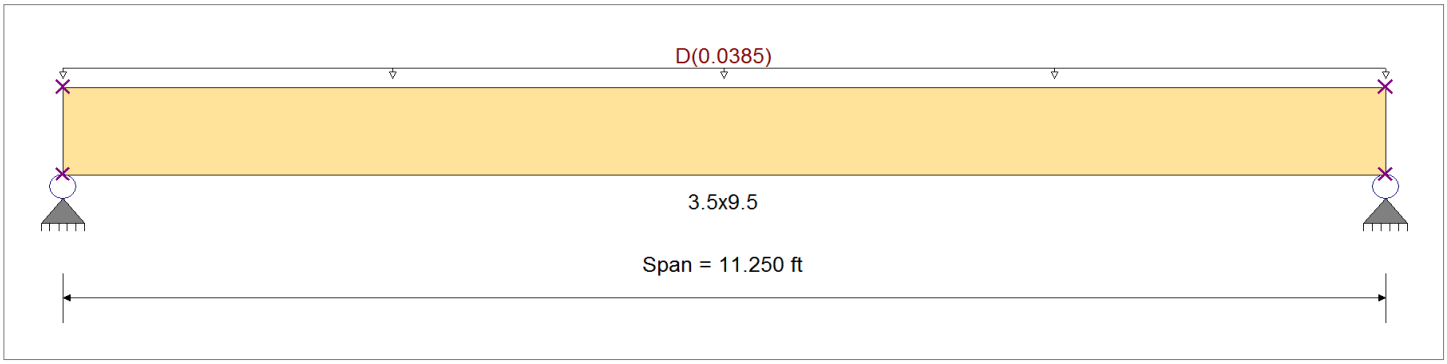
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

Beam Bracing : Completely Unbraced

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	32.210 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Uniform Load : D = 0.03850 , Tributary Width = 1.0 ft, (Wind)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.053 : 1	Maximum Shear Stress Ratio	=	0.032 : 1
Section used for this span		3.5x9.5	Section used for this span		3.5x9.5
fb : Actual	=	138.83 psi	fv : Actual	=	8.41 psi
FB : Allowable	=	2,607.26 psi	Fv : Allowable	=	261.00 psi
Load Combination		+D+H	Load Combination		+D+H
Location of maximum on span	=	5.625 ft	Location of maximum on span	=	10.470 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.000 in	Ratio =	0 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.028 in	Ratio =	4837 >=360.
Max Upward Total Deflection	0.000 in	Ratio =	0 <360.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.053	0.032	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	2607.26	0.19	8.41	261.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.048	0.029	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	2896.61	0.19	8.41	290.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.038	0.023	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	3619.67	0.19	8.41	362.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.042	0.025	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	3330.50	0.19	8.41	333.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.038	0.023	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	3619.67	0.19	8.41	362.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.042	0.025	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	3330.50	0.19	8.41	333.50

Wood Beam

File = M:\Stuart Silk\18689 - Lundin Residence\Calculations\Gravity\Wind Beam.ec6 .
Software copyright ENERCALC, INC. 1983-2018, Build:10.18.9.24 .

Description : Wind beam at great room - gravity (Beam 17)

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.030	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	4631.20	0.19	8.41	464.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.030	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	4631.20	0.19	8.41	464.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.030	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	4631.20	0.19	8.41	464.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.030	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	4631.20	0.19	8.41	464.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.030	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.61	138.83	4631.20	0.19	8.41	464.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.018	0.011	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.37	83.30	4631.20	0.11	5.05	464.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.250 ft	1	0.018	0.011	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.37	83.30	4631.20	0.11	5.05	464.00

Overall Maximum Deflections

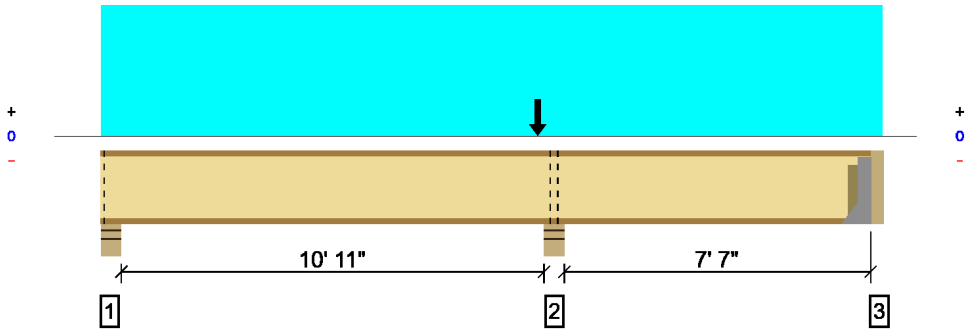
Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.0279	5.666		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.217	0.217
Overall MINimum	0.217	0.217
+D+H	0.217	0.217
+D+L+H	0.217	0.217
+D+Lr+H	0.217	0.217
+D+S+H	0.217	0.217
+D+0.750Lr+0.750L+H	0.217	0.217
+D+0.750L+0.750S+H	0.217	0.217
+D+0.60W+H	0.217	0.217
+D+0.70E+H	0.217	0.217
+D+0.750Lr+0.750L+0.450W+H	0.217	0.217
+D+0.750L+0.750S+0.450W+H	0.217	0.217
+D+0.750L+0.750S+0.5250E+H	0.217	0.217
+0.60D+0.60W+0.60H	0.130	0.130
+0.60D+0.70E+0.60H	0.130	0.130
D Only	0.217	0.217
Lr Only		
L Only		
S Only		
W Only		
E Only		
H Only		

Overall Length: 19' 8 1/2"



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2230 @ 11' 7 1/4"	2950 (5.25")	Passed (76%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1645 @ 11'	2519	Passed (65%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-1459 @ 11' 7 1/4"	5140	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.027 @ 5' 7 1/4"	0.225	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.055 @ 5' 7 5/16"	0.281	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	68	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 2" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 3" o/c unless detailed otherwise.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	5.50"	5.50"	1.75"	249	275/-15	17	541/-15	Blocking
2 - Stud wall - HF	5.50"	5.50"	3.50"	1207	652	712	2571	Blocking
3 - Hanger on 16" LSL beam	3.50"	Hanger[1]	1.75" / - [2]	100	203/-48	-29	303/-77	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Connector: Simpson Strong-Tie Connectors						
Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
3 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10d	2-10dx1.5	Web Stiffeners

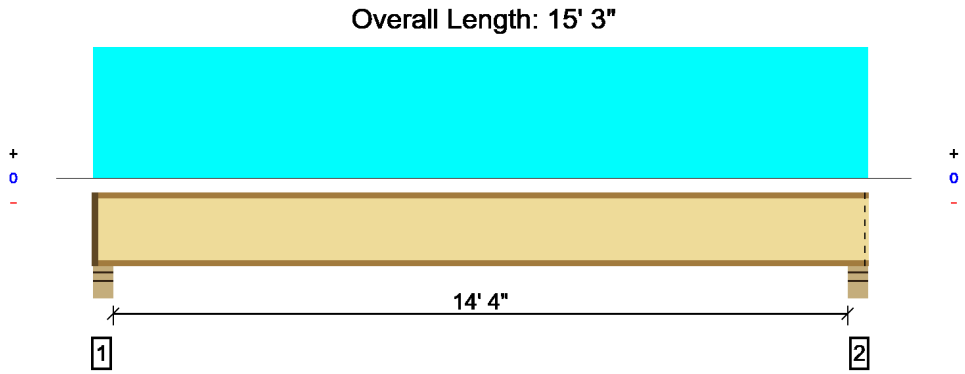
Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 19' 8 1/2"	16"	36.0	40.0	-	Residential - Living Areas
2 - Point (lb)	11'	N/A	610	-	700	Point load

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	773 @ 14' 10 1/2"	1460 (3.50")	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	726 @ 5 1/2"	2190	Passed (33%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2663 @ 7' 7 1/2"	5140	Passed (52%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.089 @ 7' 7 1/2"	0.290	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.168 @ 7' 7 1/2"	0.363	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	62	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 5' 4" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 1" o/c unless detailed otherwise.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	3.75"	1.75"	366	407	773	1 3/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	1.75"	366	407	773	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

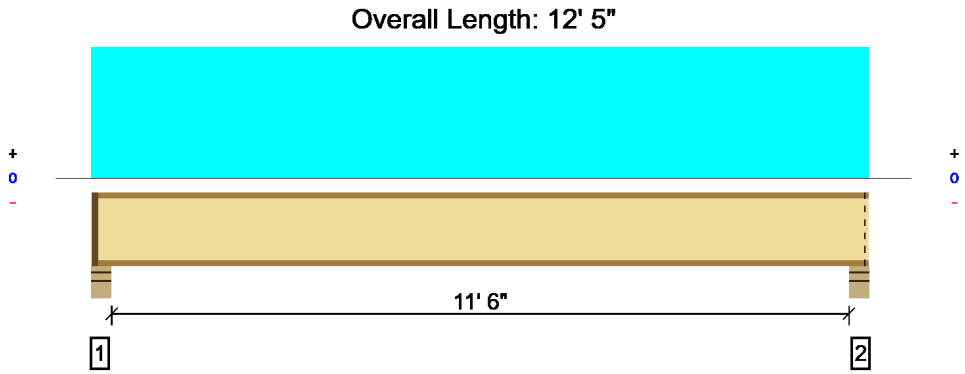
Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 3"	16"	36.0	40.0	Residential - Living Areas

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	828 @ 12' 1/2"	1460 (3.50")	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	767 @ 5 1/2"	1945	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2269 @ 6' 2 1/2"	4490	Passed (51%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.080 @ 6' 2 1/2"	0.233	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.133 @ 6' 2 1/2"	0.292	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	65	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 5' 4" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	3.75"	1.75"	331	497	828	1 3/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	1.75"	331	497	828	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

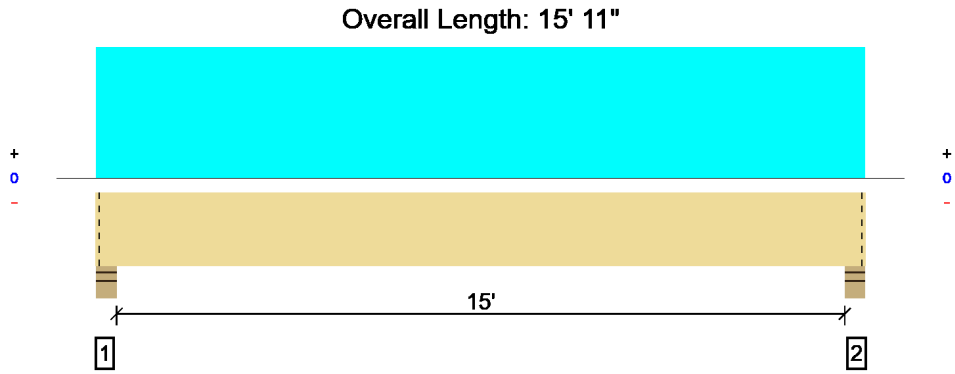
Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 12' 5"	16"	40.0	60.0	Terrace

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	8273 @ 4"	11694 (5.50")	Passed (71%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	6411 @ 1' 9 1/2"	16240	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	30221 @ 7' 11 1/2"	52432	Passed (58%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.184 @ 7' 11 1/2"	0.305	Passed (L/995)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.359 @ 7' 11 1/2"	0.381	Passed (L/510)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 15' 11" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 15' 11" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	5.50"	3.89"	4029	4244	8273	Blocking
2 - Stud wall - HF	5.50"	5.50"	3.89"	4029	4244	8273	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

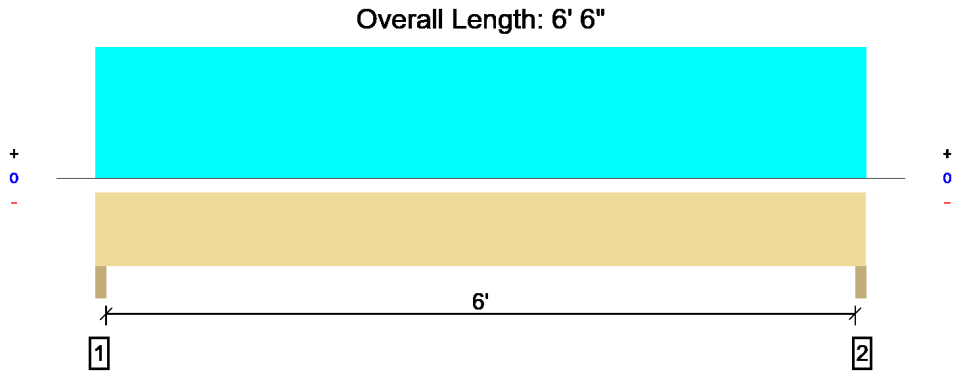
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 15' 11"	N/A	26.3		
1 - Uniform (PSF)	0 to 15' 11" (Top)	13' 4"	36.0	40.0	Residential - Living Areas

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3056 @ 1 1/2"	10313 (3.00")	Passed (30%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2077 @ 1' 1/2"	5922	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4592 @ 3' 3"	6032	Passed (76%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.033 @ 3' 3"	0.125	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.063 @ 3' 3"	0.156	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 6' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	1470	1586	3056	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	1470	1586	3056	None

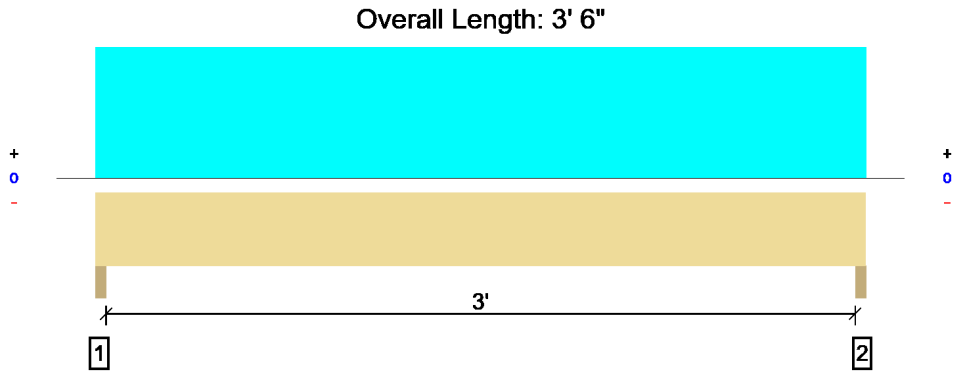
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	13.2		
1 - Uniform (PSF)	0 to 6' 6"	12' 2 3/8"	36.0	40.0	Residential - Living Areas

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2923 @ 1 1/2"	4253 (3.00")	Passed (69%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1496 @ 10 1/4"	2918	Passed (51%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	2205 @ 1' 9"	3247	Passed (68%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.013 @ 1' 9"	0.065	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.029 @ 1' 9"	0.081	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	2.06"	1579	854	938	3371	None
2 - Trimmer - HF	3.00"	3.00"	2.06"	1579	854	938	3371	None

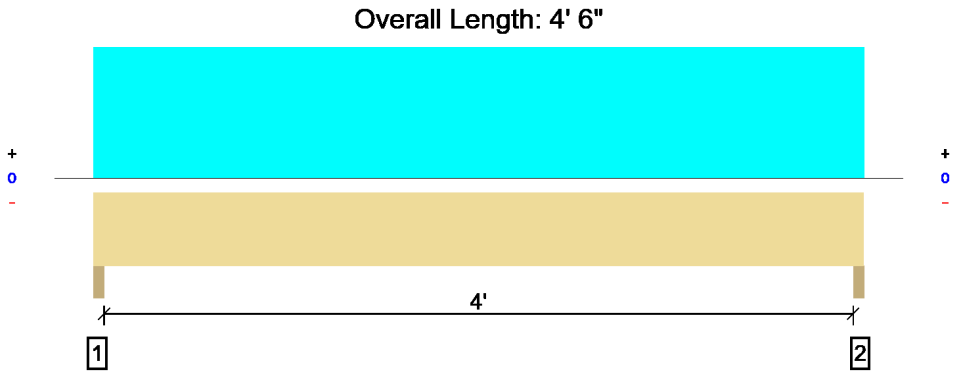
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	6.4			
1 - Uniform (PSF)	0 to 3' 6"	13' 2"	18.0	-	30.0	Upper roof
2 - Uniform (PSF)	0 to 3' 6"	5'	11.0	-	-	Wall
3 - Uniform (PSF)	0 to 3' 6"	4' 8 3/8"	18.0	-	30.0	Low roof
4 - Uniform (PSF)	0 to 3' 6"	10'	8.0	-	-	Wall
5 - Uniform (PSF)	0 to 3' 6"	12' 2 3/8"	36.0	40.0	-	Floor

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3762 @ 1 1/2"	6563 (3.00")	Passed (57%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2055 @ 1' 1/4"	4468	Passed (46%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	3775 @ 2' 3"	5166	Passed (73%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.016 @ 2' 3"	0.085	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.033 @ 2' 3"	0.106	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 4' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.72"	1987	1260	1107	4354	None
2 - Trimmer - HF	3.00"	3.00"	1.72"	1987	1260	1107	4354	None

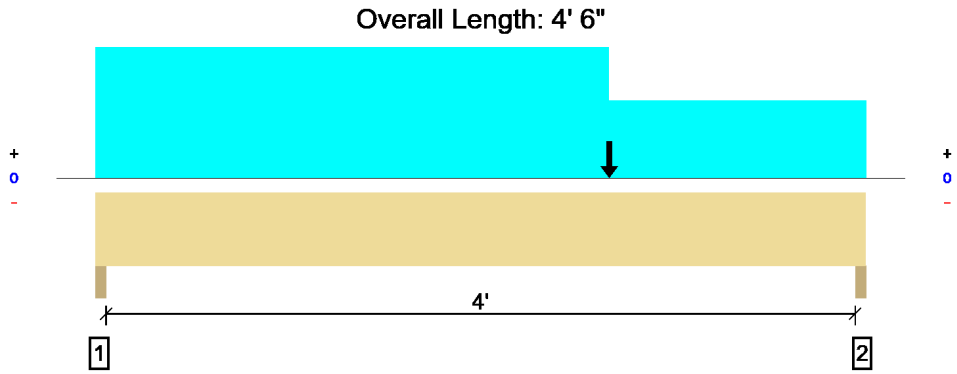
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 6"	N/A	8.2			
1 - Uniform (PSF)	0 to 4' 6"	16' 4 13/16"	18.0	-	30.0	Roof
2 - Uniform (PSF)	0 to 4' 6"	14' 6"	11.0	-	-	Wall
3 - Uniform (PSF)	0 to 4' 6"	5'	36.0	40.0	-	Floor
4 - Uniform (PSF)	0 to 4' 6"	6'	40.0	60.0	-	Terrace

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4366 @ 4' 4 1/2"	6563 (3.00")	Passed (67%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3338 @ 3' 5 3/4"	4468	Passed (75%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	5027 @ 2' 6 15/16"	5166	Passed (97%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.021 @ 2' 3 1/4"	0.085	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.044 @ 2' 3 3/16"	0.106	Passed (L/999+)	--	1.0 D + 0.75 L + 0.75 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 4' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 4' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.97"	2241	1260	1498	4999	None
2 - Trimmer - HF	3.00"	3.00"	2.00"	2278	1260	1525	5063	None

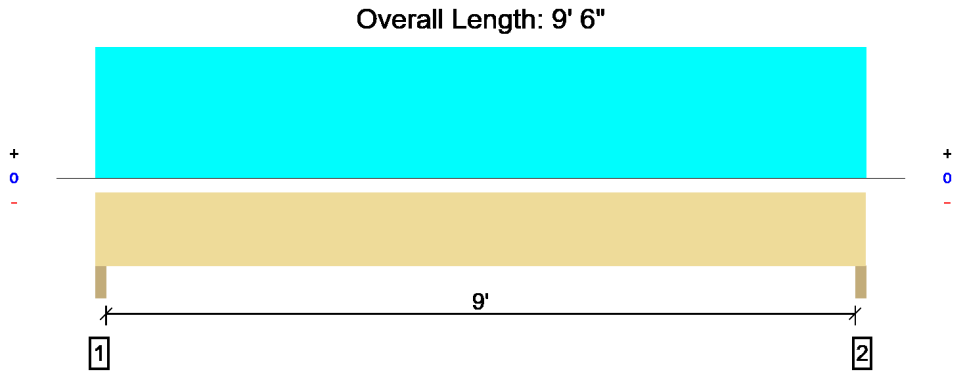
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 4' 6"	N/A	8.2			
1 - Uniform (PSF)	0 to 3'	16' 4 13/16"	18.0	-	30.0	Roof
2 - Uniform (PSF)	0 to 4' 6"	14' 6"	11.0	-	-	Wall
3 - Uniform (PSF)	0 to 4' 6"	5'	36.0	40.0	-	Floor
4 - Uniform (PSF)	0 to 4' 6"	6'	40.0	60.0	-	Terrace
5 - Point (lb)	3'	N/A	988	-	1547	Point load

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3032 @ 1 1/2"	7613 (3.00")	Passed (40%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2367 @ 1' 1/2"	6872	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6828 @ 4' 9"	10422	Passed (66%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.170 @ 4' 9"	0.185	Passed (L/652)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.302 @ 4' 9"	0.302	Passed (L/368)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/368).
- Top Edge Bracing (Lu): Top compression edge must be braced at 9' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 9' 6" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	1322	1710	3032	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	1322	1710	3032	None

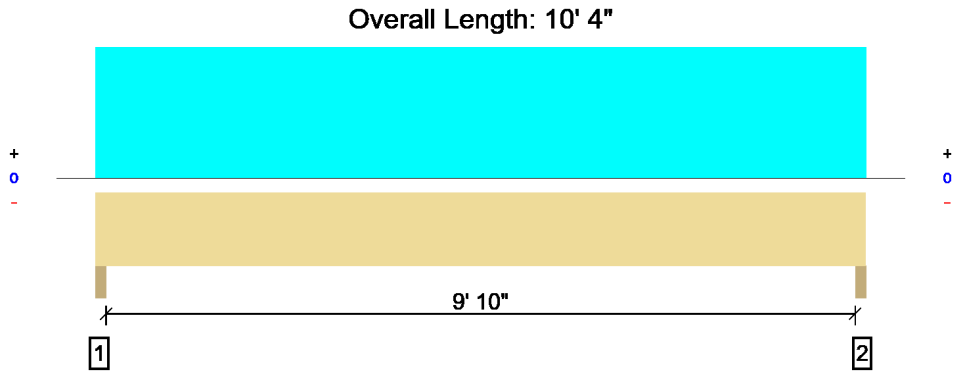
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 9' 6"	N/A	10.4		
1 - Uniform (PSF)	0 to 9' 6"	3' 6"	8.0	-	Guardrail
2 - Uniform (PSF)	0 to 9' 6"	6'	40.0	60.0	Terrace

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3934 @ 1 1/2"	7613 (3.00")	Passed (52%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2990 @ 1' 2 7/8"	8590	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	9678 @ 5' 2"	15953	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.109 @ 5' 2"	0.202	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.269 @ 5' 2"	0.269	Passed (L/451)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/450).
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 4" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 4" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - HF	3.00"	3.00"	1.55"	2333	1602	3935	None
2 - Trimmer - HF	3.00"	3.00"	1.55"	2333	1602	3935	None

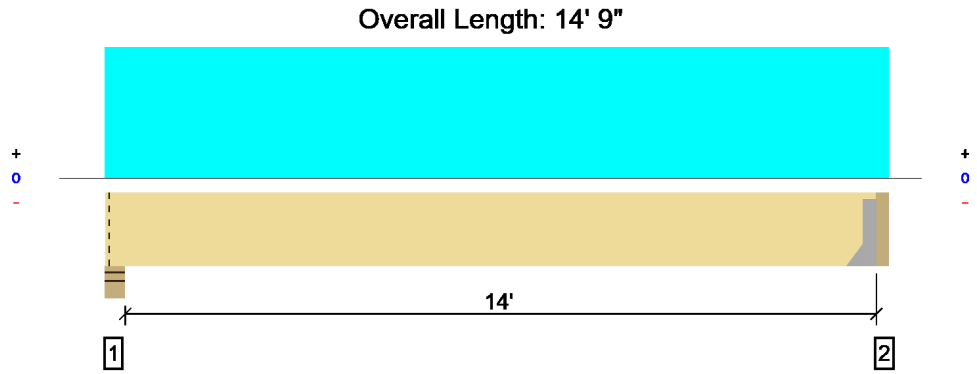
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 10' 4"	N/A	13.0		
1 - Uniform (PSF)	0 to 10' 4"	14' 6"	11.0	-	Wall
2 - Uniform (PSF)	0 to 10' 4"	7' 9"	36.0	40.0	Floor

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1663 @ 14' 5 1/2"	4725 (1.50")	Passed (35%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1349 @ 13' 1 1/2"	11573	Passed (12%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5873 @ 7' 4 3/4"	28178	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.055 @ 7' 4 3/4"	0.282	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.130 @ 7' 4 3/4"	0.353	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 14' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 14' 6" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	1002	740	1742	Blocking
2 - Hanger on 16" LSL beam	3.50"	Hanger[1]	1.50"	991	735	1726	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Connector: Simpson Strong-Tie Connectors						
Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
2 - Face Mount Hanger	LUS414	2.00"	N/A	10-10d	6-10d	None

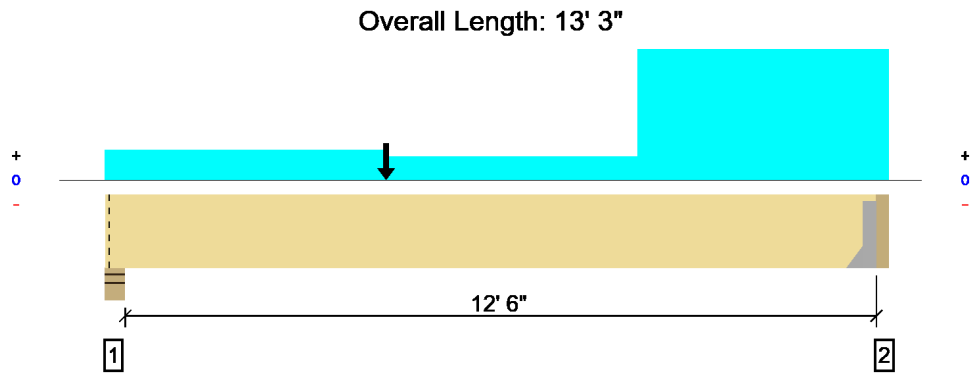
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 14' 5 1/2"	N/A	17.5		
1 - Uniform (PSF)	0 to 14' 9" (Top)	3' 6"	8.0	-	Guardrail
2 - Uniform (PSF)	0 to 14' 9" (Top)	2' 6"	36.0	40.0	Floor

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2403 @ 12' 11 1/2"	4725 (1.50")	Passed (51%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1857 @ 1' 9 1/2"	11573	Passed (16%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	7808 @ 4' 9"	28178	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.058 @ 6' 6 5/8"	0.252	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.134 @ 6' 6 1/4"	0.316	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 13' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 13' o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	1185	885	2070	Blocking
2 - Hanger on 16" LSL beam	3.50"	Hanger[1]	1.50"	1270	1092	2362	See note [1]

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Connector: Simpson Strong-Tie Connectors

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
2 - Face Mount Hanger	THAC418	1.78"	N/A	16-16d	6-16d	None

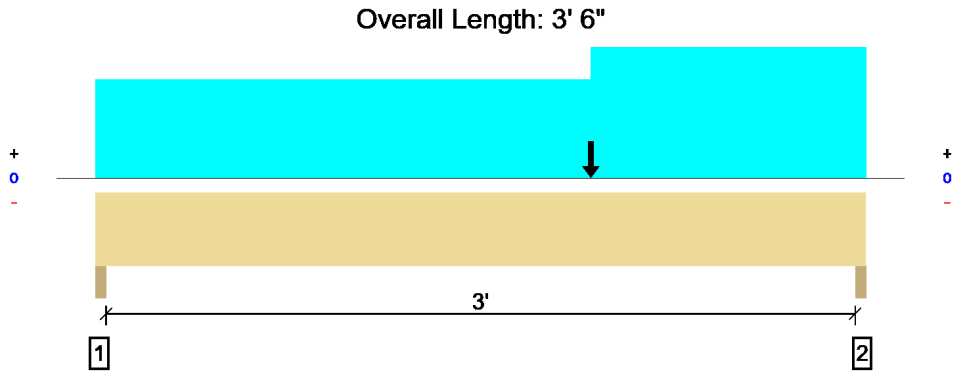
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 12' 11 1/2"	N/A	17.5		
1 - Uniform (PSF)	4' 9" to 9' (Top)	3' 6"	8.0	-	Guardrail
2 - Uniform (PSF)	0 to 13' 3" (Top)	8"	36.0	40.0	Floor
3 - Uniform (PSF)	0 to 4' 9" (Top)	8"	36.0	40.0	Floor
4 - Uniform (PSF)	9' to 13' 3" (Top)	5'	36.0	40.0	Stair
5 - Point (lb)	4' 9" (Top)	N/A	991	735	Point load

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3032 @ 3' 4 1/2"	4253 (3.00")	Passed (71%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2124 @ 2' 7 3/4"	2538	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2589 @ 2' 3"	2823	Passed (92%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.014 @ 1' 9 7/16"	0.065	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.031 @ 1' 9 3/8"	0.081	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - HF	3.00"	3.00"	1.53"	1212	959	2171	None
2 - Trimmer - HF	3.00"	3.00"	2.14"	1624	1409	3033	None

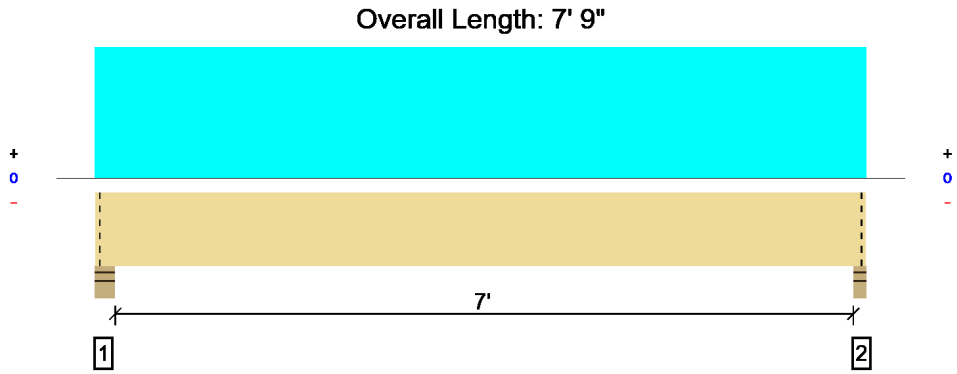
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	6.4		
1 - Uniform (PSF)	0 to 2' 3"	14' 6"	9.0	-	Wall
2 - Uniform (PSF)	0 to 2' 3"	8' 9"	36.0	40.0	Floor
3 - Uniform (PSF)	2' 3" to 3' 6"	13' 10 13/16"	36.0	40.0	Floor
4 - Point (lb)	2' 3"	N/A	1185	885	Point load

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1148 @ 7' 7"	4961 (3.50")	Passed (23%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	827 @ 1' 2 3/4"	3238	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1990 @ 3' 11 1/2"	4242	Passed (47%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.047 @ 3' 11 1/2"	0.145	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.063 @ 3' 11 1/2"	0.181	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 7' 9" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 7' 9" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	5.50"	1.50"	302	897	1199	Blocking
2 - Stud wall - HF	3.50"	3.50"	1.50"	289	859	1148	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

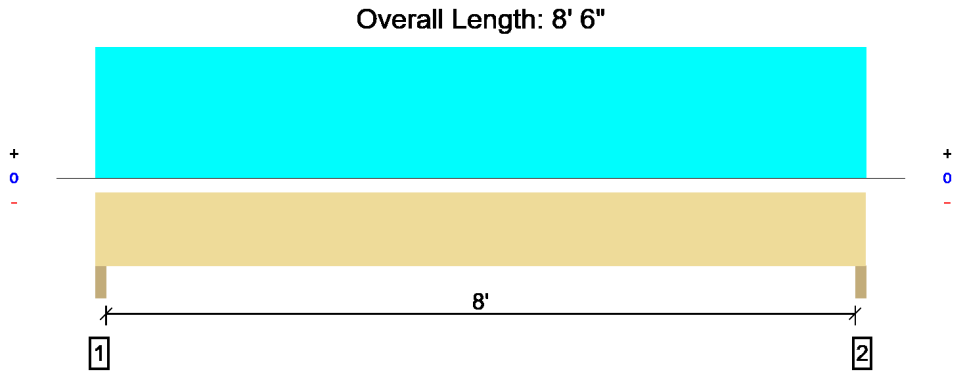
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 7' 9"	N/A	8.2		
1 - Uniform (PSF)	0 to 7' 9" (Top)	5' 8"	12.0	40.0	Stair

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3118 @ 1 1/2"	7613 (3.00")	Passed (41%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2354 @ 1' 1/2"	7902	Passed (30%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6242 @ 4' 3"	11985	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.106 @ 4' 3"	0.165	Passed (L/935)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.225 @ 4' 3"	0.225	Passed (L/440)	--	1.0 D + 1.0 S (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/440).
- Top Edge Bracing (Lu): Top compression edge must be braced at 8' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 8' 6" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	1652	113	1466	3231	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	1652	113	1466	3231	None

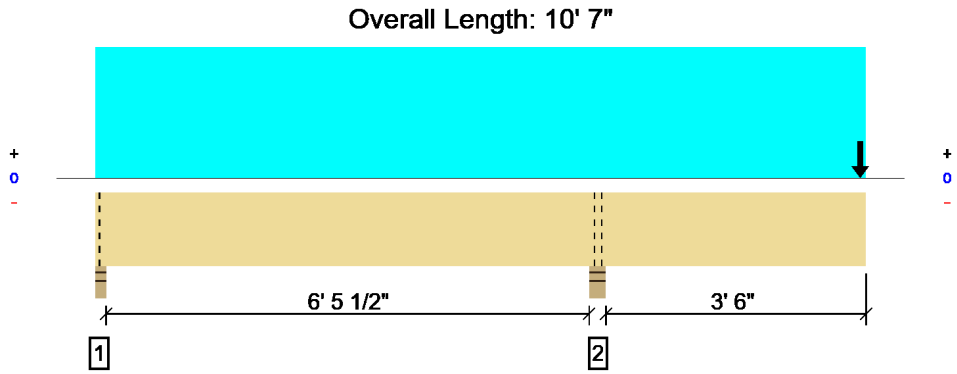
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	10.4			
1 - Uniform (PSF)	0 to 8' 6"	11' 6"	18.0	-	30.0	Roof
2 - Uniform (PSF)	0 to 8' 6"	11' 9"	11.0	-	-	Wall
3 - Uniform (PSF)	0 to 8' 6"	8"	63.0	40.0	-	Garage

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	7815 @ 6' 10 3/4"	9568 (4.50")	Passed (82%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2894 @ 5' 6 1/2"	14210	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-8844 @ 6' 10 3/4"	40743	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.020 @ 10' 7"	0.200	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.066 @ 10' 7"	0.200	Passed (2L/999+)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Overhang deflection criteria: LL (0.2") and TL (0.2").
- Top Edge Bracing (Lu): Top compression edge must be braced at 10' 7" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 10' 7" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	874	885/-321	1759/-321	Blocking
2 - Stud wall - HF	4.50"	4.50"	3.68"	5585	2230	7815	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

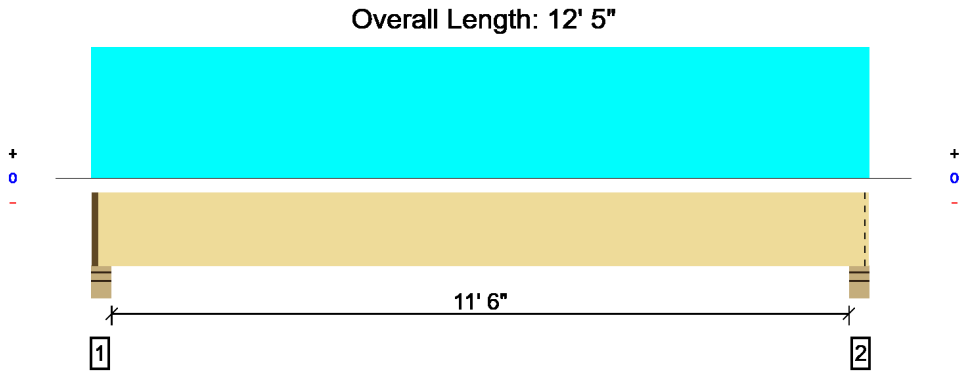
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 10' 7"	N/A	23.0		
1 - Uniform (PSF)	0 to 10' 7" (Top)	10'	11.0	-	Wall
2 - Uniform (PSF)	0 to 10' 7" (Top)	6' 3 5/8"	63.0	40.0	Floor
3 - Point (lb)	10' 6" (Top)	N/A	852	127	Point load

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	624 @ 4 1/2"	2658 (3.75")	Passed (23%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	455 @ 1' 9 1/2"	5320	Passed (9%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1752 @ 6' 2 1/2"	16179	Passed (11%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.016 @ 6' 2 1/2"	0.233	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.041 @ 6' 2 1/2"	0.292	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	72	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	3.75"	1.50"	391	248	639	1 3/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	1.50"	391	248	639	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

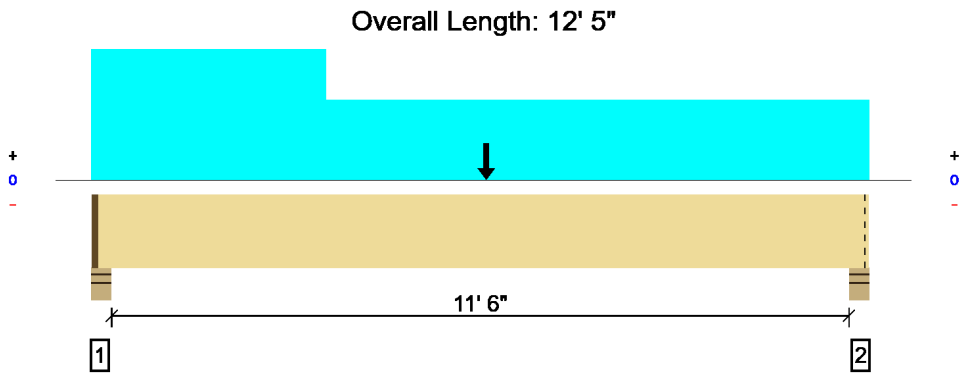
Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 12' 5"	12"	63.0	40.0	Garage

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1492 @ 4 1/2"	2658 (3.75")	Passed (56%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1323 @ 1' 9 1/2"	5320	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6977 @ 6' 3"	16179	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.116 @ 6' 3"	0.233	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.141 @ 6' 3"	0.292	Passed (L/990)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	72	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 7' 10" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	3.75"	2.11"	391	1116	1507	1 3/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	1.99"	391	1020	1411	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

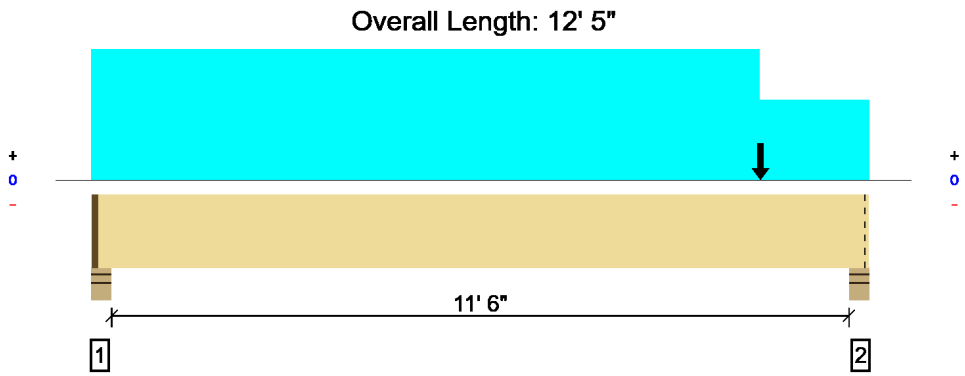
Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 12' 5"	12"	63.0	-	Garage
2 - Uniform (PSF)	0 to 3' 9"	12"	-	40.0	Garage - Live load
3 - Point (lb)	6' 3"	N/A	-	1986	Vehicle

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2316 @ 12' 1/2"	3898 (5.50")	Passed (59%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2203 @ 10' 7 1/2"	5320	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3413 @ 8' 6 3/16"	16179	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.054 @ 6' 9 5/16"	0.233	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.079 @ 6' 7"	0.292	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	72	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' 3" o/c unless detailed otherwise.
- A 4% increase in the moment capacity has been added to account for repetitive member usage.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	5.50"	3.75"	1.50"	391	486	877	1 3/4" Rim Board
2 - Stud wall - HF	5.50"	5.50"	3.27"	391	1925	2316	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

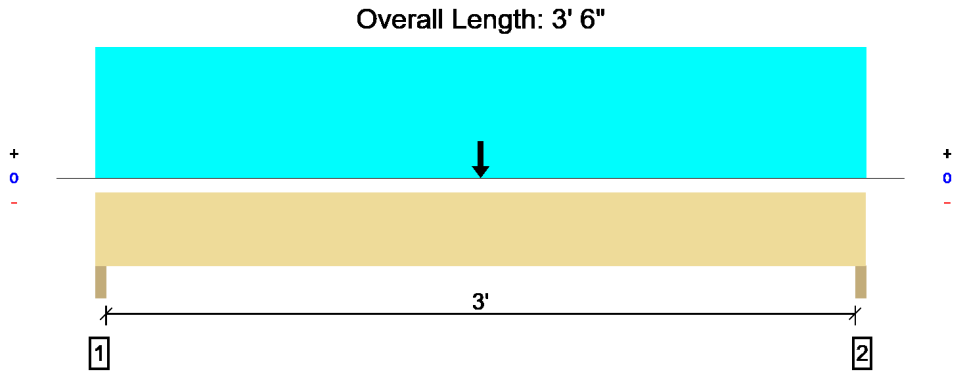
Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 12' 5"	12"	63.0	-	Garage
2 - Uniform (PSF)	0 to 10' 7 1/2"	12"	-	40.0	Garage - Live load
3 - Point (lb)	10' 7 1/2"	N/A	-	1986	Vehicle

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3686 @ 1 1/2"	10313 (3.00")	Passed (36%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2385 @ 1' 1/2"	5922	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4087 @ 1' 9"	6032	Passed (68%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.010 @ 1' 9"	0.065	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.013 @ 1' 9"	0.081	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 3' 6" o/c unless detailed otherwise.
- Applicable calculations are based on NDS.

Supports	Bearing			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	1346	2340	3686	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	1346	2340	3686	None

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	13.2		
1 - Uniform (PSF)	0 to 3' 6"	12'	63.0	40.0	Garage
2 - Point (lb)	1' 9"	N/A	-	3000	Vehicle

Weyerhaeuser Notes

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

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

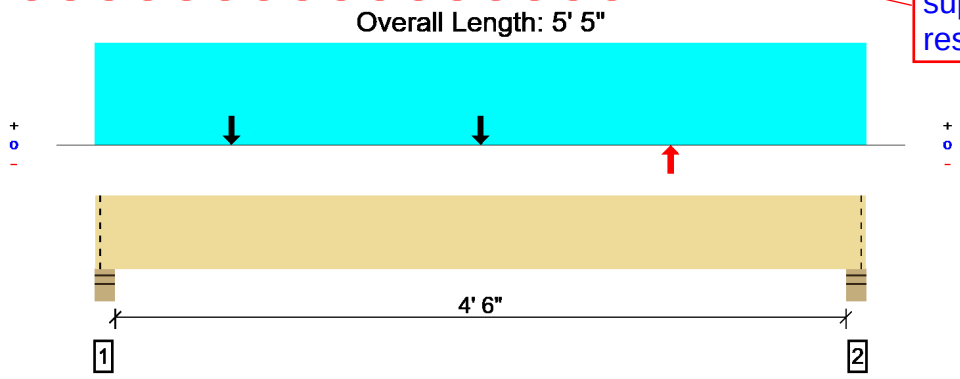
SUSTAINABLE FORESTRY INITIATIVE

1 piece(s) 3 1/2" x 16" 1.55E TimberStrand® LSL

FAILED

This product failed due to an excessive uplift of -2412 lbs at support located at 4".
This product failed due to an excessive uplift of -2412 lbs at support located at 5' 1".

Connection at backspan supports is provided to resist uplift.



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5868 @ 4"	7796 (5.50")	Passed (75%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2284 @ 1' 9 1/2"	11573	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5974 @ 2' 8 1/2"	28178	Passed (21%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.019 @ 2' 8 1/2"	0.095	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.027 @ 2' 8 1/2"	0.119	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Top Edge Bracing (Lu): Top compression edge must be braced at 5' 5" o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 5' 5" o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)						Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Wind	Seismic	Total	
1 - Stud wall - HF	5.50"	5.50"	4.14"	1594	2222	108	2236	4812/-4812	10972/-4812	Blocking
2 - Stud wall - HF	5.50"	5.50"	4.14"	1594	2222	108	-2236	4812/-4812	8736/-7048	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Wind (1.60)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 5' 5"	N/A	17.5					
1 - Uniform (PSF)	0 to 5' 5" (Top)	8"	18.0	-	30.0	-	-	Upper roof
2 - Uniform (PSF)	0 to 5' 5" (Top)	5'	11.0	-	-	-	-	Wall
3 - Uniform (PSF)	0 to 5' 5" (Top)	8"	18.0	-	30.0	-	-	Lower roof
4 - Uniform (PSF)	0 to 5' 5" (Top)	10'	9.0	-	-	-	-	Wall
5 - Uniform (PSF)	0 to 5' 5" (Top)	8"	36.0	40.0	-	-	-	Floor
6 - Uniform (PSF)	0 to 5' 5" (Top)	6'	63.0	40.0	-	-	-	Garage
7 - Point (lb)	2' 8 1/2" (Top)	N/A	-	3000	-	-	-	Vehicle
8 - Point (lb)	11 1/2" (Top)	N/A	-	-	-	3445	7413	Overturning
9 - Point (lb)	4' 1/2" (Top)	N/A	-	-	-	-3445	-7413	Overturning

Weyerhaeuser Notes

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

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

SUSTAINABLE FORESTRY INITIATIVE

FORTE®

MEMBER REPORT *Main floor framing, 37*

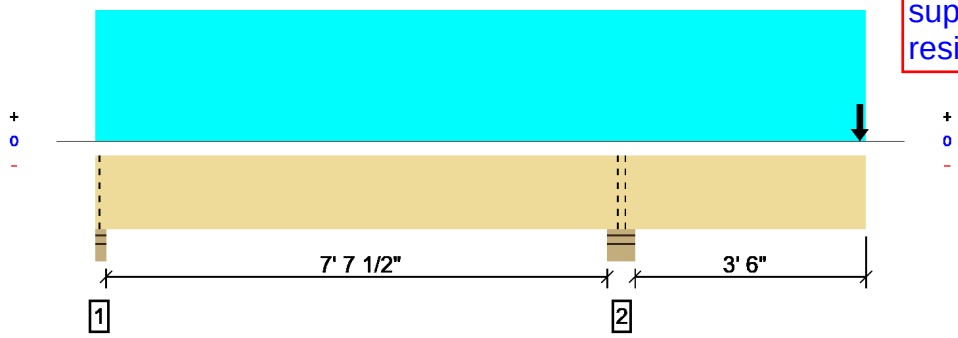
1 piece(s) 5 1/4" x 14" 2.2E Parallam® PSL

FAILED

This product failed due to an excessive uplift of -3465 lbs at support located at 1 1/2".

Connection at backspan supports is provided to resist uplift.

Overall Length: 12'



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	13828 @ 8' 2 1/4"	15947 (7.50")	Passed (87%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	8369 @ 9' 8"	14210	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-30891 @ 8' 2 1/4"	40743	Passed (76%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.171 @ 12'	0.200	Passed (2L/536)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.370 @ 12'	0.200	Failed (2L/248)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/600) and TL (L/480).
- Overhang deflection criteria: LL (0.2") and TL (0.2").
- Top Edge Bracing (Lu): Top compression edge must be braced at 12' o/c unless detailed otherwise.
- Bottom Edge Bracing (Lu): Bottom compression edge must be braced at 12' o/c unless detailed otherwise.

Supports	Bearing			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Stud wall - HF	3.00"	3.00"	1.50"	-1893	166/-1572	-936	166/-4401	Blocking
2 - Stud wall - HF	7.50"	7.50"	6.50"	7685	5222	2969	15876	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

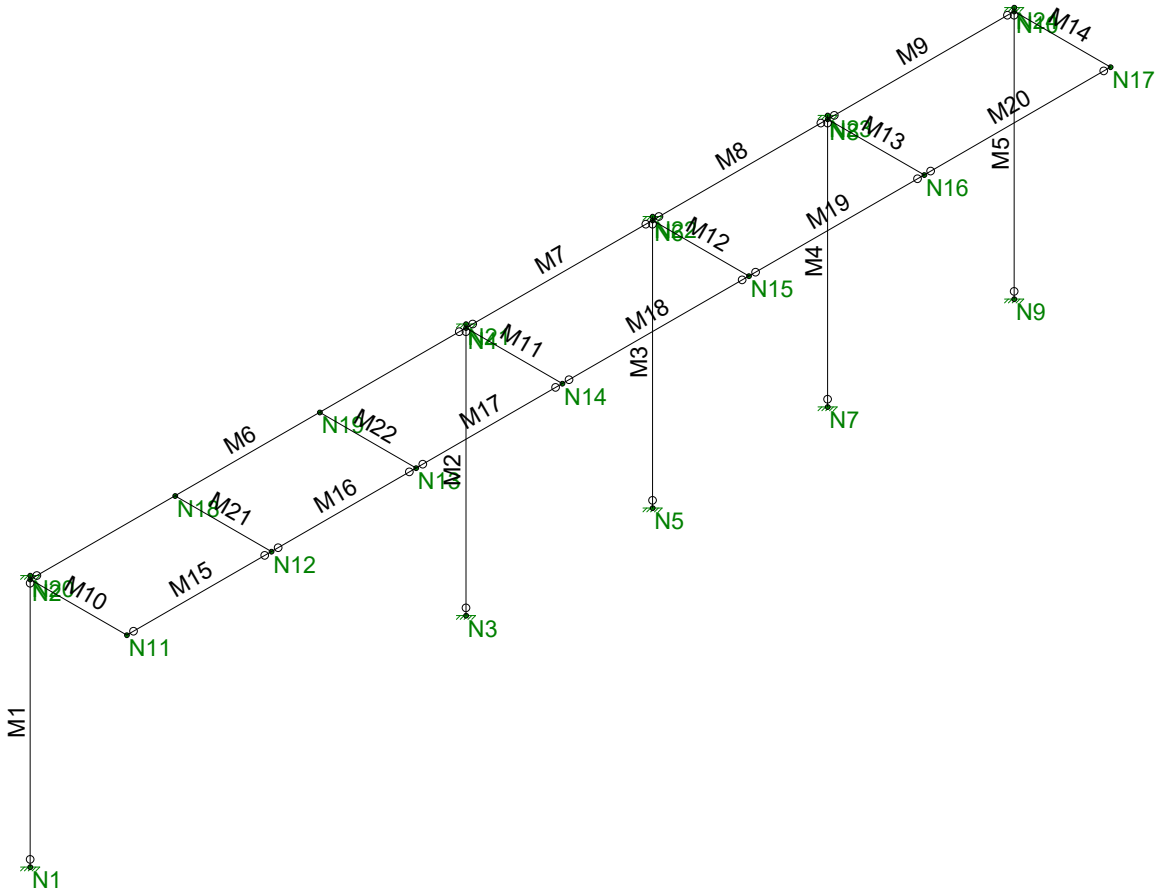
Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12'	N/A	23.0			
1 - Uniform (PSF)	0 to 12' (Top)	3' 6"	11.0	-	-	Wall
2 - Uniform (PSF)	0 to 12' (Top)	8"	40.0	60.0	-	Terrace
3 - Point (lb)	11' 10 13/16" (Top)	N/A	4734	3336	2033	Point load

Weyerhaeuser Notes

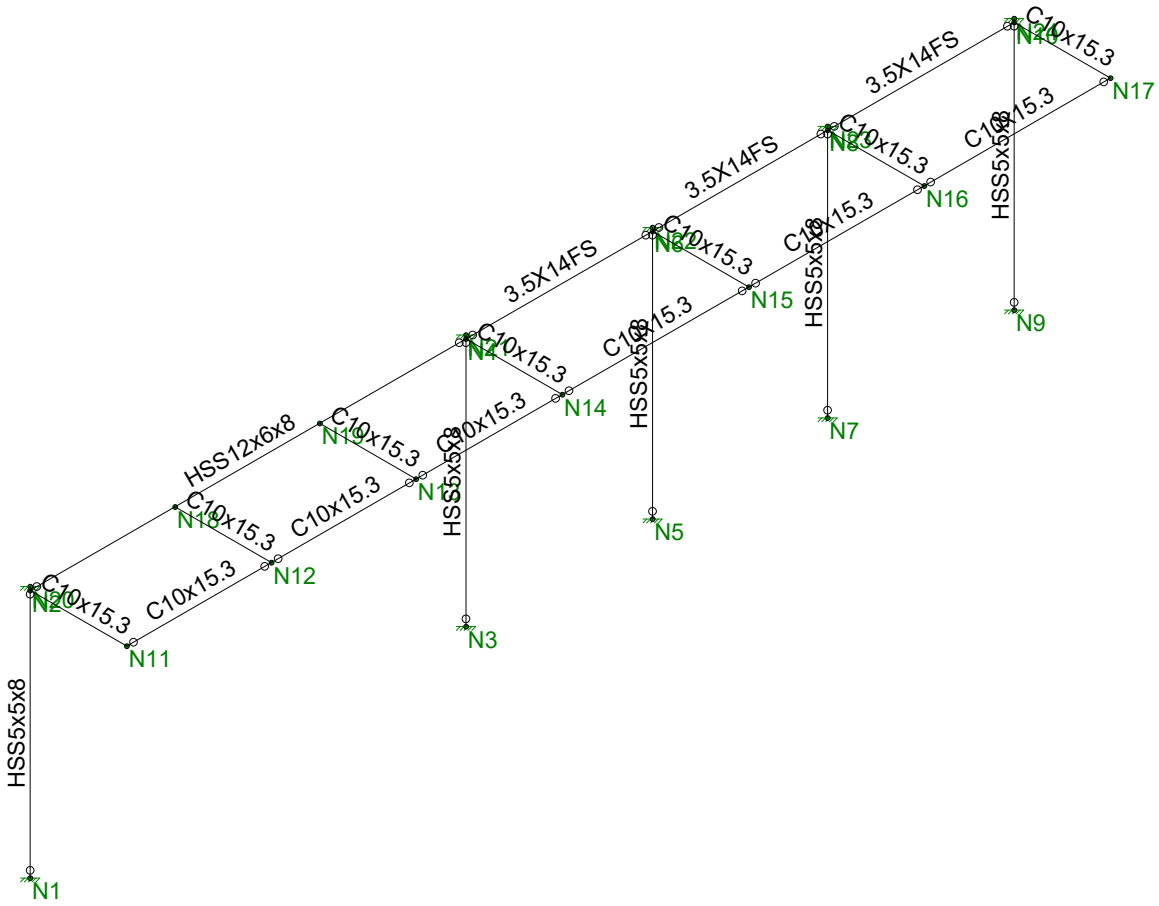
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional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

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

SUSTAINABLE FORESTRY INITIATIVE



Quantum Consulting Engin...	Great room steel awning	SK - 1
Qing		Jan 7, 2019 at 10:23 AM
18689.01		Steel Awning_Great room.r3d



Quantum Consulting Engin...		SK - 2
Qing	Great room steel awning	Jan 7, 2019 at 10:23 AM
18689.01		Steel Awning_Great room.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-16: ASD
Wood Code	AWC NDS-15: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	TMS 402-16: ASD
Aluminum Code	AA ADM1-15: ASD - Building
	AISC 14th(360-10): ASD

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E..	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Wood Material Properties

	Label	Type	Database	Species	Grade	Cm	Emod	Nu	Therm...	Dens[k/f...
1	LSL	SCL	TrusJoist	1.55E TimberStrand ...	na		1	.3	.3	.035
2	SP	Solid Sa...	Visually Graded	Southern Pine	No.1		1	.3	.3	.035
3	HF	Solid Sa...	Visually Graded	Hem-Fir	No.1		1	.3	.3	.035
4	SPF	Solid Sa...	Visually Graded	Spruce-Pine-fir	No.1		1	.3	.3	.035
5	24F-1.8E DF Balanced	Glulam	NDS Table 5A	24F-1.8E_DF_BAL	na		1	.3	.3	.035
6	24F-1.8E DF Unbalanced	Glulam	NDS Table 5A	24F-1.8E_DF_UNBAL	na		1	.3	.3	.035
7	24F-1.8E SP Balanced	Glulam	NDS Table 5A	24F-1.8E_SP_BAL	na		1	.3	.3	.035
8	24F-1.8E SP Unbalanced	Glulam	NDS Table 5A	24F-1.8E_SP_UNBAL	na		1	.3	.3	.035

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Column	HSS5x5x8	Column	Tube	A500 Gr.B ...	Typical	7.88	26	26	44.6
2	Terrace Column	HSS5x5x8	Column	Tube	A500 Gr.B ...	Typical	7.88	26	26	44.6
3	Beam	HSS12x6x8	Beam	Tube	A500 Gr.B ...	Typical	15.3	91.1	271	227
4	Awning	C12x20.7	Beam	Channel	A36 Gr.36	Typical	6.08	3.86	129	.369
5	Awning Perimeter	C10x15.3	Beam	Channel	A36 Gr.36	Typical	4.48	2.27	67.3	.209

Wood Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Wood Beam	3.5X14FS	Beam	1.55E TimberSt...	LSL	Typical	49	50.021	800.333	168.58

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	15.5	0	0	
3	N3	0	0	-27.1	0	
4	N4	0	15.5	-27.1	0	
5	N5	0	0	-38.7	0	
6	N6	0	15.5	-38.7	0	
7	N7	0	0	-49.6	0	
8	N8	0	15.5	-49.6	0	
9	N9	0	0	-61.2	0	
10	N10	0	15.5	-61.2	0	
11	N11	6	15.5	0	0	
12	N12	6	15.5	-9	0	
13	N13	6	15.5	-18	0	
14	N14	6	15.5	-27.1	0	
15	N15	6	15.5	-38.7	0	
16	N16	6	15.5	-49.6	0	
17	N17	6	15.5	-61.2	0	
18	N18	0	15.5	-9	0	
19	N19	0	15.5	-18	0	
20	N20	0	15.7	0	0	
21	N21	0	15.7	-27.1	0	
22	N22	0	15.7	-38.7	0	
23	N23	0	15.7	-49.6	0	
24	N24	0	15.7	-61.2	0	

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N20			Terrace Column	Column	Tube	A500 Gr.B...	Typical
2	M2	N3	N21			Terrace Column	Column	Tube	A500 Gr.B...	Typical
3	M3	N5	N22			Column	Column	Tube	A500 Gr.B...	Typical
4	M4	N7	N23			Column	Column	Tube	A500 Gr.B...	Typical
5	M5	N9	N24			Column	Column	Tube	A500 Gr.B...	Typical
6	M6	N2	N4			Beam	Beam	Tube	A500 Gr.B...	Typical
7	M7	N4	N6			Wood Beam	Beam	1.55E TimberS...	LSL	Typical
8	M8	N6	N8			Wood Beam	Beam	1.55E TimberS...	LSL	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
9	M9	N8	N10			Wood Beam	Beam	1.55E TimberS...	LSL	Typical
10	M10	N2	N11			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
11	M11	N4	N14			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
12	M12	N6	N15			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
13	M13	N8	N16			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
14	M14	N10	N17			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
15	M15	N11	N12			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
16	M16	N12	N13			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
17	M17	N13	N14			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
18	M18	N14	N15			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
19	M19	N15	N16			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
20	M20	N16	N17			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
21	M21	N18	N12			Awning Perime...	Beam	Channel	A36 Gr.36	Typical
22	M22	N19	N13			Awning Perime...	Beam	Channel	A36 Gr.36	Typical

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N3	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N5	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N7	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
5	N9	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N2						
7	N4						
8	N6						
9	N8						
10	N10						
11	N20	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
12	N21	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
13	N22	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
14	N23	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
15	N24	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Distributed Loads (BLC 1 : Dead load)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M6	Y	-.108	-.108	0	0
2	M7	Y	-.237	-.237	0	0
3	M8	Y	-.237	-.237	0	0
4	M9	Y	-.237	-.237	0	0

Member Distributed Loads (BLC 3 : Snow load)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M6	Y	-.18	-.18	0	0
2	M7	Y	-.395	-.395	0	0
3	M8	Y	-.395	-.395	0	0
4	M9	Y	-.395	-.395	0	0

Member Distributed Loads (BLC 4 : Wind load)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M2	X	-.23	-.23	0	0
2	M3	X	-.447	-.447	0	0
3	M4	X	-.447	-.447	0	0
4	M5	X	-.23	-.23	0	0

Member Distributed Loads (BLC 5 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M10	Y	-.022	-.022	0	6
2	M21	Y	-.022	-.022	4.441e-16	6
3	M21	Y	-.022	-.022	0	6
4	M22	Y	-.022	-.022	4.441e-16	6
5	M11	Y	-.023	-.023	1.332e-15	6
6	M22	Y	-.023	-.023	0	6
7	M11	Y	-.029	-.029	2.887e-15	6
8	M12	Y	-.056	-.056	0	6
9	M13	Y	-.027	-.027	7.772e-16	6
10	M13	Y	-.029	-.029	6.661e-16	6
11	M14	Y	-.029	-.029	8.882e-16	6

Member Distributed Loads (BLC 6 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M10	Y	-.09	-.09	0	6
2	M21	Y	-.09	-.09	4.441e-16	6
3	M21	Y	-.09	-.09	0	6
4	M22	Y	-.09	-.09	4.441e-16	6
5	M11	Y	-.091	-.091	1.332e-15	6
6	M22	Y	-.091	-.091	0	6
7	M11	Y	-.116	-.116	2.887e-15	6
8	M12	Y	-.225	-.225	0	6
9	M13	Y	-.109	-.109	7.772e-16	6
10	M13	Y	-.116	-.116	6.661e-16	6
11	M14	Y	-.116	-.116	8.882e-16	6

Member Area Loads (BLC 1 : Dead load)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[ksf]
1	N2	N18	N12	N11	Y	A-B	-.005
2	N18	N19	N13	N12	Y	A-B	-.005
3	N19	N4	N14	N13	Y	A-B	-.005
4	N4	N6	N15	N14	Y	A-B	-.005
5	N6	N8	N16	N15	Y	A-B	-.005
6	N8	N10	N17	N16	Y	A-B	-.005

Member Area Loads (BLC 2 : Live load)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[ksf]
1	N2	N18	N12	N11	Y	A-B	-.02
2	N18	N19	N13	N12	Y	A-B	-.02
3	N19	N4	N14	N13	Y	A-B	-.02
4	N4	N6	N15	N14	Y	A-B	-.02
5	N6	N8	N16	N15	Y	A-B	-.02

Member Area Loads (BLC 2 : Live load) (Continued)

	Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[ksf]
6	N8	N10	N17	N16	Y	A-B	-.02

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead load	DL		-1				4	6	
2	Live load	LL							6	
3	Snow load	SL						4		
4	Wind load	WL						4		
5	BLC 1 Transient Area...	None						11		
6	BLC 2 Transient Area...	None						11		

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	Deflection 1	Yes	Y		DL	1																		
2	Deflection 2	Yes	Y		LL	1																		
3	Deflection 3	Yes	Y		DL	1	LL	1																
4	IBC 16-8	Yes	Y		DL	1																		
5	IBC 16-9	Yes	Y		DL	1	LL	1	LLS	1														
6	IBC 16-10...	Yes	Y		DL	1	RLL	1																
7	IBC 16-10...	Yes	Y		DL	1	SL	1	SLN	1														
8	IBC 16-11...	Yes	Y		DL	1	LL	.75	LLS	.75	RLL	.75												
9	IBC 16-11...	Yes	Y		DL	1	LL	.75	LLS	.75	SL	.75	SLN	.75										
10	IBC 16-12...	Yes	Y		DL	1	WL	.6																
11	IBC 16-12...	Yes	Y		DL	1	WL	-.6																
12	IBC 16-13...	Yes	Y		DL	1	WL	.45	LL	.75	LLS	.75	RLL	.75										
13	IBC 16-13...	Yes	Y		DL	1	WL	-.45	LL	.75	LLS	.75	RLL	.75										
14	IBC 16-13...	Yes	Y		DL	1	WL	.45	LL	.75	LLS	.75	SL	.75	SLN	.75								
15	IBC 16-13...	Yes	Y		DL	1	WL	-.45	LL	.75	LLS	.75	SL	.75	SLN	.75								
16	IBC 16-13...	Yes	Y		DL	1	WL	.45	LL	.75	LLS	.75												
17	IBC 16-13...	Yes	Y		DL	1	WL	-.45	LL	.75	LLS	.75												
18	IBC 16-15...	Yes	Y		DL	.6	WL	.6																
19	IBC 16-15...	Yes	Y		DL	.6	WL	-.6																

Member AISC 14th(360-10): ASD Steel Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
1	1	M1	HSS5x5x8	.108	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
2	1	M2	HSS5x5x8	.120	15.373	.005	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
3	1	M3	HSS5x5x8	.078	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
4	1	M4	HSS5x5x8	.074	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
5	1	M5	HSS5x5x8	.046	15.373	.002	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
6	1	M6	HSS12x6x8	.149	13.55	.044	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
7	1	M10	C10x15.3	.038	0	.010	0	y	56.357	96.575	3.319	28.563	2.019	H1-1b
8	1	M11	C10x15.3	.075	0	.018	0	y	56.357	96.575	3.319	28.563	1.982	H1-1b
9	1	M12	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.977	H1-1b
10	1	M13	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.979	H1-1b
11	1	M14	C10x15.3	.047	0	.011	0	y	56.357	96.575	3.319	28.563	2.005	H1-1b
12	1	M15	C10x15.3	.007	4.5	.007	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b

Member AISC 14th(360-10): ASD Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
13	1	M16	C10x15.3	.007	4.5	.003	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
14	1	M17	C10x15.3	.007	4.55	.005	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
15	1	M18	C10x15.3	.014	5.8	.007	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
16	1	M19	C10x15.3	.012	5.45	.003	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
17	1	M20	C10x15.3	.014	5.8	.006	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
18	1	M21	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.989	H1-1b
19	1	M22	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
20	2	M1	HSS5x5x8	.178	15.373	.007	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
21	2	M2	HSS5x5x8	.203	15.373	.008	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
22	2	M3	HSS5x5x8	.136	15.373	.005	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
23	2	M4	HSS5x5x8	.128	15.373	.005	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
24	2	M5	HSS5x5x8	.072	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
25	2	M6	HSS12x6x8	.075	17.784	.054	0	y	129.479	421.437	80.798	131.756	1.14	H1-1b
26	2	M10	C10x15.3	.057	0	.017	0	y	56.357	96.575	3.319	28.563	2.318	H1-1b
27	2	M11	C10x15.3	.131	0	.040	0	y	56.357	96.575	3.319	28.563	2.326	H1-1b
28	2	M12	C10x15.3	.142	0	.043	0	y	56.357	96.575	3.319	28.563	2.323	H1-1b
29	2	M13	C10x15.3	.142	0	.043	0	y	56.357	96.575	3.319	28.563	2.328	H1-1b
30	2	M14	C10x15.3	.073	0	.022	0	y	56.357	96.575	3.319	28.563	2.321	H1-1b
31	2	M15	C10x15.3	.000	0	.008	0	y	29.252	96.575	3.319	19.821	1	H1-1b
32	2	M16	C10x15.3	.000	0	.001	0	y	29.252	96.575	3.319	19.821	1	H1-1b
33	2	M17	C10x15.3	.000	0	.004	0	y	28.613	96.575	3.319	19.676	1	H1-1b
34	2	M18	C10x15.3	.000	0	.006	0	y	17.609	96.575	3.319	15.84	1	H1-1b
35	2	M19	C10x15.3	.000	0	.001	0	z	19.943	96.575	3.319	17.07	1	H1-1b
36	2	M20	C10x15.3	.000	0	.007	0	y	17.609	96.575	3.319	15.84	1	H1-1b
37	2	M21	C10x15.3	.114	0	.035	0	y	56.357	96.575	3.319	28.563	2.329	H1-1b
38	2	M22	C10x15.3	.114	0	.035	0	y	56.357	96.575	3.319	28.563	2.328	H1-1b
39	3	M1	HSS5x5x8	.285	15.373	.012	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
40	3	M2	HSS5x5x8	.322	15.373	.014	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
41	3	M3	HSS5x5x8	.214	15.373	.009	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
42	3	M4	HSS5x5x8	.202	15.373	.008	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
43	3	M5	HSS5x5x8	.118	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
44	3	M6	HSS12x6x8	.223	13.55	.097	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
45	3	M10	C10x15.3	.095	0	.027	0	y	56.357	96.575	3.319	28.563	2.188	H1-1b
46	3	M11	C10x15.3	.206	0	.058	0	y	56.357	96.575	3.319	28.563	2.187	H1-1b
47	3	M12	C10x15.3	.223	0	.063	0	y	56.357	96.575	3.319	28.563	2.184	H1-1b
48	3	M13	C10x15.3	.223	0	.063	0	y	56.357	96.575	3.319	28.563	2.188	H1-1b
49	3	M14	C10x15.3	.120	0	.034	0	y	56.357	96.575	3.319	28.563	2.187	H1-1b
50	3	M15	C10x15.3	.007	4.5	.015	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
51	3	M16	C10x15.3	.007	4.5	.004	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
52	3	M17	C10x15.3	.007	4.55	.009	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
53	3	M18	C10x15.3	.014	5.8	.013	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
54	3	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
55	3	M20	C10x15.3	.014	5.8	.013	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
56	3	M21	C10x15.3	.180	0	.051	0	y	56.357	96.575	3.319	28.563	2.19	H1-1b
57	3	M22	C10x15.3	.181	0	.051	0	y	56.357	96.575	3.319	28.563	2.19	H1-1b
58	4	M1	HSS5x5x8	.108	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
59	4	M2	HSS5x5x8	.120	15.373	.005	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
60	4	M3	HSS5x5x8	.078	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
61	4	M4	HSS5x5x8	.074	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
62	4	M5	HSS5x5x8	.046	15.373	.002	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
63	4	M6	HSS12x6x8	.149	13.55	.044	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
64	4	M10	C10x15.3	.038	0	.010	0	y	56.357	96.575	3.319	28.563	2.019	H1-1b

Member AISC 14th(360-10): ASD Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
65	4	M11	C10x15.3	.075	0	.018	0	y	56.357	96.575	3.319	28.563	1.982	H1-1b
66	4	M12	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.977	H1-1b
67	4	M13	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.979	H1-1b
68	4	M14	C10x15.3	.047	0	.011	0	y	56.357	96.575	3.319	28.563	2.005	H1-1b
69	4	M15	C10x15.3	.007	4.5	.007	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
70	4	M16	C10x15.3	.007	4.5	.003	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
71	4	M17	C10x15.3	.007	4.55	.005	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
72	4	M18	C10x15.3	.014	5.8	.007	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
73	4	M19	C10x15.3	.012	5.45	.003	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
74	4	M20	C10x15.3	.014	5.8	.006	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
75	4	M21	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.989	H1-1b
76	4	M22	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
77	5	M1	HSS5x5x8	.285	15.373	.012	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
78	5	M2	HSS5x5x8	.322	15.373	.014	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
79	5	M3	HSS5x5x8	.214	15.373	.009	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
80	5	M4	HSS5x5x8	.202	15.373	.008	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
81	5	M5	HSS5x5x8	.118	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
82	5	M6	HSS12x6x8	.223	13.55	.097	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
83	5	M10	C10x15.3	.095	0	.027	0	y	56.357	96.575	3.319	28.563	2.188	H1-1b
84	5	M11	C10x15.3	.206	0	.058	0	y	56.357	96.575	3.319	28.563	2.187	H1-1b
85	5	M12	C10x15.3	.223	0	.063	0	y	56.357	96.575	3.319	28.563	2.184	H1-1b
86	5	M13	C10x15.3	.223	0	.063	0	y	56.357	96.575	3.319	28.563	2.188	H1-1b
87	5	M14	C10x15.3	.120	0	.034	0	y	56.357	96.575	3.319	28.563	2.187	H1-1b
88	5	M15	C10x15.3	.007	4.5	.015	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
89	5	M16	C10x15.3	.007	4.5	.004	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
90	5	M17	C10x15.3	.007	4.55	.009	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
91	5	M18	C10x15.3	.014	5.8	.013	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
92	5	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
93	5	M20	C10x15.3	.014	5.8	.013	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
94	5	M21	C10x15.3	.180	0	.051	0	y	56.357	96.575	3.319	28.563	2.19	H1-1b
95	5	M22	C10x15.3	.181	0	.051	0	y	56.357	96.575	3.319	28.563	2.19	H1-1b
96	6	M1	HSS5x5x8	.108	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
97	6	M2	HSS5x5x8	.120	15.373	.005	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
98	6	M3	HSS5x5x8	.078	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
99	6	M4	HSS5x5x8	.074	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
100	6	M5	HSS5x5x8	.046	15.373	.002	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
101	6	M6	HSS12x6x8	.149	13.55	.044	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
102	6	M10	C10x15.3	.038	0	.010	0	y	56.357	96.575	3.319	28.563	2.019	H1-1b
103	6	M11	C10x15.3	.075	0	.018	0	y	56.357	96.575	3.319	28.563	1.982	H1-1b
104	6	M12	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.977	H1-1b
105	6	M13	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.979	H1-1b
106	6	M14	C10x15.3	.047	0	.011	0	y	56.357	96.575	3.319	28.563	2.005	H1-1b
107	6	M15	C10x15.3	.007	4.5	.007	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
108	6	M16	C10x15.3	.007	4.5	.003	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
109	6	M17	C10x15.3	.007	4.55	.005	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
110	6	M18	C10x15.3	.014	5.8	.007	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
111	6	M19	C10x15.3	.012	5.45	.003	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
112	6	M20	C10x15.3	.014	5.8	.006	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
113	6	M21	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.989	H1-1b
114	6	M22	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
115	7	M1	HSS5x5x8	.108	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
116	7	M2	HSS5x5x8	.119	15.373	.005	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b

Member AISC 14th(360-10): ASD Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
117	7	M3	HSS5x5x8	.078	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
118	7	M4	HSS5x5x8	.074	15.373	.003	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
119	7	M5	HSS5x5x8	.046	15.373	.002	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
120	7	M6	HSS12x6x8	.274	13.55	.059	0	y	129.479	421.437	80.798	131.756	1.136	H1-1b
121	7	M10	C10x15.3	.038	0	.010	0	y	56.357	96.575	3.319	28.563	2.019	H1-1b
122	7	M11	C10x15.3	.075	0	.018	0	y	56.357	96.575	3.319	28.563	1.982	H1-1b
123	7	M12	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.977	H1-1b
124	7	M13	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.979	H1-1b
125	7	M14	C10x15.3	.047	0	.011	0	y	56.357	96.575	3.319	28.563	2.005	H1-1b
126	7	M15	C10x15.3	.007	4.5	.007	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
127	7	M16	C10x15.3	.007	4.5	.003	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
128	7	M17	C10x15.3	.007	4.55	.005	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
129	7	M18	C10x15.3	.014	5.8	.007	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
130	7	M19	C10x15.3	.012	5.45	.003	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
131	7	M20	C10x15.3	.014	5.8	.006	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
132	7	M21	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.989	H1-1b
133	7	M22	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
134	8	M1	HSS5x5x8	.241	15.373	.010	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
135	8	M2	HSS5x5x8	.271	15.373	.011	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
136	8	M3	HSS5x5x8	.180	15.373	.007	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
137	8	M4	HSS5x5x8	.170	15.373	.007	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
138	8	M5	HSS5x5x8	.100	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
139	8	M6	HSS12x6x8	.204	13.55	.084	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
140	8	M10	C10x15.3	.081	0	.023	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
141	8	M11	C10x15.3	.173	0	.048	0	y	56.357	96.575	3.319	28.563	2.163	H1-1b
142	8	M12	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.159	H1-1b
143	8	M13	C10x15.3	.187	0	.052	0	y	56.357	96.575	3.319	28.563	2.163	H1-1b
144	8	M14	C10x15.3	.102	0	.028	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
145	8	M15	C10x15.3	.007	4.5	.013	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
146	8	M16	C10x15.3	.007	4.5	.004	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
147	8	M17	C10x15.3	.007	4.55	.008	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
148	8	M18	C10x15.3	.014	5.8	.012	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
149	8	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
150	8	M20	C10x15.3	.014	5.8	.011	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
151	8	M21	C10x15.3	.152	0	.042	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
152	8	M22	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
153	9	M1	HSS5x5x8	.241	15.373	.010	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
154	9	M2	HSS5x5x8	.271	15.373	.012	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
155	9	M3	HSS5x5x8	.180	15.373	.008	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
156	9	M4	HSS5x5x8	.170	15.373	.007	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
157	9	M5	HSS5x5x8	.100	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
158	9	M6	HSS12x6x8	.298	13.55	.095	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
159	9	M10	C10x15.3	.081	0	.023	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
160	9	M11	C10x15.3	.173	0	.048	0	y	56.357	96.575	3.319	28.563	2.163	H1-1b
161	9	M12	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.159	H1-1b
162	9	M13	C10x15.3	.187	0	.052	0	y	56.357	96.575	3.319	28.563	2.163	H1-1b
163	9	M14	C10x15.3	.102	0	.028	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
164	9	M15	C10x15.3	.007	4.5	.013	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
165	9	M16	C10x15.3	.007	4.5	.004	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
166	9	M17	C10x15.3	.007	4.55	.008	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
167	9	M18	C10x15.3	.014	5.8	.012	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
168	9	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b

Member AISC 14th(360-10): ASD Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
169	9	M20	C10x15.3	.014	5.8	.011	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
170	9	M21	C10x15.3	.152	0	.042	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
171	9	M22	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
172	10	M1	HSS5x5x8	.155	15.373	.006	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
173	10	M2	HSS5x5x8	.187	8.995	.023	0	y	105.268	217.054	30.07	30.07	1.116	H1-1b
174	10	M3	HSS5x5x8	.310	8.341	.040	0	y	105.268	217.054	30.07	30.07	1.123	H1-1b
175	10	M4	HSS5x5x8	.309	8.341	.040	0	y	105.268	217.054	30.07	30.07	1.123	H1-1b
176	10	M5	HSS5x5x8	.170	8.668	.021	0	y	105.268	217.054	30.07	30.07	1.118	H1-1b
177	10	M6	HSS12x6x8	.149	13.55	.061	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
178	10	M10	C10x15.3	.039	0	.010	0	y	56.357	96.575	3.319	28.563	2.017	H1-1b
179	10	M11	C10x15.3	.076	0	.018	0	y	56.357	96.575	3.319	28.563	1.976	H1-1b
180	10	M12	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.983	H1-1b
181	10	M13	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.985	H1-1b
182	10	M14	C10x15.3	.047	0	.011	0	y	56.357	96.575	3.319	28.563	1.996	H1-1b
183	10	M15	C10x15.3	.007	4.5	.009	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
184	10	M16	C10x15.3	.007	4.5	.005	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
185	10	M17	C10x15.3	.007	4.55	.002	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
186	10	M18	C10x15.3	.014	5.8	.015	0	y	17.609	96.575	3.319	18	1.136	H1-1b
187	10	M19	C10x15.3	.012	5.45	.003	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
188	10	M20	C10x15.3	.014	5.8	.018	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
189	10	M21	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.989	H1-1b
190	10	M22	C10x15.3	.068	0	.016	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
191	11	M1	HSS5x5x8	.060	15.373	.002	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
192	11	M2	HSS5x5x8	.144	15.373	.025	15.7	y	105.268	217.054	30.07	30.07	2.124	H1-1b
193	11	M3	HSS5x5x8	.231	7.196	.040	15.7	y	105.268	217.054	30.07	30.07	1.176	H1-1b
194	11	M4	HSS5x5x8	.234	7.196	.040	15.7	y	105.268	217.054	30.07	30.07	1.171	H1-1b
195	11	M5	HSS5x5x8	.123	7.359	.021	15.7	y	105.268	217.054	30.07	30.07	1.165	H1-1b
196	11	M6	HSS12x6x8	.149	13.55	.054	27.1	y	129.479	421.437	80.798	131.756	1.137	H1-1b
197	11	M10	C10x15.3	.038	0	.010	0	y	56.357	96.575	3.319	28.563	2.022	H1-1b
198	11	M11	C10x15.3	.075	0	.018	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
199	11	M12	C10x15.3	.082	0	.019	0	y	56.357	96.575	3.319	28.563	1.97	H1-1b
200	11	M13	C10x15.3	.081	0	.019	0	y	56.357	96.575	3.319	28.563	1.974	H1-1b
201	11	M14	C10x15.3	.047	0	.011	0	y	56.357	96.575	3.319	28.563	2.015	H1-1b
202	11	M15	C10x15.3	.007	4.5	.004	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
203	11	M16	C10x15.3	.007	4.5	.004	0	y	29.252	96.575	3.319	22.524	1.136	H1-1b
204	11	M17	C10x15.3	.007	4.55	.008	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
205	11	M18	C10x15.3	.014	5.8	.023	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
206	11	M19	C10x15.3	.012	5.45	.003	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
207	11	M20	C10x15.3	.014	5.8	.011	0	y	17.609	96.575	3.319	18	1.136	H1-1b
208	11	M21	C10x15.3	.067	0	.016	0	y	56.357	96.575	3.319	28.563	1.989	H1-1b
209	11	M22	C10x15.3	.068	0	.016	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
210	12	M1	HSS5x5x8	.276	15.373	.011	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
211	12	M2	HSS5x5x8	.267	12.429	.023	0	y	105.268	217.054	30.07	30.07	1.187	H1-1b
212	12	M3	HSS5x5x8	.303	9.485	.035	0	y	105.268	217.054	30.07	30.07	1.119	H1-1b
213	12	M4	HSS5x5x8	.297	9.485	.034	0	y	105.268	217.054	30.07	30.07	1.118	H1-1b
214	12	M5	HSS5x5x8	.167	9.813	.018	0	y	105.268	217.054	30.07	30.07	1.123	H1-1b
215	12	M6	HSS12x6x8	.204	13.55	.097	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
216	12	M10	C10x15.3	.081	0	.023	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
217	12	M11	C10x15.3	.174	0	.048	0	y	56.357	96.575	3.319	28.563	2.16	H1-1b
218	12	M12	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.162	H1-1b
219	12	M13	C10x15.3	.187	0	.052	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
220	12	M14	C10x15.3	.102	0	.028	0	y	56.357	96.575	3.319	28.563	2.161	H1-1b

Member AISC 14th(360-10): ASD Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
221	12	M15	C10x15.3	.007	4.5	.015	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
222	12	M16	C10x15.3	.007	4.5	.006	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
223	12	M17	C10x15.3	.007	4.55	.006	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
224	12	M18	C10x15.3	.014	5.8	.006	0	y	17.609	96.575	3.319	18	1.136	H1-1b
225	12	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
226	12	M20	C10x15.3	.014	5.8	.020	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
227	12	M21	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
228	12	M22	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
229	13	M1	HSS5x5x8	.205	15.373	.008	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
230	13	M2	HSS5x5x8	.290	15.373	.027	15.7	y	105.268	217.054	30.07	30.07	2.651	H1-1b
231	13	M3	HSS5x5x8	.173	15.373	.035	15.7	y	105.268	217.054	30.07	30.07	1.768	H1-1b
232	13	M4	HSS5x5x8	.160	15.373	.035	15.7	y	105.268	217.054	30.07	30.07	1.599	H1-1b
233	13	M5	HSS5x5x8	.085	15.373	.018	15.7	y	105.268	217.054	30.07	30.07	1.652	H1-1b
234	13	M6	HSS12x6x8	.204	13.55	.079	27.1	y	129.479	421.437	80.798	131.756	1.137	H1-1b
235	13	M10	C10x15.3	.081	0	.023	0	y	56.357	96.575	3.319	28.563	2.167	H1-1b
236	13	M11	C10x15.3	.173	0	.048	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
237	13	M12	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.157	H1-1b
238	13	M13	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.161	H1-1b
239	13	M14	C10x15.3	.101	0	.028	0	y	56.357	96.575	3.319	28.563	2.169	H1-1b
240	13	M15	C10x15.3	.007	4.5	.011	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
241	13	M16	C10x15.3	.007	4.5	.003	0	y	29.252	96.575	3.319	22.524	1.136	H1-1b
242	13	M17	C10x15.3	.007	4.55	.010	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
243	13	M18	C10x15.3	.014	5.8	.024	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
244	13	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
245	13	M20	C10x15.3	.014	5.8	.003	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
246	13	M21	C10x15.3	.152	0	.042	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
247	13	M22	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
248	14	M1	HSS5x5x8	.276	15.373	.012	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
249	14	M2	HSS5x5x8	.267	12.429	.023	0	y	105.268	217.054	30.07	30.07	1.186	H1-1b
250	14	M3	HSS5x5x8	.303	9.485	.035	0	y	105.268	217.054	30.07	30.07	1.119	H1-1b
251	14	M4	HSS5x5x8	.297	9.485	.034	0	y	105.268	217.054	30.07	30.07	1.118	H1-1b
252	14	M5	HSS5x5x8	.167	9.813	.018	0	y	105.268	217.054	30.07	30.07	1.123	H1-1b
253	14	M6	HSS12x6x8	.298	13.55	.108	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
254	14	M10	C10x15.3	.081	0	.023	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
255	14	M11	C10x15.3	.174	0	.048	0	y	56.357	96.575	3.319	28.563	2.16	H1-1b
256	14	M12	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.162	H1-1b
257	14	M13	C10x15.3	.187	0	.052	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
258	14	M14	C10x15.3	.102	0	.028	0	y	56.357	96.575	3.319	28.563	2.161	H1-1b
259	14	M15	C10x15.3	.007	4.5	.015	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
260	14	M16	C10x15.3	.007	4.5	.006	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
261	14	M17	C10x15.3	.007	4.55	.006	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
262	14	M18	C10x15.3	.014	5.8	.006	0	y	17.609	96.575	3.319	18	1.136	H1-1b
263	14	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
264	14	M20	C10x15.3	.014	5.8	.020	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
265	14	M21	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
266	14	M22	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
267	15	M1	HSS5x5x8	.205	15.373	.009	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
268	15	M2	HSS5x5x8	.289	15.373	.027	15.7	y	105.268	217.054	30.07	30.07	2.652	H1-1b
269	15	M3	HSS5x5x8	.172	15.373	.035	15.7	y	105.268	217.054	30.07	30.07	1.769	H1-1b
270	15	M4	HSS5x5x8	.160	15.373	.034	15.7	y	105.268	217.054	30.07	30.07	1.6	H1-1b
271	15	M5	HSS5x5x8	.085	15.373	.018	15.7	y	105.268	217.054	30.07	30.07	1.652	H1-1b
272	15	M6	HSS12x6x8	.298	13.55	.090	27.1	y	129.479	421.437	80.798	131.756	1.137	H1-1b

Member AISC 14th(360-10): ASD Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
273	15	M10	C10x15.3	.081	0	.023	0	y	56.357	96.575	3.319	28.563	2.167	H1-1b
274	15	M11	C10x15.3	.173	0	.048	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
275	15	M12	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.157	H1-1b
276	15	M13	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.161	H1-1b
277	15	M14	C10x15.3	.101	0	.028	0	y	56.357	96.575	3.319	28.563	2.169	H1-1b
278	15	M15	C10x15.3	.007	4.5	.011	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
279	15	M16	C10x15.3	.007	4.5	.003	0	y	29.252	96.575	3.319	22.524	1.136	H1-1b
280	15	M17	C10x15.3	.007	4.55	.010	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
281	15	M18	C10x15.3	.014	5.8	.024	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
282	15	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
283	15	M20	C10x15.3	.014	5.8	.003	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
284	15	M21	C10x15.3	.152	0	.042	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
285	15	M22	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
286	16	M1	HSS5x5x8	.276	15.373	.011	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
287	16	M2	HSS5x5x8	.267	12.429	.023	0	y	105.268	217.054	30.07	30.07	1.187	H1-1b
288	16	M3	HSS5x5x8	.303	9.485	.035	0	y	105.268	217.054	30.07	30.07	1.119	H1-1b
289	16	M4	HSS5x5x8	.297	9.485	.034	0	y	105.268	217.054	30.07	30.07	1.118	H1-1b
290	16	M5	HSS5x5x8	.167	9.813	.018	0	y	105.268	217.054	30.07	30.07	1.123	H1-1b
291	16	M6	HSS12x6x8	.204	13.55	.097	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
292	16	M10	C10x15.3	.081	0	.023	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
293	16	M11	C10x15.3	.174	0	.048	0	y	56.357	96.575	3.319	28.563	2.16	H1-1b
294	16	M12	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.162	H1-1b
295	16	M13	C10x15.3	.187	0	.052	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
296	16	M14	C10x15.3	.102	0	.028	0	y	56.357	96.575	3.319	28.563	2.161	H1-1b
297	16	M15	C10x15.3	.007	4.5	.015	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
298	16	M16	C10x15.3	.007	4.5	.006	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
299	16	M17	C10x15.3	.007	4.55	.006	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
300	16	M18	C10x15.3	.014	5.8	.006	0	y	17.609	96.575	3.319	18	1.136	H1-1b
301	16	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
302	16	M20	C10x15.3	.014	5.8	.020	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
303	16	M21	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
304	16	M22	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
305	17	M1	HSS5x5x8	.205	15.373	.008	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
306	17	M2	HSS5x5x8	.290	15.373	.027	15.7	y	105.268	217.054	30.07	30.07	2.651	H1-1b
307	17	M3	HSS5x5x8	.173	15.373	.035	15.7	y	105.268	217.054	30.07	30.07	1.768	H1-1b
308	17	M4	HSS5x5x8	.160	15.373	.035	15.7	y	105.268	217.054	30.07	30.07	1.599	H1-1b
309	17	M5	HSS5x5x8	.085	15.373	.018	15.7	y	105.268	217.054	30.07	30.07	1.652	H1-1b
310	17	M6	HSS12x6x8	.204	13.55	.079	27.1	y	129.479	421.437	80.798	131.756	1.137	H1-1b
311	17	M10	C10x15.3	.081	0	.023	0	y	56.357	96.575	3.319	28.563	2.167	H1-1b
312	17	M11	C10x15.3	.173	0	.048	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
313	17	M12	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.157	H1-1b
314	17	M13	C10x15.3	.188	0	.052	0	y	56.357	96.575	3.319	28.563	2.161	H1-1b
315	17	M14	C10x15.3	.101	0	.028	0	y	56.357	96.575	3.319	28.563	2.169	H1-1b
316	17	M15	C10x15.3	.007	4.5	.011	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
317	17	M16	C10x15.3	.007	4.5	.003	0	y	29.252	96.575	3.319	22.524	1.136	H1-1b
318	17	M17	C10x15.3	.007	4.55	.010	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
319	17	M18	C10x15.3	.014	5.8	.024	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
320	17	M19	C10x15.3	.012	5.45	.004	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
321	17	M20	C10x15.3	.014	5.8	.003	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
322	17	M21	C10x15.3	.152	0	.042	0	y	56.357	96.575	3.319	28.563	2.166	H1-1b
323	17	M22	C10x15.3	.153	0	.042	0	y	56.357	96.575	3.319	28.563	2.165	H1-1b
324	18	M1	HSS5x5x8	.112	15.373	.004	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b

Member AISC 14th(360-10): ASD Steel Code Checks (Continued)

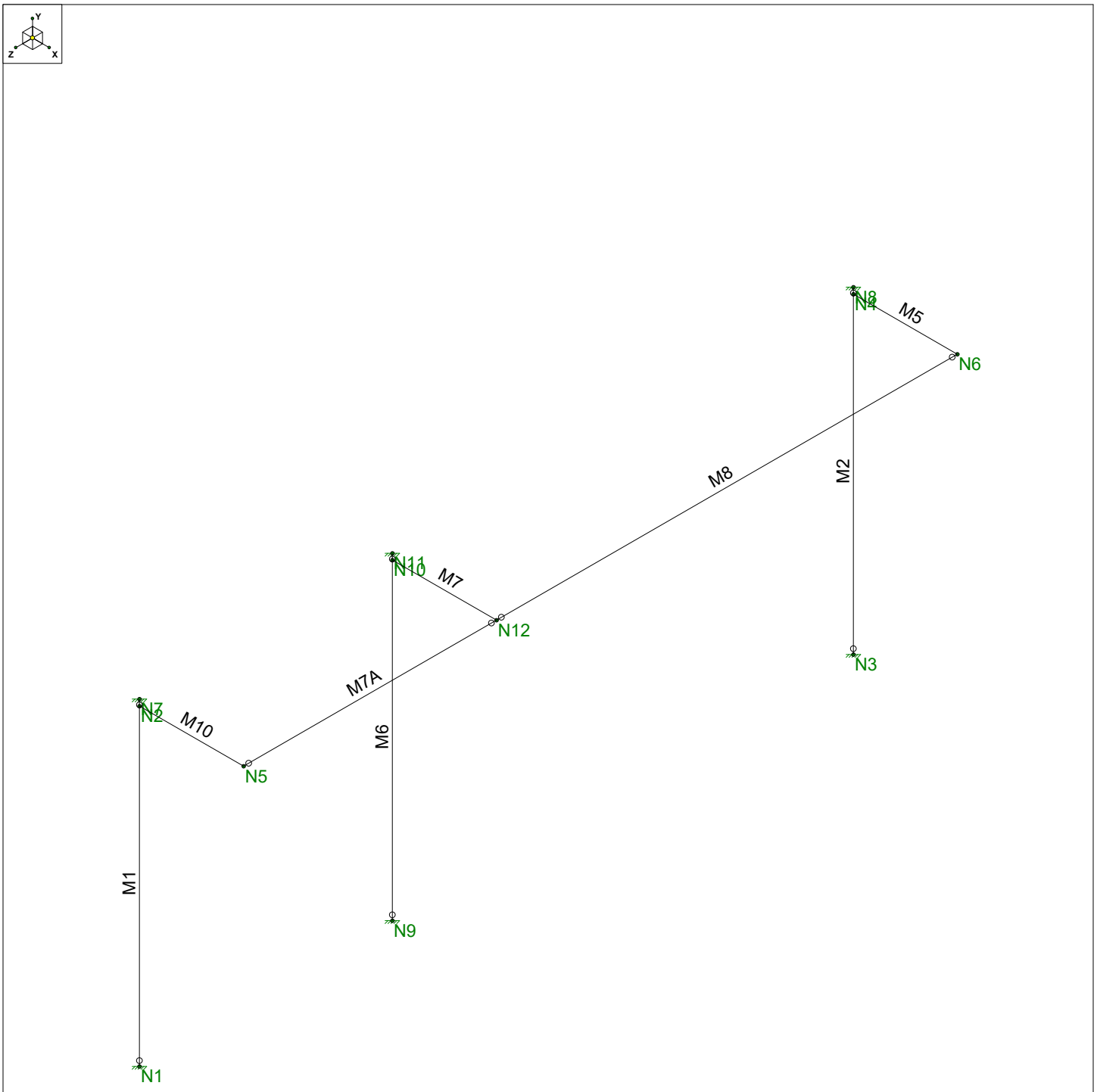
	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
325	18	M2	HSS5x5x8	.160	8.341	.021	0	y	105.268	217.054	30.07	30.07	1.122	H1-1b
326	18	M3	HSS5x5x8	.293	8.177	.039	0	y	105.268	217.054	30.07	30.07	1.128	H1-1b
327	18	M4	HSS5x5x8	.293	8.177	.039	0	y	105.268	217.054	30.07	30.07	1.128	H1-1b
328	18	M5	HSS5x5x8	.160	8.341	.021	0	y	105.268	217.054	30.07	30.07	1.122	H1-1b
329	18	M6	HSS12x6x8	.089	13.55	.044	0	y	129.479	421.437	80.798	131.756	1.137	H1-1b
330	18	M10	C10x15.3	.023	0	.006	0	y	56.357	96.575	3.319	28.563	2.015	H1-1b
331	18	M11	C10x15.3	.046	0	.011	0	y	56.357	96.575	3.319	28.563	1.972	H1-1b
332	18	M12	C10x15.3	.049	0	.012	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
333	18	M13	C10x15.3	.049	0	.012	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
334	18	M14	C10x15.3	.028	0	.007	0	y	56.357	96.575	3.319	28.563	1.99	H1-1b
335	18	M15	C10x15.3	.004	4.5	.007	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
336	18	M16	C10x15.3	.004	4.5	.004	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
337	18	M17	C10x15.3	.004	4.55	.002	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
338	18	M18	C10x15.3	.009	5.8	.015	0	y	17.609	96.575	3.319	18	1.136	H1-1b
339	18	M19	C10x15.3	.007	5.45	.002	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
340	18	M20	C10x15.3	.009	5.8	.016	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
341	18	M21	C10x15.3	.041	0	.010	0	y	56.357	96.575	3.319	28.563	1.989	H1-1b
342	18	M22	C10x15.3	.041	0	.010	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b
343	19	M1	HSS5x5x8	.017	15.373	.001	15.536	y	105.268	217.054	30.07	30.07	1.643	H1-1b
344	19	M2	HSS5x5x8	.096	15.373	.023	15.7	y	105.268	217.054	30.07	30.07	1.342	H1-1b
345	19	M3	HSS5x5x8	.246	7.359	.040	15.7	y	105.268	217.054	30.07	30.07	1.159	H1-1b
346	19	M4	HSS5x5x8	.248	7.523	.039	15.7	y	105.268	217.054	30.07	30.07	1.156	H1-1b
347	19	M5	HSS5x5x8	.132	7.523	.020	15.7	y	105.268	217.054	30.07	30.07	1.149	H1-1b
348	19	M6	HSS12x6x8	.089	13.55	.040	27.1	y	129.479	421.437	80.798	131.756	1.137	H1-1b
349	19	M10	C10x15.3	.023	0	.006	0	y	56.357	96.575	3.319	28.563	2.023	H1-1b
350	19	M11	C10x15.3	.045	0	.011	0	y	56.357	96.575	3.319	28.563	1.992	H1-1b
351	19	M12	C10x15.3	.049	0	.012	0	y	56.357	96.575	3.319	28.563	1.965	H1-1b
352	19	M13	C10x15.3	.049	0	.012	0	y	56.357	96.575	3.319	28.563	1.971	H1-1b
353	19	M14	C10x15.3	.028	0	.007	0	y	56.357	96.575	3.319	28.563	2.021	H1-1b
354	19	M15	C10x15.3	.004	4.5	.001	9	y	29.252	96.575	3.319	22.524	1.136	H1-1b
355	19	M16	C10x15.3	.004	4.5	.004	0	y	29.252	96.575	3.319	22.524	1.136	H1-1b
356	19	M17	C10x15.3	.004	4.55	.006	0	y	28.613	96.575	3.319	22.36	1.136	H1-1b
357	19	M18	C10x15.3	.009	5.8	.020	11.6	y	17.609	96.575	3.319	18	1.136	H1-1b
358	19	M19	C10x15.3	.007	5.45	.002	0	y	19.943	96.575	3.319	19.398	1.136	H1-1b
359	19	M20	C10x15.3	.009	5.8	.011	0	y	17.609	96.575	3.319	18	1.136	H1-1b
360	19	M21	C10x15.3	.041	0	.010	0	y	56.357	96.575	3.319	28.563	1.989	H1-1b
361	19	M22	C10x15.3	.041	0	.010	0	y	56.357	96.575	3.319	28.563	1.988	H1-1b

Member Wood Code Checks

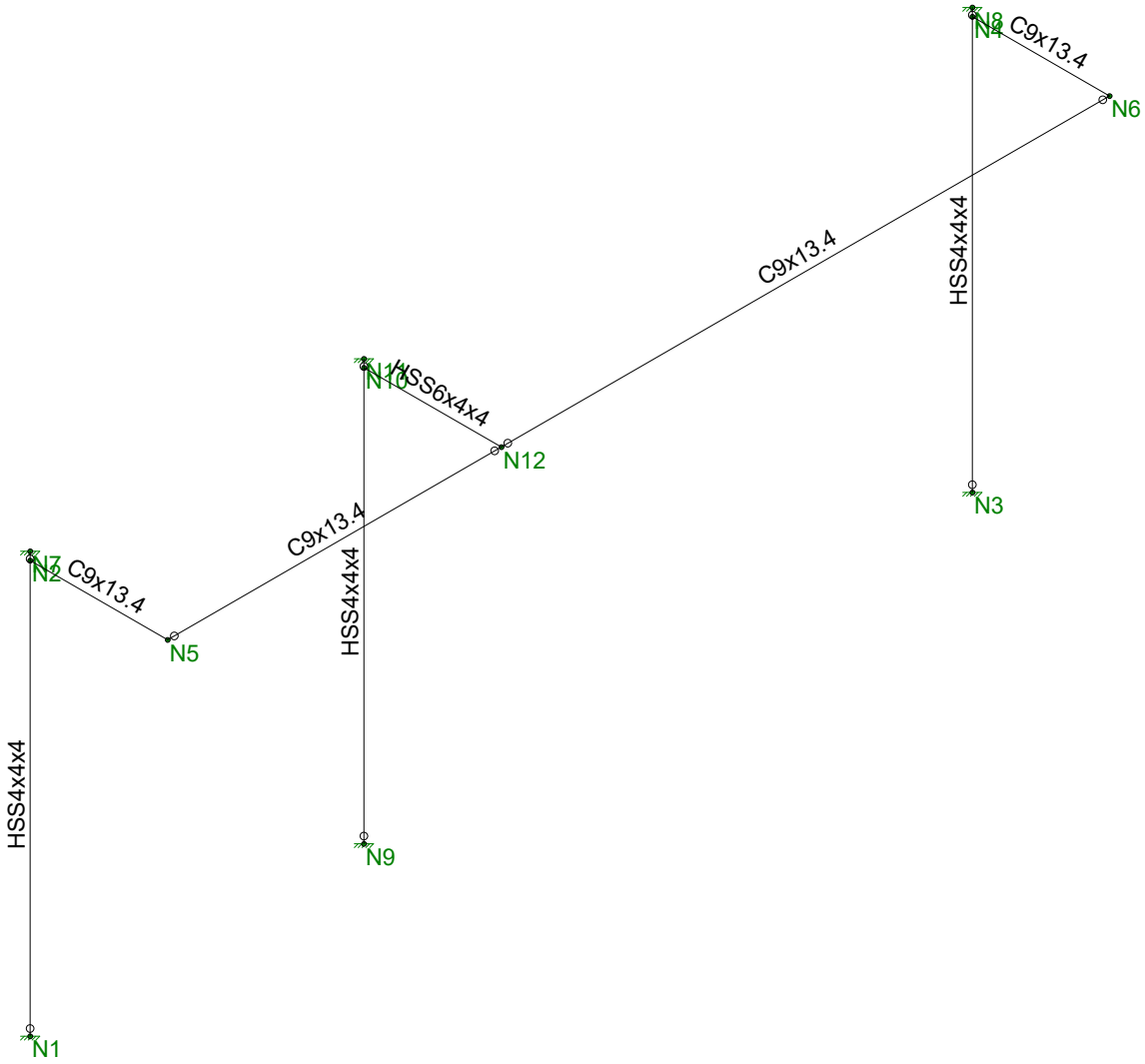
	LC	Member	Shape	UC Max	Loc[ft]	Shear ...	Loc[ft]	Dir	Fc' [ksi]	Ft' [ksi]	Fb1' [k...	Fb2' [k...	Fv' [ksi]	RB	CL	CP	Eqn
1	1	M7	3.5X14FS	.194	5.8	.216	11.6	y	.416	1.07	2.26	2.325	.31	12.613	.972	.192	3.9-3
2	1	M8	3.5X14FS	.171	5.45	.142	0	y	.469	1.07	2.265	2.325	.31	12.226	.974	.216	3.9-3
3	1	M9	3.5X14FS	.194	5.8	.193	11.6	y	.416	1.07	2.26	2.325	.31	12.613	.972	.192	3.9-3
4	2	M7	3.5X14FS	.000	0	.118	0	z	.416	1.07	2.26	2.325	.31	12.613	.972	.192	3.9-1
5	2	M8	3.5X14FS	.000	0	.015	0	z	.469	1.07	2.265	2.325	.31	12.226	.974	.216	3.9-1
6	2	M9	3.5X14FS	.000	0	.100	0	z	.416	1.07	2.26	2.325	.31	12.613	.972	.192	3.9-3
7	3	M7	3.5X14FS	.194	5.8	.334	0	y	.416	1.07	2.26	2.325	.31	12.613	.972	.192	3.9-3
8	3	M8	3.5X14FS	.171	5.45	.157	0	y	.469	1.07	2.265	2.325	.31	12.226	.974	.216	3.9-3
9	3	M9	3.5X14FS	.194	5.8	.293	11.6	y	.416	1.07	2.26	2.325	.31	12.613	.972	.192	3.9-3
10	4	M7	3.5X14FS	.215	5.8	.240	11.6	y	.415	.963	2.042	2.093	.279	12.613	.976	.212	3.9-3

Member Wood Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear ...	Loc[ft]	Dir	Fc' [ksi]	Ft' [ksi]	Fb1' [k...	Fb2' [k...	Fv' [ksi]	RB	CL	CP	Eqn
11	4	M8	3.5X14FS	.190	5.45	.158	0	y	.467	.963	2.046	2.093	.279	12.226	.978	.239	3.9-3
12	4	M9	3.5X14FS	.215	5.8	.214	11.6	y	.415	.963	2.042	2.093	.279	12.613	.976	.212	3.9-3
13	5	M7	3.5X14FS	.194	5.8	.334	0	y	.416	1.07	2.26	2.325	.31	12.613	.972	.192	3.9-3
14	5	M8	3.5X14FS	.171	5.45	.157	0	y	.469	1.07	2.265	2.325	.31	12.226	.974	.216	3.9-3
15	5	M9	3.5X14FS	.194	5.8	.293	11.6	y	.416	1.07	2.26	2.325	.31	12.613	.972	.192	3.9-3
16	6	M7	3.5X14FS	.157	5.8	.173	11.6	y	.418	1.338	2.791	2.906	.388	12.613	.96	.154	3.9-3
17	6	M8	3.5X14FS	.138	5.45	.114	0	y	.472	1.338	2.802	2.906	.388	12.226	.964	.174	3.9-3
18	6	M9	3.5X14FS	.157	5.8	.154	11.6	y	.418	1.338	2.791	2.906	.388	12.613	.96	.154	3.9-3
19	7	M7	3.5X14FS	.440	5.8	.385	11.6	y	.417	1.23	2.581	2.674	.356	12.613	.965	.167	3.9-3
20	7	M8	3.5X14FS	.388	5.45	.309	0	y	.471	1.23	2.59	2.674	.356	12.226	.969	.189	3.9-3
21	7	M9	3.5X14FS	.440	5.8	.364	11.6	y	.417	1.23	2.581	2.674	.356	12.613	.965	.167	3.9-3
22	8	M7	3.5X14FS	.157	5.8	.244	11.6	y	.418	1.338	2.791	2.906	.388	12.613	.96	.154	3.9-3
23	8	M8	3.5X14FS	.138	5.45	.123	0	y	.472	1.338	2.802	2.906	.388	12.226	.964	.174	3.9-3
24	8	M9	3.5X14FS	.157	5.8	.214	11.6	y	.418	1.338	2.791	2.906	.388	12.613	.96	.154	3.9-3
25	9	M7	3.5X14FS	.373	5.8	.413	11.6	y	.417	1.23	2.581	2.674	.356	12.613	.965	.167	3.9-3
26	9	M8	3.5X14FS	.328	5.45	.272	0	y	.471	1.23	2.59	2.674	.356	12.226	.969	.189	3.9-3
27	9	M9	3.5X14FS	.373	5.8	.380	11.6	y	.417	1.23	2.581	2.674	.356	12.613	.965	.167	3.9-3
28	10	M7	3.5X14FS	.126	5.8	.221	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
29	10	M8	3.5X14FS	.110	5.45	.086	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
30	10	M9	3.5X14FS	.126	5.8	.252	0	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
31	11	M7	3.5X14FS	.126	5.8	.313	0	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
32	11	M8	3.5X14FS	.110	5.45	.092	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
33	11	M9	3.5X14FS	.126	5.8	.189	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
34	12	M7	3.5X14FS	.126	5.8	.121	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
35	12	M8	3.5X14FS	.110	5.45	.094	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
36	12	M9	3.5X14FS	.126	5.8	.266	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
37	13	M7	3.5X14FS	.126	5.8	.324	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
38	13	M8	3.5X14FS	.110	5.45	.098	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
39	13	M9	3.5X14FS	.126	5.8	.109	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
40	14	M7	3.5X14FS	.276	5.8	.227	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
41	14	M8	3.5X14FS	.242	5.45	.193	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
42	14	M9	3.5X14FS	.276	5.8	.371	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
43	15	M7	3.5X14FS	.276	5.8	.429	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
44	15	M8	3.5X14FS	.242	5.45	.198	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
45	15	M9	3.5X14FS	.276	5.8	.215	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
46	16	M7	3.5X14FS	.126	5.8	.121	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
47	16	M8	3.5X14FS	.110	5.45	.094	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
48	16	M9	3.5X14FS	.126	5.8	.266	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
49	17	M7	3.5X14FS	.126	5.8	.324	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
50	17	M8	3.5X14FS	.110	5.45	.098	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
51	17	M9	3.5X14FS	.126	5.8	.109	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
52	18	M7	3.5X14FS	.075	5.8	.203	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
53	18	M8	3.5X14FS	.066	5.45	.050	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
54	18	M9	3.5X14FS	.075	5.8	.204	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
55	19	M7	3.5X14FS	.075	5.8	.259	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3
56	19	M8	3.5X14FS	.066	5.45	.057	0	y	.475	1.712	3.518	3.72	.496	12.226	.946	.137	3.9-3
57	19	M9	3.5X14FS	.075	5.8	.166	11.6	y	.42	1.712	3.493	3.72	.496	12.613	.939	.121	3.9-3



Quantum Consulting Engin...		SK - 1
Qing	Entry steel awning	Jan 7, 2019 at 10:59 AM
18689.01		Steel Awning_Entry.r3d



Quantum Consulting Engin...	Entry steel awning	SK - 2
Qing		Jan 7, 2019 at 10:59 AM
18689.01		Steel Awning_Entry.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-16: ASD
Wood Code	AWC NDS-15: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	TMS 402-16: ASD
Aluminum Code	AA ADM1-15: ASD - Building
	AISC 14th(360-10): ASD

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Column	HSS4x4x4	Column	Tube	A500 Gr.B ...	Typical	3.37	7.8	7.8	12.8
2	Awning	C9x13.4	Beam	Channel	A36 Gr.36	Typical	3.94	1.75	47.8	.168
3	Beam	HSS6x4x4	Beam	Channel	A36 Gr.36	Typical	4.3	11.1	20.9	23.6

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	10.5	0	0	
3	N3	0	0	-24	0	
4	N4	0	10.5	-24	0	
5	N5	3.5	10.5	0	0	
6	N6	3.5	10.5	-24	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
7	N7	0	10.7	0	0	
8	N8	0	10.7	-24	0	
9	N9	0	0	-8.5	0	
10	N10	0	10.5	-8.5	0	
11	N11	0	10.7	-8.5	0	
12	N12	3.5	10.5	-8.5	0	

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N7			Column	Column	Tube	A500 Gr.B..	Typical
2	M2	N3	N8			Column	Column	Tube	A500 Gr.B..	Typical
3	M10	N2	N5			Awning	Beam	Channel	A36 Gr.36	Typical
4	M5	N4	N6		180	Awning	Beam	Channel	A36 Gr.36	Typical
5	M6	N9	N11			Column	Column	Tube	A500 Gr.B..	Typical
6	M7	N10	N12			Beam	Beam	Channel	A36 Gr.36	Typical
7	M7A	N5	N12			Awning	Beam	Channel	A36 Gr.36	Typical
8	M8	N12	N6			Awning	Beam	Channel	A36 Gr.36	Typical

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N3	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N2						
4	N4						
5	N7	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N8	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N9	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
8	N11	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Distributed Loads (BLC 1 : Dead load)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M7A	Y	-.021	-.021	0	0
2	M8	Y	-.021	-.021	0	0

Member Distributed Loads (BLC 2 : Snow load)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M7A	Y	-.053	-.053	0	0
2	M8	Y	-.053	-.053	0	0

Member Area Loads

Joint A	Joint B	Joint C	Joint D	Direction	Distribution	Magnitude[ksf]
No Data to Print ...						

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead load	DL		-1				2		
2	Snow load	SL						2		

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...	BLC	Fact...
1	Deflection 1	Yes	Y		DL	1																				
2	Deflection 2	Yes	Y		LL	1																				
3	Deflection 3	Yes	Y		DL	1	LL	1																		
4	IBC 16-8	Yes	Y		DL	1																				
5	IBC 16-9	Yes	Y		DL	1	LL	1	LLS	1																
6	IBC 16-10...	Yes	Y		DL	1	SL	1	SLN	1																
7	IBC 16-11...	Yes	Y		DL	1	LL	.75	LLS	.75	SL	.75	SLN	.75												

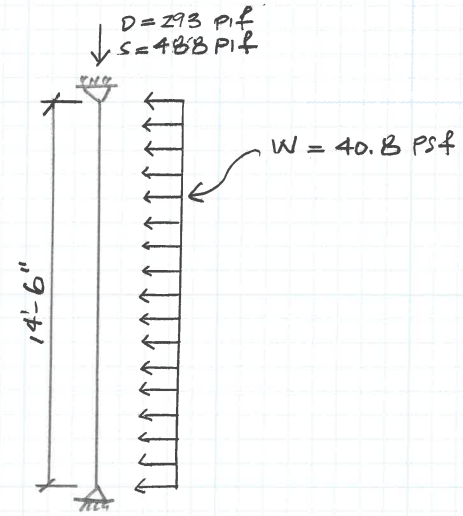
Member AISC 14th(360-10): ASD Steel Code Checks

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
1	1	M1	HSS4x4x4	.055	10.477	.002	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
2	1	M2	HSS4x4x4	.093	10.477	.004	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
3	1	M10	C9x13.4	.026	0	.007	0	y	68.91	84.934	2.75	22.635	1.724	H1-1b
4	1	M5	C9x13.4	.045	0	.012	0	y	68.91	84.934	2.75	22.635	1.704	H1-1b
5	1	M6	HSS4x4x4	.139	10.477	.006	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
6	1	M7	HSS6x4x4	.100	0	.015	0	y	89.419	92.695	11.587	15.323	1.7	H1-1b
7	1	M7A	C9x13.4	.017	4.25	.016	8.5	y	25.282	84.934	2.75	18.123	1.136	H1-1b
8	1	M8	C9x13.4	.104	7.75	.014	0	y	7.603	84.934	2.75	9.908	1.136	H1-1b
9	2	M1	HSS4x4x4	.000	0	.000	0	y	57.488	92.826	10.765	10.765	1	H1-1b
10	2	M2	HSS4x4x4	.000	0	.000	0	y	57.488	92.826	10.765	10.765	1	H1-1b
11	2	M10	C9x13.4	.000	0	.000	0	y	68.91	84.934	2.75	21.787	1	H1-1b
12	2	M5	C9x13.4	.000	0	.000	0	y	68.91	84.934	2.75	21.787	1	H1-1b
13	2	M6	HSS4x4x4	.000	0	.000	0	y	57.488	92.826	10.765	10.765	1	H1-1b
14	2	M7	HSS6x4x4	.000	0	.000	0	y	89.419	92.695	11.587	15.323	1	H1-1b
15	2	M7A	C9x13.4	.000	0	.000	0	y	25.282	84.934	2.75	15.948	1	H1-1b
16	2	M8	C9x13.4	.000	0	.000	0	y	7.603	84.934	2.75	8.719	1	H1-1b
17	3	M1	HSS4x4x4	.055	10.477	.002	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
18	3	M2	HSS4x4x4	.093	10.477	.004	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
19	3	M10	C9x13.4	.026	0	.007	0	y	68.91	84.934	2.75	22.635	1.724	H1-1b
20	3	M5	C9x13.4	.045	0	.012	0	y	68.91	84.934	2.75	22.635	1.704	H1-1b
21	3	M6	HSS4x4x4	.139	10.477	.006	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
22	3	M7	HSS6x4x4	.100	0	.015	0	y	89.419	92.695	11.587	15.323	1.7	H1-1b
23	3	M7A	C9x13.4	.017	4.25	.016	8.5	y	25.282	84.934	2.75	18.123	1.136	H1-1b
24	3	M8	C9x13.4	.104	7.75	.014	0	y	7.603	84.934	2.75	9.908	1.136	H1-1b
25	4	M1	HSS4x4x4	.055	10.477	.002	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
26	4	M2	HSS4x4x4	.093	10.477	.004	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
27	4	M10	C9x13.4	.026	0	.007	0	y	68.91	84.934	2.75	22.635	1.724	H1-1b
28	4	M5	C9x13.4	.045	0	.012	0	y	68.91	84.934	2.75	22.635	1.704	H1-1b
29	4	M6	HSS4x4x4	.139	10.477	.006	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
30	4	M7	HSS6x4x4	.100	0	.015	0	y	89.419	92.695	11.587	15.323	1.7	H1-1b
31	4	M7A	C9x13.4	.017	4.25	.016	8.5	y	25.282	84.934	2.75	18.123	1.136	H1-1b
32	4	M8	C9x13.4	.104	7.75	.014	0	y	7.603	84.934	2.75	9.908	1.136	H1-1b
33	5	M1	HSS4x4x4	.055	10.477	.002	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b

Member AISC 14th(360-10): ASD Steel Code Checks (Continued)

	LC	Member	Shape	UC Max	Loc[ft]	Shear UC	Loc[ft]	Dir	Pnc/om [k]	Pnt/om [k]	Mnyy/om...	Mnzz/om...	Cb	Eqn
34	5	M2	HSS4x4x4	.093	10.477	.004	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
35	5	M10	C9x13.4	.026	0	.007	0	y	68.91	84.934	2.75	22.635	1.724	H1-1b
36	5	M5	C9x13.4	.045	0	.012	0	y	68.91	84.934	2.75	22.635	1.704	H1-1b
37	5	M6	HSS4x4x4	.139	10.477	.006	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
38	5	M7	HSS6x4x4	.100	0	.015	0	y	89.419	92.695	11.587	15.323	1.7	H1-1b
39	5	M7A	C9x13.4	.017	4.25	.016	8.5	y	25.282	84.934	2.75	18.123	1.136	H1-1b
40	5	M8	C9x13.4	.104	7.75	.014	0	y	7.603	84.934	2.75	9.908	1.136	H1-1b
41	6	M1	HSS4x4x4	.127	10.477	.005	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
42	6	M2	HSS4x4x4	.224	10.477	.009	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
43	6	M10	C9x13.4	.062	0	.015	0	y	68.91	84.934	2.75	22.635	1.685	H1-1b
44	6	M5	C9x13.4	.109	0	.027	0	y	68.91	84.934	2.75	22.635	1.681	H1-1b
45	6	M6	HSS4x4x4	.340	10.477	.014	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
46	6	M7	HSS6x4x4	.244	0	.034	0	y	89.419	92.695	11.587	15.323	1.683	H1-1b
47	6	M7A	C9x13.4	.044	4.25	.041	8.5	y	25.282	84.934	2.75	18.123	1.136	H1-1b
48	6	M8	C9x13.4	.265	7.75	.034	0	y	7.603	84.934	2.75	9.908	1.136	H1-1b
49	7	M1	HSS4x4x4	.109	10.477	.004	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
50	7	M2	HSS4x4x4	.191	10.477	.008	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
51	7	M10	C9x13.4	.053	0	.013	0	y	68.91	84.934	2.75	22.635	1.69	H1-1b
52	7	M5	C9x13.4	.093	0	.023	0	y	68.91	84.934	2.75	22.635	1.684	H1-1b
53	7	M6	HSS4x4x4	.290	10.477	.012	10.589	y	57.488	92.826	10.765	10.765	1.643	H1-1b
54	7	M7	HSS6x4x4	.208	0	.029	0	y	89.419	92.695	11.587	15.323	1.685	H1-1b
55	7	M7A	C9x13.4	.037	4.25	.035	8.5	y	25.282	84.934	2.75	18.123	1.136	H1-1b
56	7	M8	C9x13.4	.225	7.75	.029	0	y	7.603	84.934	2.75	9.908	1.136	H1-1b

Stud Design:

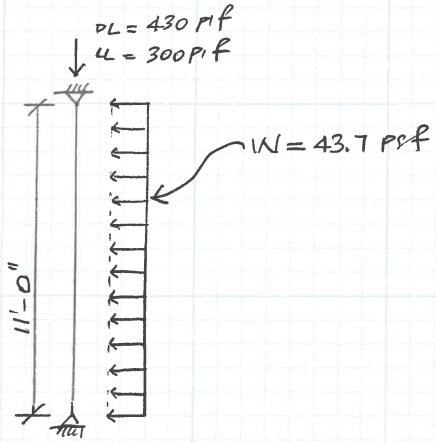


DL = 18 Psf x 16.25' = 293 plf
SL = 30 Psf x 16.25' = 488 plf

2x6 studs @ 16" o/c

Upper Floor - Grid D

2). Main Floor - Grid (E)



DL = 14.5' x 11 psf = 160 plf (Wall)
DL = 7.5' x 36 psf = 270 plf (Floor)
LL = 7.5' x 40 psf = 300 plf (Floor)

2x6 studs @ 16" o/c

QUANTUM | CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

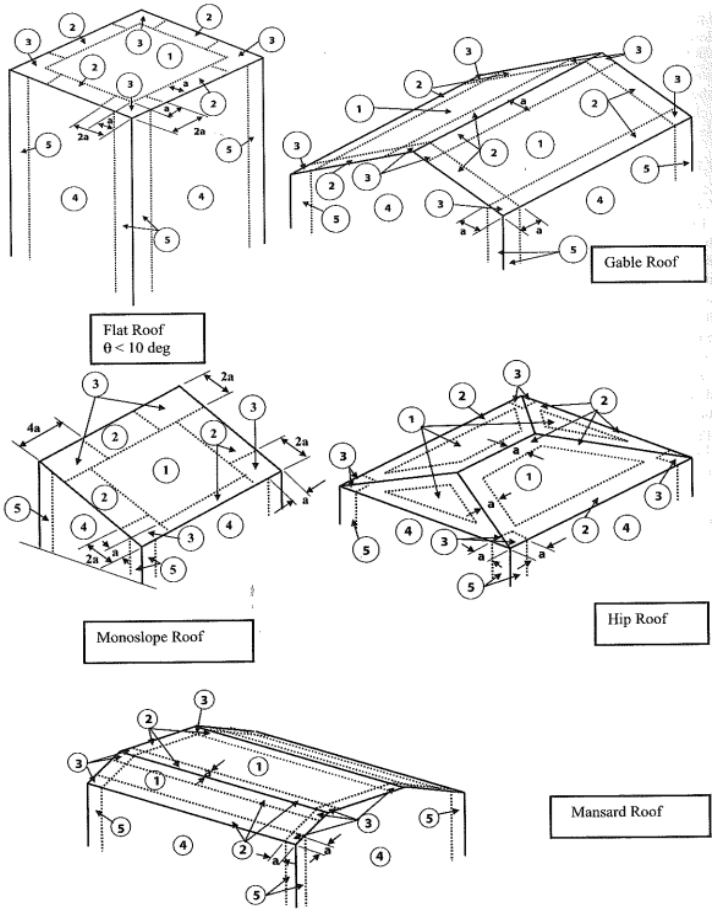
Lundin Residence		01-03-19	18689.01
project		date	project no.
		Qing	G-8
		designer	sheet
David & Aymee Lundin		Sandro	
client		checked by	

Wind Loads - Components and Cladding

ASCE 7-10 Chapter 30 - Part 4 Enclosed Buildings With h<160 FT (Simplified)

Wind Load Criteria

Risk Category:	**II**	Table 1.5-1
Basic Wind Speed:	**110 mph**	Figure 26.5.1
Exposure Category:	**C**	Section 26.7.3
K_{zt}:	**1.00**	Section 26.8
Roof Type:	**Flat Roof**	



Zone 2, 3, and 5 Dimensions

Least Horiz. BLDG Dimension: **35 ft**

a:	**3.5 ft**
2a:	**7.0 ft**
4a:	**14.0 ft**

Wall and Roof Pressures

Effective Wind Area:

Zone 1:	**100 ft^2**
Zone 2:	**100 ft^2**
Zone 3:	**100 ft^2**
Zone 4:	**100 ft^2**
Zone 5:	**70 ft^2**

Zone (PSF)

Load Case	1	2	3	4	5
1	**-35.6**	**-43.1**	**-65.1**	**-29.0**	**-40.8**
2	**13.1**	**13.1**	**13.1**	**24.9**	**25.8**

*Values from Table 30.7-2

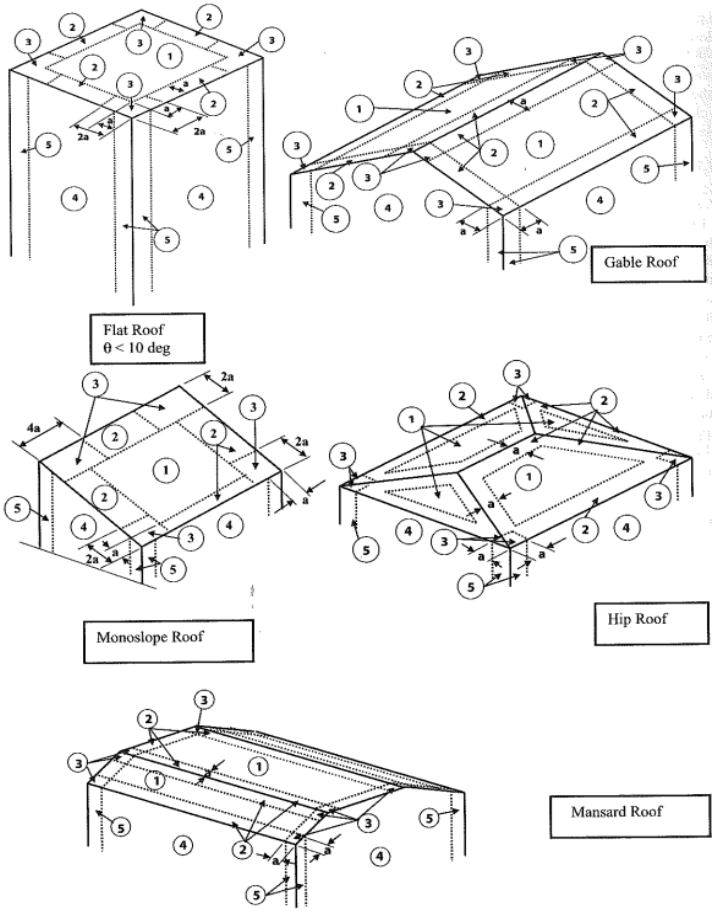
*All Values Ultimate (multiply x0.6 for ASD)

Wind Loads - Components and Cladding

ASCE 7-10 Chapter 30 - Part 4 Enclosed Buildings With h<160 FT (Simplified)

Wind Load Criteria

Risk Category:	**II**	Table 1.5-1
Basic Wind Speed:	**110 mph**	Figure 26.5.1
Exposure Category:	**C**	Section 26.7.3
K_{zt}:	**1.00**	Section 26.8
Roof Type:	**Flat Roof**	



Zone 2, 3, and 5 Dimensions

Least Horiz. BLDG Dimension: **35 ft**

a:	**3.5 ft**
2a:	**7.0 ft**
4a:	**14.0 ft**

Wall and Roof Pressures

Effective Wind Area:

Zone 1:	**100 ft^2**
Zone 2:	**100 ft^2**
Zone 3:	**100 ft^2**
Zone 4:	**100 ft^2**
Zone 5:	**41 ft^2**

Zone (PSF)

Load Case	1	2	3	4	5
1	**-35.6**	**-43.1**	**-65.1**	**-29.0**	**-43.7**
2	**13.1**	**13.1**	**13.1**	**24.9**	**27.1**

*Values from Table 30.7-2

*All Values Ultimate (multiply x0.6 for ASD)

Wood Stud Wall Design

Per IBC 2015 & NDS 2015

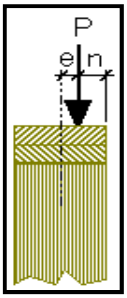
Structure: Lundin Residence
Wall Line: Upper floor - grid D

Wall Configuration

Wall Height (ft):	14.50	Stud Spacing (in):	16
Stud Size:	2x6	Stud Species & Grade:	HF #2
Bot. Plate Th.:	2x	Bot. Plate Species & Grade:	HF #2

Wall Finish Type: Flexible Deflection Criteria: L/120 =1.5 in per IBC 1604.3.1

Does Wall Qualify for Bending Stress Increase per NDS 3.1.1.1: Yes



Wall Loading

Axial Load		*Out of Plane Pressure Load*			*Wall Axial Load Eccentricity*	
DL (plf):	293	Wind (psf):	40.8	Strength	n (in):	1.75
LL (plf):	0	EQ (psf):	5	Strength	e (in):	1.00
SL (plf):	488	Sds:	0.94			

Stud Properties

b (in):	1.50	E (psi):	1300000	per NDS Table 4A	F_b (psi):	850	per NDS Table 4A
d (in):	5.50	E' (psi):	1300000	= $E*C_M*C_t$	F_c (psi):	1300	per NDS Table 4A
A (in^2):	8.25	E_{min} (psi):	470000	per NDS Table 4A			
S (in^3):	7.56	E'_{min} (psi):	470000	= $E_{min}*C_M*C_t$			
I (in^4):	20.80						

C_P:	L_e (ft):	14.13	stud height	C_F:	1.30	per NDS Table 4A
	L_e/d:	30.82		C_M:	1.00	per NDS 4.3.3
	F_{cE} (psi):	407	= $0.822*E'_{min}/(L_e/d)^2$	C_t:	1.00	per NDS 4.3.4
	c:	0.8	per NDS 3.7.1.5	C_F:	1.10	per NDS Table 4A

Bot. Plate Properties

b (in): 1.50

$F_{c\perp}$ (psi):	405	per NDS Table 4A	$F'_{c\perp}$ (psi):	506	= $F_{c\perp}*C_M*C_t*C_b$
C_b:	1.25	per NDS 3.10.4	P_{all} (lb):	4177	= F'_c*A

Wood Stud Wall Design

Per IBC 2015 & NDS 2015

Structure: Lundin Residence
Wall Line: Upper floor - grid D

Check Wall Axial and Flexural Capacities for Load Cases per IBC 1605.3.1

$f_c = P_{axial}/A$ $\quad f_b = M_{tot}/S$

$F'_c = F_c*C_D*C_M*C_t*C_F*C_P$ $\quad F'_b = F_b*C_D*C_M*C_t*C_F*C_r$

P_{Axial} (lb)	Bot. Plate P_{all} Status	f_c (psi)	C_D: NDS Table 2.3.2	C_P	F'_c (psi)	C_r: NDS 4.3.9	M_{tot} (lb-ft)	f_b (psi)	F'_b (psi)	Interaction per NDS 3.9.2	Deflection (in)	Wall Status
Load Case: D + L												
391	<= Pall: OK	47	1.00	0.27	379	1.15	33	52	1271	**0.06**	**0.03**	**OK**
Load Case: D + S												
1041	<= Pall: OK	126	1.15	0.23	383	1.15	87	138	1461	**0.24**	**0.07**	**OK**
Load Case: D + 0.75(L + S)												
879	<= Pall: OK	107	1.15	0.23	383	1.15	73	116	1461	**0.18**	**0.06**	**OK**
Load Case: D + 0.6W												
391	<= Pall: OK	47	1.60	0.17	391	1.35	847	1343	2387	**0.65**	**0.78**	**OK**
Load Case: D + 0.75(L + S + 0.6W)												
879	<= Pall: OK	107	1.60	0.17	391	1.15	684	1085	2033	**0.80**	**0.63**	**OK**
Load Case: (1.0 + 0.14Sds) D + 0.7E												
442	<= Pall: OK	54	1.60	0.17	391	1.15	153	243	2033	**0.16**	**0.18**	**OK**
Load Case: (1.0 + 0.14Sds) D + 0.75(L + S + 0.7E)												
994	<= Pall: OK	121	1.60	0.17	391	1.15	170	270	2033	**0.28**	**0.18**	**OK**

Wall: 2x6 @ 16 in. o.c. is acceptable

Wood Stud Wall Design

Per IBC 2015 & NDS 2015

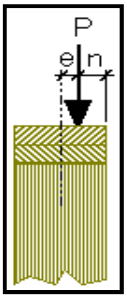
Structure: Lundin Residence
Wall Line: Main floor - grid E

Wall Configuration

Wall Height (ft):	11.00	Stud Spacing (in):	16
Stud Size:	2x6	Stud Species & Grade:	HF #2
Bot. Plate Th.:	2x	Bot. Plate Species & Grade:	HF #2

Wall Finish Type: Flexible Deflection Criteria: L/120 =1.1 in per IBC 1604.3.1

Does Wall Qualify for Bending Stress Increase per NDS 3.1.1.1: Yes



Wall Loading

Axial Load		*Out of Plane Pressure Load*			*Wall Axial Load Eccentricity*	
DL (plf):	430	Wind (psf):	43.7	Strength	n (in):	1.75
LL (plf):	300	EQ (psf):	5	Strength	e (in):	1.00
SL (plf):	0	Sds:	0.94			

Stud Properties

b (in):	1.50	E (psi):	1300000	per NDS Table 4A	F_b (psi):	850	per NDS Table 4A
d (in):	5.50	E' (psi):	1300000	= $E*C_M*C_t$	F_c (psi):	1300	per NDS Table 4A
A (in^2):	8.25	E_{min} (psi):	470000	per NDS Table 4A			
S (in^3):	7.56	E'_{min} (psi):	470000	= $E_{min}*C_M*C_t$			
I (in^4):	20.80						

C_P:	L_e (ft):	10.63	stud height	C_F:	1.30	per NDS Table 4A
	L_e/d:	23.18		C_M:	1.00	per NDS 4.3.3
	F_{cE} (psi):	719	= $0.822*E'_{min}/(L_e/d)^2$	C_t:	1.00	per NDS 4.3.4
	c:	0.8	per NDS 3.7.1.5	C_F:	1.10	per NDS Table 4A

Bot. Plate Properties

b (in): 1.50

$F_{c\perp}$ (psi):	405	per NDS Table 4A	$F'_{c\perp}$ (psi):	506	= $F_{c\perp}*C_M*C_t*C_b$
C_b:	1.25	per NDS 3.10.4	P_{all} (lb):	4177	= F'_c*A

Wood Stud Wall Design

Per IBC 2015 & NDS 2015

Structure: Lundin Residence
Wall Line: Main floor - grid E

Check Wall Axial and Flexural Capacities for Load Cases per IBC 1605.3.1

$f_c = P_{axial}/A$ $\quad f_b = M_{tot}/S$

$F'_c = F_c*C_D*C_M*C_t*C_F*C_P$ $\quad F'_b = F_b*C_D*C_M*C_t*C_F*C_r$

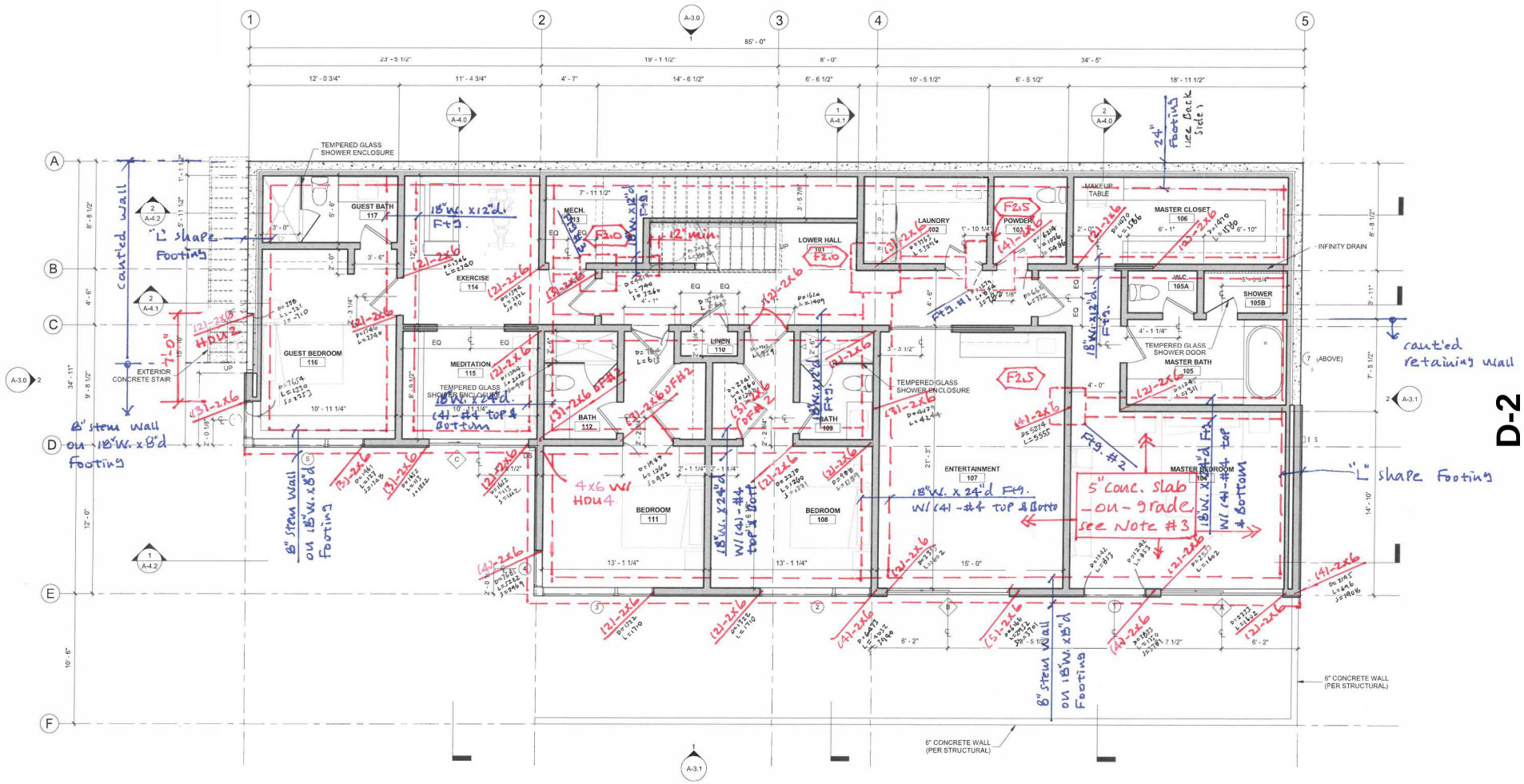
P_{Axial} (lb)	Bot. Plate P_{all} Status	f_c (psi)	C_D: NDS Table 2.3.2	C_P	F'_c (psi)	C_r: NDS 4.3.9	M_{tot} (lb-ft)	f_b (psi)	F'_b (psi)	Interaction per NDS 3.9.2	Deflection (in)	Wall Status
Load Case: D + L												
973	<= Pall: OK	118	1.00	0.44	623	1.15	81	129	1271	**0.16**	**0.04**	**OK**
Load Case: D + S												
573	<= Pall: OK	69	1.15	0.39	638	1.15	48	76	1461	**0.07**	**0.02**	**OK**
Load Case: D + 0.75(L + S)												
873	<= Pall: OK	106	1.15	0.39	638	1.15	73	115	1461	**0.12**	**0.03**	**OK**
Load Case: D + 0.6W												
573	<= Pall: OK	69	1.60	0.29	665	1.35	541	859	2387	**0.41**	**0.28**	**OK**
Load Case: D + 0.75(L + S + 0.6W)												
873	<= Pall: OK	106	1.60	0.29	665	1.15	443	703	2033	**0.43**	**0.23**	**OK**
Load Case: (1.0 + 0.14Sds) D + 0.7E												
649	<= Pall: OK	79	1.60	0.29	665	1.15	120	190	2033	**0.12**	**0.07**	**OK**
Load Case: (1.0 + 0.14Sds) D + 0.75(L + S + 0.7E)												
988	<= Pall: OK	120	1.60	0.29	665	1.15	132	209	2033	**0.16**	**0.08**	**OK**

Wall: 2x6 @ 16 in. o.c. is acceptable

LUNDIN RESIDENCE
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 18689.01

FOUNDATION CALCULATIONS



1 LOWER FLOOR PLAN
1/4" = 1'-0"

cantied wall

"L" shape Footing

8" stem wall on 18"W. x 8"d Footing

cantied retaining wall

"L" shape Footing

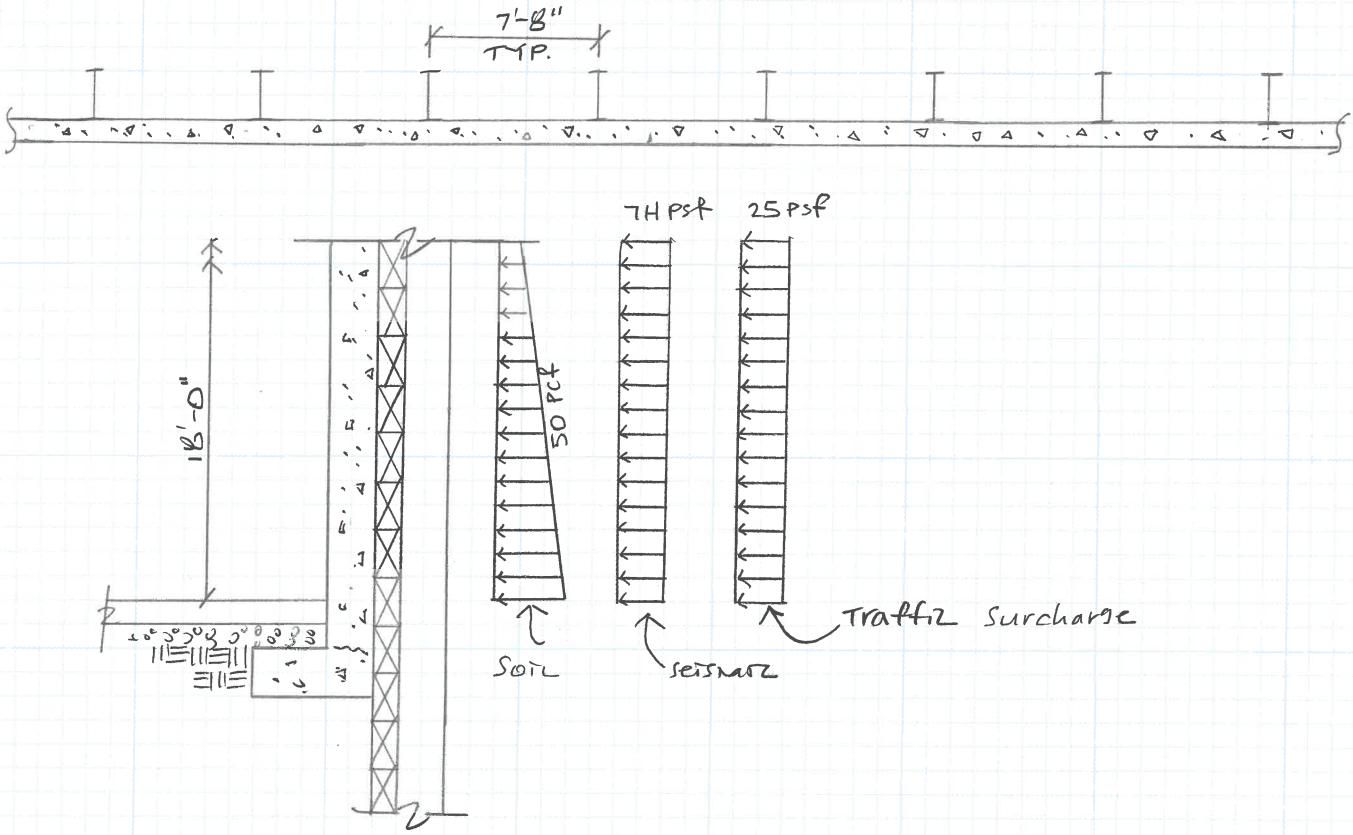
8" stem wall on 18"W. x 8"d Footing

24" Footing (see back sheet)

D-2

Foundation Plan
1/8" = 1'-0"

Concrete Wall Behind Permanent shoring



Loading @ conc. wall (1' Trib)

Soil = 50 pcf x 17' = 850 psf (Lateral Earth Pressure Taken 1' Above F.F)

Seismic = 7H = 7x17' = 119 psf

Traffic = 25 psf (Live Load)

Load combinations =

1.6(L+H) = 1.6(25 + 850) psf = 1400 psf

1.0E + 0.5L + 1.6H = 119 psf + 0.5 x 25 psf + 1.6 x 850 psf = 1492 psf

Per ACI 318-14, Table 6.5.2 and Table 6.5.4

$M_u = W_u \cdot l^2/10 = 1492\ plf \times (7'-8")^2/10 = 8170\ \#'$

$V_u = 1.15 W_u l/2 = 1.15 \times 1492\ plf \times (7'-8")/2 = 6578\ \#$

QUANTUM | CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

Lundin Residence (project)		12-20-18 (date)	18689.01 (project no.)
		Qing (designer)	F-1 (sheet)
David & Taymee Lundin (client)		Sandro (checked by)	

TRT 8" Conc. Wall

$Mu \leq \phi Mn$

Where = $\phi = 0.90$

$Mn = As \cdot fy \cdot (d - a/2) \approx As \cdot fy \cdot 0.9d$

$d = 4"$

$\Rightarrow Mn = \frac{Mu}{\phi} = \frac{8170\#'}{0.9} = 9078\#'$

$As = \frac{9078\#'}{fy \; 0.9d} = \frac{108.94 \; K"}{60 \; ksi \times 0.9 \times 4"} = 0.48 \; in^2$

W1 #5 rebar ($As = 0.31 in^2$)

Spacing $S = \frac{0.31 in^2}{0.48 in^2} \times 12" = 7.8"$

↑ use 8" o/c

Check Shear Capacity

$Vn = 2\sqrt{f'c} \, bw \cdot d \cdot \lambda$

$= 2\sqrt{3000 PSi} \times 12" \times 8" \times 1.0$

$= 10516 \#$

$\phi Vn = 0.75 \times 10516\# = 7887\# > Vu = 6578\#$ OK

*

8" Concrete Wall W1
#5 @ 8" o/c Horizontal,
#4 @ 12" o/c Vertical

QUANTUM | CONSULTING ENGINEERS

1511 THIRD AVENUE
SUITE 323
SEATTLE, WA 98101
TEL 206.957.3900
FAX 206.957.3901
www.quantumce.com

Lundin residence (project)		12-20-18 (date)	1866.01 (project no.)
		Qing (designer)	F-2 (sheet)
David & Jaymee Lundin (client)		Sandro (checked by)	

Perimeter Footing

Quantum Consulting Engineers
Lundin Residence
4041 West Mercer Way
Mercer Island, Wa 98040

Quantum Job # 18689.01

Blue Cells Indicate Inputs!!
Green Cells Indicate Inputs!!

Loads on Footing

	Trib. Width *ft*	q_{DL} *psf*	q_{SL} *psf*	q_{LL} *psf*	Width *in*	Thickness *in*	Cocn. Weight *pcf*	Total DL *plf*	Total SL *plf*	Total LL *plf*
Roof	13.2	18	30	0				238	396	0
Wall	28	11						303		
Steel Awning	6	12	0	20				72	0	120
Main Floor	8	36	0	40				279	0	310
Lower Floor	0	36	0	40				0	0	0
Concrete Stem Wall					8	24	150	200		
Concrete Footing					18	8	150	150		
							Total Loads	**1241**	**396**	**430**

Allowable Soil Bearing B_{SOIL} (psf) = 3000

ASD Combinations:	**P** (plf)	**B_{SOIL}** (psf)	Footing Size (in)
D	1241	3000	5.0
D + L	1671	3000	6.7
D + S	1637	3000	6.5
D + 0.75L + 0.75S	1861	3000	7.4

Req'd. Footing Size (in) **7.4**

User Selected Footing Size (in) **18**

Footing Reinforcing **fy =** 40 (ksi) f'c = 2500 psi

LRFD Combinations:	**P_u** (plf)	Footing Width (in)	Soil Pressure (psf)	Can'ted L (in)	**M_u** (k-in)	**M_n** (k-in)	Footing Depth (in)	d (in)	***As*** *(in^2)*	*Min.* ***As*** *(in^2)*	*Req.* ***As*** *(in^2)*	*#4 Rebar (in^2)*	*Rebar Spacing (in)*	User Selected Spacing (in)
1.4D	1738	18	1158	5	1.21	1.34	8	4.75	0.0078	0.1026	0.1026	0.2	23.4	#4 @ 16" o.c.
1.2D + 1.6L + 0.5S	2375	18	1584	5	1.65	1.83	8	4.75	0.0107	0.1026	0.1026	0.2	23.4	#4 @ 16" o.c.
1.2D + 1.6S + 0.5L	2338	18	1559	5	1.62	1.80	8	4.75	0.0105	0.1026	0.1026	0.2	23.4	#4 @ 16" o.c.
1.2D + 0.5L + 0.5S	1902	18	1268	5	1.32	1.47	8	4.75	0.0086	0.1026	0.1026	0.2	23.4	#4 @ 16" o.c.
1.2D + 0.5L + 0.2S	1784	18	1189	5	1.24	1.38	8	4.75	0.0080	0.1026	0.1026	0.2	23.4	#4 @ 16" o.c.

Longitudinal Steel

Steel Ratio **ρ**	Width (in)	Thickness (in)	*Req.* ***As*** *(in^2)*	User Selected Reinforcing
0.0020	18	8	0.288	(2) - #4 Longitudinal

Check Footing Thickness λ (Light Weight Concrete Factor) = 1.00

1.0 for normal weight concrete
0.85 for sand light weight concrete
0.75 for all light weight concrete

LRFD Combinations:	**σ** (psf)	Effective Length (in)	Effective Area (ft^2)	**V_u** (lb)	**ϕV_u** (lb)	**Result**
1.4D	1158	0.25	0.02	24	4275	**OK**
1.2D + 1.6L + 0.5S	1584	0.25	0.02	33	4275	**OK**
1.2D + 1.6S + 0.5L	1559	0.25	0.02	32	4275	**OK**
1.2D + 0.5L + 0.5S	1268	0.25	0.02	26	4275	**OK**
1.2D + 0.5L + 0.2S	1189	0.25	0.02	25	4275	**OK**

18"w.x8"d. Continuous Footing w/ (2)-#4 cont. Longitudinal Bar

Interior Footing - Garage

Quantum Consulting Engineers
Lundin Residence
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job # 18689.01

Blue Cells Indicate Inputs!!
Green Cells Indicate Inputs!!

Loads on Footing

	Trib. Width *ft*	q_{DL} *psf*	q_{SL} *psf*	q_{LL} *psf*	Width *in*	Thickness *in*	Cocn. Weight *pcf*	Total DL *plf*	Total SL *plf*	Total LL *plf*
Roof	0	18	30	0				0	0	0
Wall	11	9						99		
Main Floor	15	63	0	40				945	0	600
Lower Floor	0	36	0	40				0	0	0
Vehicle	1.2	0	0	1985				0	0	2382
Concrete Stem Wall					0	0	150	0		
Concrete Footing					18	12	150	225		
							Total Loads	**1269**	**0**	**2982**

Allowable Soil Bearing B_{SOIL} (psf) = 3000

ASD Combinations:	**P** (plf)	**B_{SOIL}** (psf)	Footing Size (in)
D	1269	3000	5.1
D + L	4251	3000	17.0
D + S	1269	3000	5.1
D + 0.75L + 0.75S	3506	3000	14.0

Req'd. Footing Size (in) **17.0**

User Selected Footing Size (in) **18**

Footing Reinforcing **fy =** 40 (ksi) f'c = 2500 psi

LRFD Combinations:	**P_u** (plf)	Footing Width (in)	Soil Pressure (psf)	Can'ted L (in)	**M_u** (k-in)	**M_n** (k-in)	Footing Depth (in)	d (in)	***As*** *(in^2)*	*Min.* ***As*** *(in^2)*	*Req.* ***As*** *(in^2)*	*#4 Rebar (in^2)*	*Rebar Spacing (in)*	User Selected Spacing (in)
1.4D	1777	18	1184	6.25	1.93	2.14	12	8.75	0.0068	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 1.6L + 0.5S	6294	18	4196	6.25	6.83	7.59	12	8.75	0.0241	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 1.6S + 0.5L	3014	18	2009	6.25	3.27	3.63	12	8.75	0.0115	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 0.5L + 0.5S	3014	18	2009	6.25	3.27	3.63	12	8.75	0.0115	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 0.5L + 0.2S	3014	18	2009	6.25	3.27	3.63	12	8.75	0.0115	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.

Longitudinal Steel

Steel Ratio **ρ**	Width (in)	Thickness (in)	*Req.* ***As*** *(in^2)*	User Selected Reinforcing
0.0020	18	12	0.432	(3) - #4 Longitudinal

Check Footing Thickness λ (Light Weight Concrete Factor) = 1.00

1.0 for normal weight concrete
0.85 for sand light weight concrete
0.75 for all light weight concrete

LRFD Combinations:	**σ** (psf)	Effective Length (in)	Effective Area (ft^2)	**V_u** (lb)	**$øV_u$** (lb)	**Result**
1.4D	1184	-2.50	-0.21	-247	7875	**OK**
1.2D + 1.6L + 0.5S	4196	-2.50	-0.21	-874	7875	**OK**
1.2D + 1.6S + 0.5L	2009	-2.50	-0.21	-419	7875	**OK**
1.2D + 0.5L + 0.5S	2009	-2.50	-0.21	-419	7875	**OK**
1.2D + 0.5L + 0.2S	2009	-2.50	-0.21	-419	7875	**OK**

18"w.x12"d. Continuous Footing w/ (3)-#4 cont. Longitudinal Bar

Typical Interior Footing

Quantum Consulting Engineers
Lundin Residence
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job # 18689.01

Blue Cells Indicate Inputs!!
Green Cells Indicate Inputs!!

Loads on Footing

	Trib. Width *ft*	q_{DL} *psf*	q_{SL} *psf*	q_{LL} *psf*	Width *in*	Thickness *in*	Cocn. Weight *pcf*	Total DL *plf*	Total SL *plf*	Total LL *plf*
Upper Roof	13.2	18	30	0				238	396	0
Wall	27.5	11						303		
Low Roof	4.7	18	30	0				85	141	0
Main Floor	12	36	0	40				432	0	480
Lower Floor	0.0	36	0	40				0	0	0
Concrete Stem Wall					0	0	150	0		
Concrete Footing					18	12	150	225		
							Total Loads	**1282**	**537**	**480**

Allowable Soil Bearing B_{SOIL} (psf) = 3000

ASD Combinations:	**P** (plf)	**B_{SOIL}** (psf)	Footing Size (in)
D	1282	3000	5.1
D + L	1762	3000	7.0
D + S	1819	3000	7.3
D + 0.75L + 0.75S	2044	3000	8.2

Req'd. Footing Size (in) **8.2**

User Selected Footing Size (in) **18**

Footing Reinforcing **fy =** 40 (ksi) f'c = 2500 psi

LRFD Combinations:	**P_u** (plf)	Footing Width (in)	Soil Pressure (psf)	Can'ted L (in)	**M_u** (k-in)	**M_n** (k-in)	Footing Depth (in)	d (in)	***As*** *(in^2)*	*Min.* ***As*** *(in^2)*	*Req.* ***As*** *(in^2)*	*#4 Rebar (in^2)*	*Rebar Spacing (in)*	User Selected Spacing (in)
1.4D	1794	18	1196	6.25	1.95	2.16	12	8.75	0.0069	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 1.6L + 0.5S	2575	18	1716	6.25	2.79	3.10	12	8.75	0.0099	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 1.6S + 0.5L	2637	18	1758	6.25	2.86	3.18	12	8.75	0.0101	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 0.5L + 0.5S	2047	18	1364	6.25	2.22	2.47	12	8.75	0.0078	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 0.5L + 0.2S	1885	18	1257	6.25	2.05	2.27	12	8.75	0.0072	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.

Longitudinal Steel

Steel Ratio **ρ**	Width (in)	Thickness (in)	*Req.* ***As*** *(in^2)*	User Selected Reinforcing
0.0020	18	12	0.432	(3) - #4 Longitudinal

Check Footing Thickness λ (Light Weight Concrete Factor) = 1.00

1.0 for normal weight concrete
0.85 for sand light weight concrete
0.75 for all light weight concrete

LRFD Combinations:	**σ** (psf)	Effective Length (in)	Effective Area (ft^2)	**V_u** (lb)	**ϕV_u** (lb)	**Result**
1.4D	1196	-2.50	-0.21	-249	7875	**OK**
1.2D + 1.6L + 0.5S	1716	-2.50	-0.21	-358	7875	**OK**
1.2D + 1.6S + 0.5L	1758	-2.50	-0.21	-366	7875	**OK**
1.2D + 0.5L + 0.5S	1364	-2.50	-0.21	-284	7875	**OK**
1.2D + 0.5L + 0.2S	1257	-2.50	-0.21	-262	7875	**OK**

18"w.x12"d. Continuous Footing w/ (3)-#4 cont. Longitudinal Bar

Interior Shear Wall Footing

Quantum Consulting Engineers
Lundin Residence
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job # 18689.01

Blue Cells Indicate Inputs!!
Green Cells Indicate Inputs!!

Loads on Footing

	Trib. Width *ft*	q_{DL} *psf*	q_{SL} *psf*	q_{LL} *psf*	Width *in*	Thickness *in*	Cocn. Weight *pcf*	Total DL *plf*	Total SL *plf*	Total LL *plf*
Roof	16.5	18	30	0				297	495	0
Wall	26	11						286		
Terrace	6	40	0	60				240	0	360
Main Floor	5	36	0	40				180	0	200
Lower Floor	0	36	0	40				0	0	0
Concrete Stem Wall					0	0	150	0		
Concrete Footing					18	24	150	450		
							Total Loads	**1453**	**495**	**560**

Allowable Soil Bearing B_{SOIL} (psf) = 3000

ASD Combinations:	**P** (plf)	**B_{SOIL}** (psf)	Footing Size (in)
D	1453	3000	5.8
D + L	2013	3000	8.1
D + S	1948	3000	7.8
D + 0.75L + 0.75S	2244	3000	9.0

Req'd. Footing Size (in) **9.0**

User Selected Footing Size (in) **18**

Footing Reinforcing **fy =** 40 (ksi) f'c = 2500 psi

LRFD Combinations:	**P_u** (plf)	Footing Width (in)	Soil Pressure (psf)	Can'ted L (in)	**M_u** (k-in)	**M_n** (k-in)	Footing Depth (in)	d (in)	***As*** *(in^2)*	*Min. **As*** *(in^2)*	*Req. **As*** *(in^2)*	*#4 Rebar (in^2)*	*Rebar Spacing (in)*	User Selected Spacing (in)
1.4D	2034	18	1356	6.25	2.21	2.45	24	20.75	0.0033	0.4482	0.4482	0.2	5.4	#4 @ 12" o.c.
1.2D + 1.6L + 0.5S	2887	18	1925	6.25	3.13	3.48	24	20.75	0.0047	0.4482	0.4482	0.2	5.4	#4 @ 12" o.c.
1.2D + 1.6S + 0.5L	2816	18	1877	6.25	3.06	3.39	24	20.75	0.0045	0.4482	0.4482	0.2	5.4	#4 @ 12" o.c.
1.2D + 0.5L + 0.5S	2271	18	1514	6.25	2.46	2.74	24	20.75	0.0037	0.4482	0.4482	0.2	5.4	#4 @ 12" o.c.
1.2D + 0.5L + 0.2S	2123	18	1415	6.25	2.30	2.56	24	20.75	0.0034	0.4482	0.4482	0.2	5.4	#4 @ 12" o.c.

Longitudinal Steel

Steel Ratio **ρ**	Width (in)	Thickness (in)	*Req. **As*** *(in^2)*	User Selected Reinforcing
0.0020	18	24	0.864	(8) - #4 Longitudinal

Check Footing Thickness λ (Light Weight Concrete Factor) = 1.00

1.0 for normal weight concrete
0.85 for sand light weight concrete
0.75 for all light weight concrete

LRFD Combinations:	**σ** (psf)	Effective Length (in)	Effective Area (ft^2)	**V_u** (lb)	**ϕV_u** (lb)	**Result**
1.4D	1356	-14.50	-1.21	-1639	18675	**OK**
1.2D + 1.6L + 0.5S	1925	-14.50	-1.21	-2326	18675	**OK**
1.2D + 1.6S + 0.5L	1877	-14.50	-1.21	-2268	18675	**OK**
1.2D + 0.5L + 0.5S	1514	-14.50	-1.21	-1829	18675	**OK**
1.2D + 0.5L + 0.2S	1415	-14.50	-1.21	-1710	18675	**OK**

18"w.x24"d. Continuous Footing w/ (4)-#4 cont. Longitudinal Bar Top & Bottom

Perimeter Footing At Grid 5

Quantum Consulting Engineers
Lundin Residence
4041 West Mercer Way
Mercer Island, Wa 98040

Quantum Job # 18689.01

Blue Cells Indicate Inputs!!
Green Cells Indicate Inputs!!

Loads on Footing

	Trib. Width *ft*	q_{DL} *psf*	q_{SL} *psf*	q_{LL} *psf*	Width *in*	Thickness *in*	Cocn. Weight *pcf*	Total DL *plf*	Total SL *plf*	Total LL *plf*
Roof	1	18	30	0				18	30	0
Wall	6	11						66		
Upper Floor	1	36	0	40				36	0	40
Main Floor	0	36	0	40				0	0	0
Lower Floor	0	36	0	40				0	0	0
Concrete Wall					10	210	150	2188		
Concrete Footing					24	12	150	300		
							Total Loads	**2608**	**30**	**40**

Allowable Soil Bearing B_{SOIL} (psf) = 3000

ASD Combinations:	**P** (plf)	**B_{SOIL}** (psf)	Footing Size (in)
D	2608	3000	10.4
D + L	2648	3000	10.6
D + S	2638	3000	10.6
D + 0.75L + 0.75S	2660	3000	10.6

Req'd. Footing Size (in) **10.6**

User Selected Footing Size (in) **24**

Footing Reinforcing **fy =** 40 (ksi) f'c = 2500 psi

LRFD Combinations:	**P_u** (plf)	Footing Width (in)	Soil Pressure (psf)	Can'ted L (in)	**M_u** (k-in)	**M_n** (k-in)	Footing Depth (in)	d (in)	***As*** *(in^2)*	*Min.* ***As*** *(in^2)*	*Req.* ***As*** *(in^2)*	*#4 Rebar (in^2)*	*Rebar Spacing (in)*	User Selected Spacing (in)
1.4D	3651	24	1825	14	14.91	16.56	12	8.75	0.0526	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 1.6L + 0.5S	3208	24	1604	14	13.10	14.55	12	8.75	0.0462	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 1.6S + 0.5L	3197	24	1599	14	13.05	14.50	12	8.75	0.0460	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 0.5L + 0.5S	3164	24	1582	14	12.92	14.36	12	8.75	0.0456	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.
1.2D + 0.5L + 0.2S	3155	24	1578	14	12.88	14.31	12	8.75	0.0454	0.189	0.1890	0.2	12.7	#4 @ 12" o.c.

Longitudinal Steel

Steel Ratio **ρ**	Width (in)	Thickness (in)	*Req.* ***As*** *(in^2)*	User Selected Reinforcing
0.0020	24	12	0.576	(3) - #4 Longitudinal

Check Footing Thickness λ (Light Weight Concrete Factor) = 1.00

1.0 for normal weight concrete
0.85 for sand light weight concrete
0.75 for all light weight concrete

LRFD Combinations:	**σ** (psf)	Effective Length (in)	Effective Area (ft^2)	**V_u** (lb)	**ϕV_u** (lb)	**Result**
1.4D	1825	5.25	0.44	799	7875	**OK**
1.2D + 1.6L + 0.5S	1604	5.25	0.44	702	7875	**OK**
1.2D + 1.6S + 0.5L	1599	5.25	0.44	699	7875	**OK**
1.2D + 0.5L + 0.5S	1582	5.25	0.44	692	7875	**OK**
1.2D + 0.5L + 0.2S	1578	5.25	0.44	690	7875	**OK**

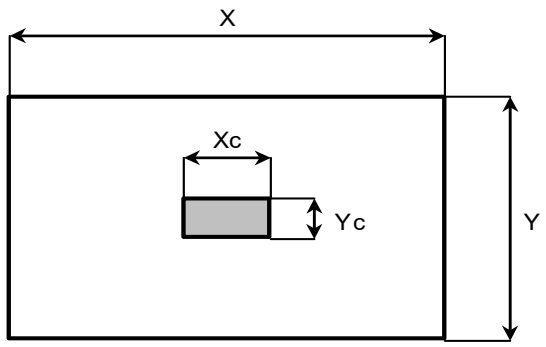
24"w.x12"d. Continuous Footing w/ (3)-#4 cont. Longitudinal Bar

Spread Footing 1

Project Number: 18689.01
Project Name: Lundin Residence
Footing Number: Footing 1
Today's Date: 1/7/2019
Engineer: Qing Huang

Inputs:

Service Dead Load = 6.2 kips
Service Live Load = 1.0 kips
Service Snow Load = 5.5 kips
LRFD Factored Load = 17.9 kips
Allowable Soil Bearing = 3000 psf
Concrete Strength (f'c) = 2500 psi
Column Xc Dimension = 6.00 in.
Column Yc Dimension = 5.50 in.
Footing X Dimension = 2.50 ft.
Footing Y Dimension = 2.50 ft.
Rebar Strength Fy = 40.0 ksi
Footing Thickness (t) = 12.00 in.
Rebar Clear Cover = 3.00 in.
Rebar Effective Depth (d) = 8.75 in.



Bearing Check:

ASD Factored Load = 12.6 kips
Required Footing Area = 4.21 sq. ft.
Actual Footing Area = 6.25 sq. ft. OK

Beam Shear Design - X Direction:

Ultimate Soil Bearing Stress = 2.86 ksf
Ø= 0.75
Vu = 2 kips
ØVn = 20 kips OK

Beam Shear Design - Y Direction:

Ø= 0.75
Vu = 2 kips
ØVn = 20 kips OK

Punching Shear Design:

Ø= 0.75
Vu = 14 kips
ØVn = 76 kips OK

Flexural Design - X Direction:

Ø= 0.9
Bar Size = #4
Number of Bars Provided = 4
As Minimum = 0.72 sq. in.
As Provided = 0.80 sq. in. OK
Mu = 4 ft-kips
ØMn = 20 ft-kips OK
Bar Spacing = 8.00 in. OK

Flexural Design - Y Direction:

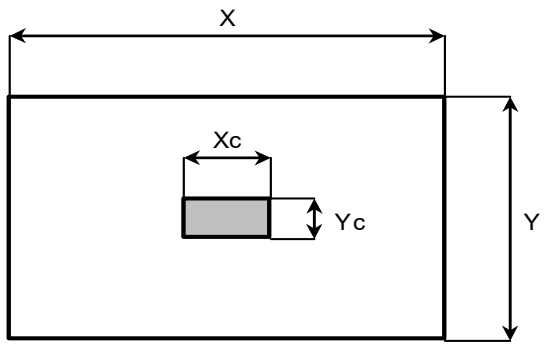
Ø= 0.9
Bar Size = #4
Number of Bars Provided = 4
As Minimum = 0.72 sq. in.
As Provided = 0.80 sq. in. OK
Mu = 4 ft-kips
ØMn = 20 ft-kips OK
Bar Spacing = 8.00 in. OK

Spread Footing 2

Project Number: 18689.01
Project Name: Lundin Residence
Footing Number: Footing 2
Today's Date: 1/7/2019
Engineer: Qing Huang

Inputs:

Service Dead Load = 5.3 kips
Service Live Load = 5.6 kips
Service Snow Load = 0.0 kips
LRFD Factored Load = 16.3 kips
Allowable Soil Bearing = 3000 psf
Concrete Strength (f'c) = 2500 psi
Column Xc Dimension = 6.00 in.
Column Yc Dimension = 5.50 in.
Footing X Dimension = 2.50 ft.
Footing Y Dimension = 2.50 ft.
Rebar Strength Fy = 40.0 ksi
Footing Thickness (t) = 12.00 in.
Rebar Clear Cover = 3.00 in.
Rebar Effective Depth (d) = 8.75 in.



Bearing Check:

ASD Factored Load = 11.8 kips
Required Footing Area = 3.92 sq. ft.
Actual Footing Area = 6.25 sq. ft. OK

Beam Shear Design - X Direction:

Ultimate Soil Bearing Stress = 2.61 ksf
Ø= 0.75
Vu = 2 kips
ØVn = 20 kips OK

Beam Shear Design - Y Direction:

Ø= 0.75
Vu = 2 kips
ØVn = 20 kips OK

Punching Shear Design:

Ø= 0.75
Vu = 13 kips
ØVn = 76 kips OK

Flexural Design - X Direction:

Ø= 0.9
Bar Size = #4
Number of Bars Provided = 4
As Minimum = 0.72 sq. in.
As Provided = 0.80 sq. in. OK
Mu = 3 ft-kips
ØMn = 20 ft-kips OK
Bar Spacing = 8.00 in. OK

Flexural Design - Y Direction:

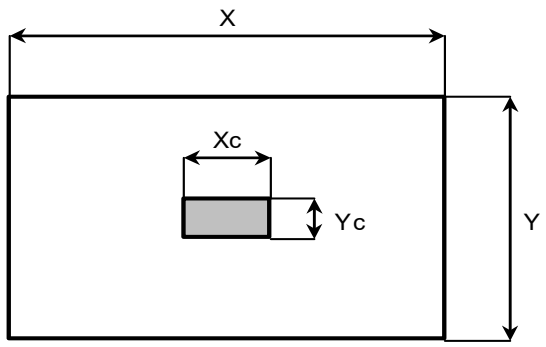
Ø= 0.9
Bar Size = #4
Number of Bars Provided = 4
As Minimum = 0.72 sq. in.
As Provided = 0.80 sq. in. OK
Mu = 3 ft-kips
ØMn = 20 ft-kips OK
Bar Spacing = 8.00 in. OK

Spread Footing 3

Project Number: 18689.01
Project Name: Lundin Residence
Footing Number: Footing 3
Today's Date: 1/7/2019
Engineer: Qing Huang

Inputs:

Service Dead Load = 4.4 kips
Service Live Load = 0.7 kips
Service Snow Load = 3.3 kips
LRFD Factored Load = 11.6 kips
Allowable Soil Bearing = 3000 psf
Concrete Strength (f'c) = 2500 psi
Column Xc Dimension = 4.50 in.
Column Yc Dimension = 5.50 in.
Footing X Dimension = 2.00 ft.
Footing Y Dimension = 2.00 ft.
Rebar Strength Fy = 40.0 ksi
Footing Thickness (t) = 12.00 in.
Rebar Clear Cover = 3.00 in.
Rebar Effective Depth (d) = 8.75 in.



Bearing Check:

ASD Factored Load = 8.3 kips
Required Footing Area = 2.76 sq. ft.
Actual Footing Area = 4.00 sq. ft. OK

Beam Shear Design - X Direction:

Ultimate Soil Bearing Stress = 2.90 ksf
Ø= 0.75
Vu = 0 kips
ØVn = 16 kips OK

Beam Shear Design - Y Direction:

Ø= 0.75
Vu = 0 kips
ØVn = 16 kips OK

Punching Shear Design:

Ø= 0.75
Vu = 8 kips
ØVn = 72 kips OK

Flexural Design - X Direction:

Ø= 0.9
Bar Size = #4
Number of Bars Provided = 3
As Minimum = 0.58 sq. in.
As Provided = 0.60 sq. in. OK
Mu = 2 ft-kips
ØMn = 15 ft-kips OK
Bar Spacing = 9.00 in. OK

Flexural Design - Y Direction:

Ø= 0.9
Bar Size = #4
Number of Bars Provided = 3
As Minimum = 0.58 sq. in.
As Provided = 0.60 sq. in. OK
Mu = 2 ft-kips
ØMn = 15 ft-kips OK
Bar Spacing = 9.00 in. OK

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Foundation\Concrete wall.RPX

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Cantilevered Retaining Wall

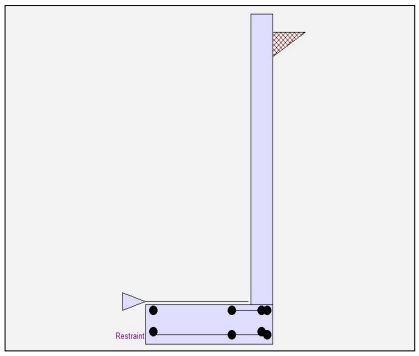
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	7.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	4,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	450.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.525
Soil height to ignore for passive pressure	=	5.40 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	555.0 lbs
Axial Live Load	=	44.0 lbs
Axial Load Eccentricity	=	1.3 in

Earth Pressure Seismic Load

Method : Uniform
Multiplier Used = 7.000
(Multiplier used on soil density)

Uniform Seismic Force = 60.083
Total Seismic Force = 515.715

Seismic surcharge

Design Summary

Wall Stability Ratios
Overturning = 1.15 Ratio < 1.5!
Slab Resists All Sliding !

Total Bearing Load	=	2,036	lbs
...resultant ecc.	=	17.84	in
Soil Pressure @ Toe	=	2,877 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	4,000	psf
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	4,028	psf
ACI Factored @ Heel	=	0	psf
Footing Shear @ Toe	=	20.8 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	82.2	psi

Sliding Calcs
Lateral Sliding Force = 1,650.3 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	LRFD	ASD	LRFD
Thickness	=	8.00		
Rebar Size	=	# 5		
Rebar Spacing	=	10.00		
Rebar Placed at	=	Center		
Design Data				
fb/FB + fa/Fa	=	**0.938**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	2,025.6		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	5,704.1		
Moment.....Allowable	=	6,083.7		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	42.2		
Shear.....Allowable	psi =	82.2		
Anet (Masonry)	in2 =		139.50	
Rebar Depth 'd'	in =	4.00		
Masonry Data				
f'm	psi =			
Fs	psi =			
Solid Grouting	=			
Modular Ratio 'n'	=			
Wall Weight	psf =	100.0		
Short Term Factor	=			
Equiv. Solid Thick.	=			
Masonry Block Type	=	Medium Weight		
Masonry Design Method	=	ASD		
Concrete Data				
f'c	psi =	3,000.0		
Fy	psi =	60,000.0		

Seismic load is included, overturning is permitted to be taken as 1.1

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.3443 in2/ft		
(4/3) * As :	0.4591 in2/ft	Min Stem T&S Reinf Area 1.536 in2	
200bd/fy : 200(12)(4)/60000 :	0.16 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.3443 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.372 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.6503 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Dimensions & Strengths

Toe Width	=	3.25 ft
Heel Width	=	0.67
Total Footing Width	=	3.92
Footing Thickness	=	13.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	4,028	0 psf
Mu' : Upward	=	7,918	0 ft-#
Mu' : Downward	=	1,030	0 ft-#
Mu: Design	=	6,889	0 ft-#
Actual 1-Way Shear	=	20.80	0.00 psi
Allow 1-Way Shear	=	82.16	43.82 psi

Toe Reinforcing = # 5 @ 10.00 in
Heel Reinforcing = # 4 @ 18.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: #4@ 7.20 in, #5@ 11.16 in, #6@ 15.83 in, #7@ 21.59 in, #8@ 28.43 in, #9@ 35
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area 1.10 in2
Min footing T&S reinf Area per foot 0.28 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 8.55 in	#4@ 17.09 in
#5@ 13.25 in	#5@ 26.50 in
#6@ 18.80 in	#6@ 37.61 in

Summary of Overturning & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,289.3	2.86	3,688.8	Soil Over Heel	=	0.3	3.92	1.1
Surcharge over Heel	=				Sloped Soil Over Hee	=			
Surcharge Over Toe	=				Surcharge Over Heel	=			
Adjacent Footing Load	=				Adjacent Footing Load	=			
Added Lateral Load	=				Axial Dead Load on Stem	=	555.0	3.48	1,930.9
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=	44.0	3.48	153.1
Seismic Earth Load	=	361.0	4.29	1,549.3	Soil Over Toe	=			
	=				Surcharge Over Toe	=			
Total		1,650.3	**O.T.M.**	5,238.1	Stem Weight(s)	=	800.0	3.58	2,866.7
	=		=		Earth @ Stem Transitions	=			
					Footing Weight	=	636.5	1.96	1,246.6
					Key Weight	=			
					Vert. Component	=			
					Total =		1,991.8 lbs	**R.M.=**	6,045.3

Resisting/Overturning Ratio = 1.15
Vertical Loads used for Soil Pressure = 2,035.8 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios be 1.1 per section 1807.2.3 of IBC 2009 or IBC 201

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

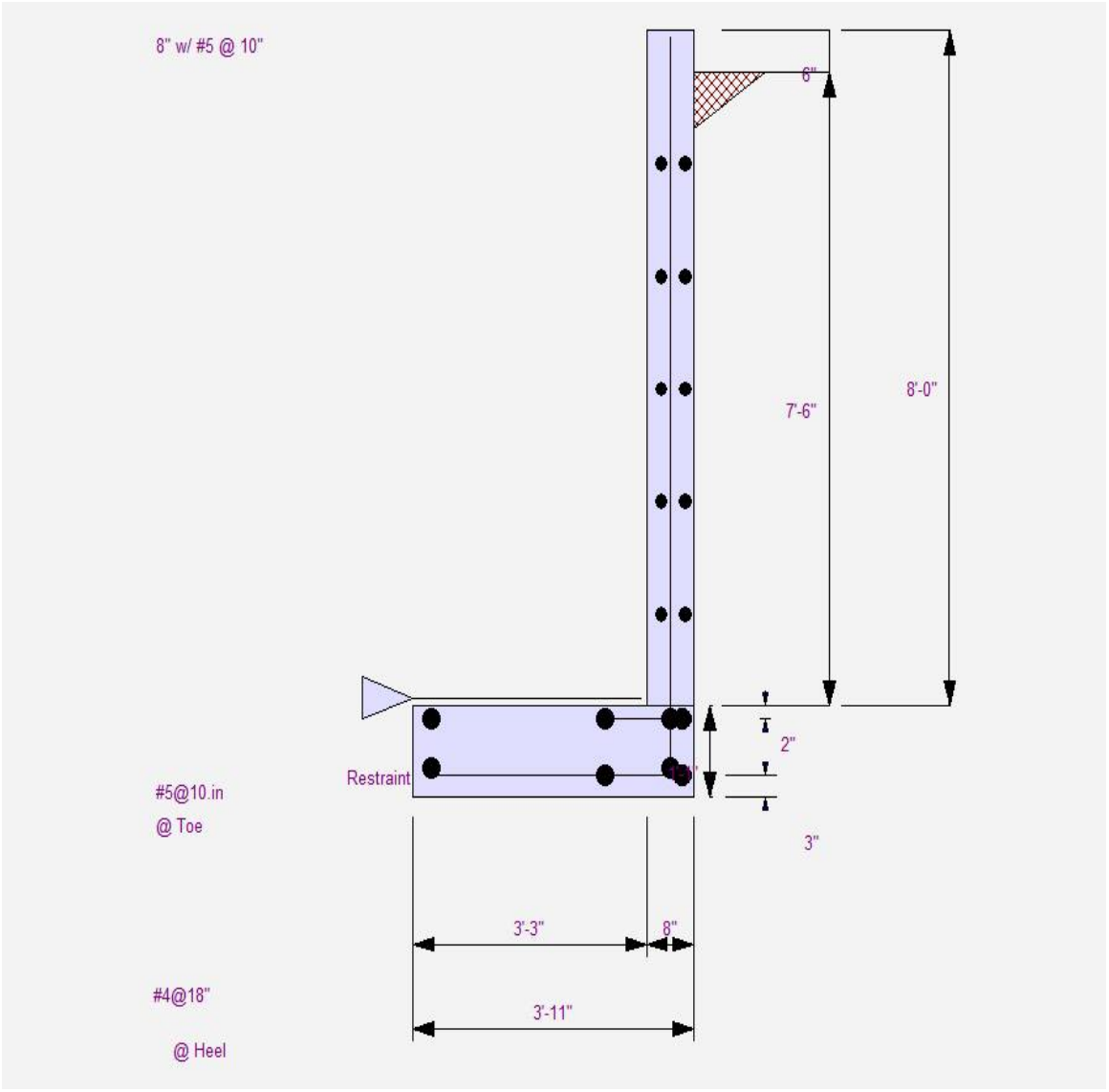
Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.163	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.


8" w/ #5 @ 10"
6"
8'-0"
7'-6"
2"
Restraint
#5@10.in
@ Toe
3"
3'-3"
8"
#4@18"
3'-11"
@ Heel

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Foundation\Concrete wall.RPX

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Cantilevered Retaining Wall

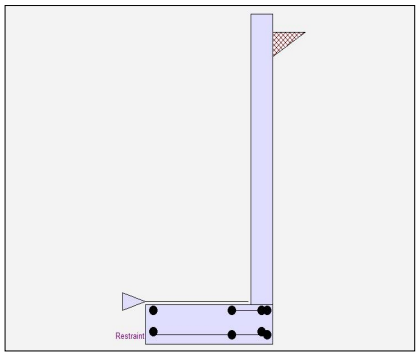
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	7.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	450.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.525
Soil height to ignore for passive pressure	=	5.40 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	555.0 lbs
Axial Live Load	=	44.0 lbs
Axial Load Eccentricity	=	1.3 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Design Summary

Wall Stability Ratios

Overturning	=	1.64	OK
Slab Resists All Sliding !			
Total Bearing Load	=	2,036 lbs	
...resultant ecc.	=	8.71 in	
Soil Pressure @ Toe	=	1,101 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,541 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	18.0 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	1,289.3 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	LRFD	ASD	LRFD
Thickness	=	8.00		
Rebar Size	=	# 5		
Rebar Spacing	=	10.00		
Rebar Placed at	=	Center		
Design Data				
fb/FB + fa/Fa	=	**0.660**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	1,575.0		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	4,014.2		
Moment.....Allowable	=	6,083.7		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	32.8		
Shear.....Allowable	psi =	82.2		
Anet (Masonry)	in2 =		139.50	
Rebar Depth 'd'	in =	4.00		
Masonry Data				
f'm	psi =			
Fs	psi =			
Solid Grouting	=			
Modular Ratio 'n'	=			
Wall Weight	psf =	100.0		
Short Term Factor	=			
Equiv. Solid Thick.	=			
Masonry Block Type	=	Medium Weight		
Masonry Design Method	=	ASD		
Concrete Data				
f'c	psi =	3,000.0		
Fy	psi =	60,000.0		

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Foundation\Concrete wall.RPX

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2423 in2/ft		
(4/3) * As :	0.3231 in2/ft	Min Stem T&S Reinf Area 1.536 in2	
200bd/fy : 200(12)(4)/60000 :	0.16 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.2423 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.372 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.6503 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Dimensions & Strengths

Toe Width	=	3.25 ft
Heel Width	=	0.67
Total Footing Width	=	3.92
Footing Thickness	=	13.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,541	0 psf
Mu' : Upward	=	5,756	0 ft-#
Mu' : Downward	=	1,030	0 ft-#
Mu: Design	=	4,726	0 ft-#
Actual 1-Way Shear	=	17.99	0.00 psi
Allow 1-Way Shear	=	82.16	43.82 psi

Toe Reinforcing = # 5 @ 10.00 in
Heel Reinforcing = # 4 @ 18.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: #4@ 8.55 in, #5@ 13.25 in, #6@ 18.80 in, #7@ 25.64 in, #8@ 33.76 in, #9@ 42
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area 1.10 in2
Min footing T&S reinf Area per foot 0.28 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 8.55 in	#4@ 17.09 in
#5@ 13.25 in	#5@ 26.50 in
#6@ 18.80 in	#6@ 37.61 in

Summary of Overturning & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,289.3	2.86	3,688.8	Soil Over Heel	=	0.3	3.92	1.1
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Surcharge Over Toe	=				Surcharge Over Heel	=			
Adjacent Footing Load	=				Adjacent Footing Load	=			
Added Lateral Load	=				Axial Dead Load on Stem	=	555.0	3.48	1,930.9
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=	44.0	3.48	153.1
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total		1,289.3	**O.T.M.**	3,688.8	Stem Weight(s)	=	800.0	3.58	2,866.7
	=		=		Earth @ Stem Transitions	=			
					Footing Weight	=	636.5	1.96	1,246.6
					Key Weight	=			
					Vert. Component	=			
					Total =		1,991.8 lbs	**R.M.=**	6,045.3

Resisting/Overturning Ratio = 1.64
Vertical Loads used for Soil Pressure = 2,035.8 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.062	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Foundation\Concrete wall.RPX

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Restrained Retaining Wall

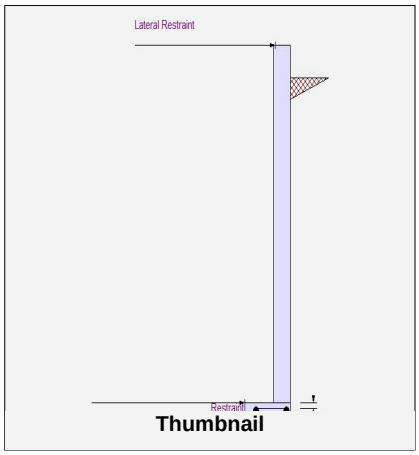
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	1.00 ft
Total Wall Height	=	11.00 ft
Top Support Height	=	11.00 ft
Slope Behind Wal	=	0.00
Height of Soil over Toe	=	0.00 in

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-rest Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	450.0 psf/ft
Soil Density	=	110.00 pcf
Footing||Soil Frictior	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Thumbnail

Surcharge Loads

Surcharge Over Heel = 0.0 psf
>>>Used To Resist Sliding & Overturning
Surcharge Over Toe = 0.0 psf
Used for Sliding & Overturning

Axial Load Applied to Stem

Axial Dead Load	=	555.0 lbs
Axial Live Load	=	44.0 lbs
Axial Load Eccentricity	=	1.3 in

Earth Pressure Seismic Load

Stem Weight Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.0 psf
K_h Soil Density Multiplier	=	0.064 g
F_p / W_p Weight Multiplier	=	0.000 g

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300
Added seismic per unit area	=	49.3 psf
Added seismic per unit area	=	0.0 psf

Seismic surcharge

Design Summary

Total Bearing Load	=	2,024 lbs
...resultant ecc.	=	6.72 in
Soil Pressure @ Toe	=	1,012 psf OK
Soil Pressure @ Heel	=	1,012 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	0 psf
ACI Factored @ Heel	=	3,705 psf
Footing Shear @ Toe	=	0.9 psi OK
Footing Shear @ Heel	=	0.0 psi OK
Allowable	=	82.2 psi
Reaction at Top	=	986.2 lbs
Reaction at Bottom	=	2,576.6 lbs

Sliding Calcs
Lateral Sliding Force = 2,576.6 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Construction

Thickness = 8.00 in Fy = 60,000 psi
Wall Weight = 100.0 psf f'c = 3,000 psi
Stem is FREE to rotate at top of footing

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg =	11.00 ft	4.64 ft	0.00 ft
Rebar Size =	# 5	# 5	# 5
Rebar Spacing =	14.00 in	14.00 in	14.00 in
Rebar Placed at =	Edge	Edge	Edge
Rebar Depth 'd' =	5.50 in	6.00 in	5.50 in
Design Data			
fb/FB + fa/Fa =	0.012	0.969	0.000
Mu....Actual =	76.7 ft-#	6,647.6 ft-#	0.0 ft-#
Mn * Phi.....Allowable =	6,264.0 ft-#	6,861.9 ft-#	6,264.0 ft-#
Shear Force @ this height =	1,539.1 lbs		3,164.9 lbs
Shear.....Actual =	23.32 psi		47.95 psi
Shear.....Allowable =	82.16 psi		82.16 psi

Other Acceptable Sizes & Spacings:

Toe: # 4 @ 18.00 in	-or-	Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Heel:# 4 @ 18.00 in	-or-	Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: Slab Resists Sliding	-or-	Slab Resists Sliding - No Force on

Concrete Stem Rebar Area Details

Top Support	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0033 in2/ft		
(4/3) * As :	0.0044 in2/ft	Min Stem T&S Reinf Area 2.112 in2	
200bd/fy : 200(12)(5.5)/60000 :	0.22 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2657 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8941 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Mmax Between Ends	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.26 in2/ft		
(4/3) * As :	0.3467 in2/ft	Min Stem T&S Reinf Area 1.221 in2	
200bd/fy : 200(12)(6)/60000 :	0.24 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.26 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2657 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.9754 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Base Support	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0 in2/ft		
(4/3) * As :	0 in2/ft	Min Stem T&S Reinf Area 0.891 in2	
200bd/fy : 200(12)(5.5)/60000 :	0.22 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2657 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8941 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Strengths & Dimensions

Toe Width	=	1.33 ft
Heel Width	=	0.67
Total Footing Width	=	2.00
Footing Thickness	=	13.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 3,000 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top = 2.00 in @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	0	3,705	psf
Mu' : Upward	=	131	0	ft-#
Mu' : Downward	=	173	0	ft-#
Mu: Design	=	-43	-0	ft-#
Actual 1-Way Shear	=	0.93	0.01	psi
Allow 1-Way Shear	=	82.16	82.16	psi

Min footing T&S reinf Area 0.56 in2
Min footing T&S reinf Area per foot 0.28 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 8.55 in	#4@ 17.09 in
#5@ 13.25 in	#5@ 26.50 in
#6@ 18.80 in	#6@ 37.61 in

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Foundation\Concrete wall.RPX

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Restrained Retaining Wall

Code: IBC 2015,ACI 318-14,ACI 530-13

Summary of Forces on Footing : Slab RESISTS sliding, stem is PINNED at footing

Forces acting on footing soil pressure

(taking moments about front of footing to find eccentricity)

Surcharge Over Heel	=	lbs		ft		ft-#
Axial Dead Load on Stem	=	599.0	lbs	1.67	ft	998.1 ft-#
Soil Over Toe	=	lbs		ft		ft-#
Adjacent Footing Load	=	lbs		ft		ft-#
Surcharge Over Toe	=	lbs		ft		ft-#
Stem Weight	=	1,100.0	lbs	1.67	ft	1,833.0 ft-#
Soil Over Heel	=	0.4	lbs	2.00	ft	0.7 ft-#
Footing Weight	=	325.0	lbs	1.00	ft	325.5 ft-#
Total Vertical Force	=	2,024.4	lbs	Moment =		3,157.3 ft-#

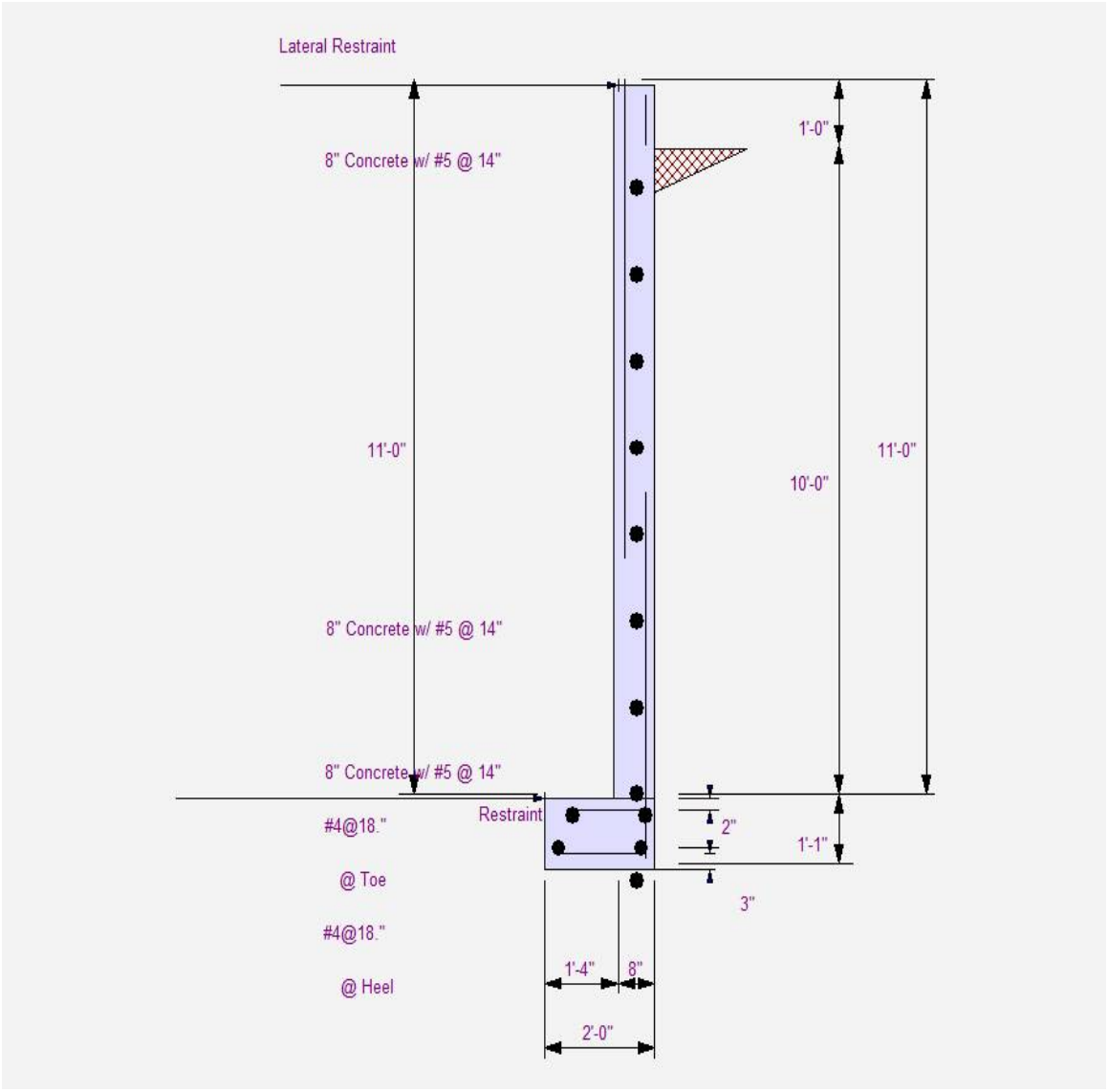
Net Mom. at Stem/Ftg Interface = -1,133.0 ft-#

Allow. Mom. @ Stem/Ftg Interface = 3,915.0 ft-#

Allow. Mom. Exceeds Applied Mom.? Yes

Therefore Uniform Soil Pressure = 1,012.2 psf

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.


Lateral Restraint
8" Concrete w/ #5 @ 14"
1'-0"
11'-0"
11'-0"
10'-0"
8" Concrete w/ #5 @ 14"
8" Concrete w/ #5 @ 14"
Restraint
#4@18."
@ Toe
#4@18."
@ Heel
2"
1'-1"
3"
1'-4"
8"
2'-0"

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Foundation\Concrete wall.RPX

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Restrained Retaining Wall

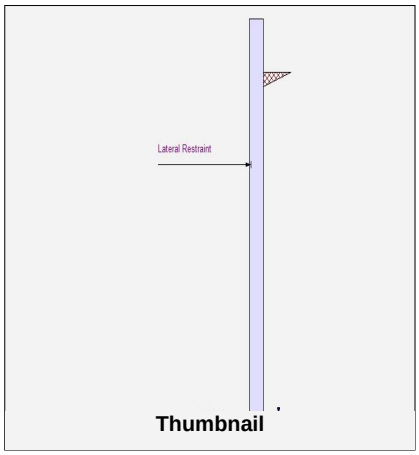
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	16.00 ft
Wall height above soil	=	2.50 ft
Total Wall Height	=	18.50 ft
Top Support Height	=	11.67 ft
Slope Behind Wal	=	0.00
Height of Soil over Toe	=	0.00 in

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
At-rest Heel Pressure	=	50.0 psf/ft
	=	
Passive Pressure	=	450.0 psf/ft
Soil Density	=	110.00 pcf
Footing||Soil Frictior	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Thumbnail

Surcharge Loads

Surcharge Over Heel = 0.0 psf
>>>Used To Resist Sliding & Overturning
Surcharge Over Toe = 0.0 psf
Used for Sliding & Overturning

Axial Load Applied to Stem

Axial Dead Load	=	256.0 lbs
Axial Live Load	=	44.0 lbs
Axial Load Eccentricity	=	1.3 in

Earth Pressure Seismic Load

Stem Weight Seismic Load

Uniform Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Strength Level)
Wind on Exposed Stem	=	0.0 psf
K_h Soil Density Multiplier	=	0.064 g
F_p / W_p Weight Multiplier	=	0.000 g

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300
Added seismic per unit area	=	78.8 psf
Added seismic per unit area	=	0.0 psf

Seismic surcharge

Design Summary

Total Bearing Load	=	2,965 lbs
...resultant ecc.	=	7.05 in
Soil Pressure @ Toe	=	1,368 psf OK
Soil Pressure @ Heel	=	1,368 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	0 psf
ACI Factored @ Heel	=	4,809 psf
Footing Shear @ Toe	=	0.9 psi OK
Footing Shear @ Heel	=	0.0 psi OK
Allowable	=	82.2 psi
Reaction at Top	=	3,778.5 lbs
Reaction at Bottom	=	4,764.2 lbs

Sliding Calcs
Lateral Sliding Force = 4,764.2 lbs

Concrete Stem Construction

Thickness = 10.00 in Fy = 60,000 psi
Wall Weight = 125.0 psf f'c = 3,000 psi
Stem is FREE to rotate at top of footing

	@ Top Support	Mmax Between Top & Base	@ Base of Wall
	Stem OK	Stem OK	Stem OK
Design Height Above Ftg =	11.67 ft	5.20 ft	0.00 ft
Rebar Size =	# 5	# 6	# 5
Rebar Spacing =	12.00 in	6.75 in	12.00 in
Rebar Placed at =	Center	Center	Edge
Rebar Depth 'd' =	5.00 in	5.00 in	7.50 in
Design Data			
fb/FB + fa/Fa =	0.333	0.999	0.000
Mu....Actual =	2,181.4 ft-#	14,881.9 ft-#	0.0 ft-#
Mn * Phi.....Allowable =	6,549.8 ft-#	14,892.5 ft-#	10,037.3 ft-#
Shear Force @ this height =	4,681.1 lbs		6,122.1 lbs
Shear.....Actual =	78.02 psi		68.02 psi
Shear.....Allowable =	82.16 psi		82.16 psi

Other Acceptable Sizes & Spacings:
Toe: # 7 @ 18.00 in -or- Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Heel:# 6 @ 16.00 in -or- Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: Slab Resists Sliding -or- Slab Resists Sliding - No Force on

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Concrete Stem Rebar Area Details

Top Support	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1036 in2/ft		
(4/3) * As :	0.1381 in2/ft	Min Stem T&S Reinf Area 2.800 in2	
200bd/fy : 200(12)(5)/60000 :	0.2 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.240 in2/ft	
0.0018bh : 0.0018(12)(10) :	0.216 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.216 in2/ft	#4@ 10.00 in	#4@ 20.00 in
Provided Area :	0.31 in2/ft	#5@ 15.50 in	#5@ 31.00 in
Maximum Area :	0.8128 in2/ft	#6@ 22.00 in	#6@ 44.00 in

Mmax Between Ends	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.7065 in2/ft		
(4/3) * As :	0.9419 in2/ft	Min Stem T&S Reinf Area 1.552 in2	
200bd/fy : 200(12)(5)/60000 :	0.2 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.240 in2/ft	
0.0018bh : 0.0018(12)(10) :	0.216 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.7065 in2/ft	#4@ 10.00 in	#4@ 20.00 in
Provided Area :	0.7822 in2/ft	#5@ 15.50 in	#5@ 31.00 in
Maximum Area :	0.8128 in2/ft	#6@ 22.00 in	#6@ 44.00 in

Base Support	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0 in2/ft		
(4/3) * As :	0 in2/ft	Min Stem T&S Reinf Area 1.248 in2	
200bd/fy : 200(12)(7.5)/60000 :	0.3 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.240 in2/ft	
0.0018bh : 0.0018(12)(10) :	0.216 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.216 in2/ft	#4@ 10.00 in	#4@ 20.00 in
Provided Area :	0.31 in2/ft	#5@ 15.50 in	#5@ 31.00 in
Maximum Area :	1.2192 in2/ft	#6@ 22.00 in	#6@ 44.00 in

Footing Strengths & Dimensions

Toe Width	=	1.33 ft
Heel Width	=	0.83
Total Footing Width	=	2.17
Footing Thickness	=	13.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 3,000 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top = 2.00 in @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	0	4,809	psf
Mu' : Upward	=	150	0	ft-#
Mu' : Downward	=	173	0	ft-#
Mu: Design	=	-23	0	ft-#
Actual 1-Way Shear	=	0.93	0.00	psi
Allow 1-Way Shear	=	82.16	0.00	psi

Min footing T&S reinf Area 0.61 in2
Min footing T&S reinf Area per foot 0.28 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 8.55 in	#4@ 17.09 in
#5@ 13.25 in	#5@ 26.50 in
#6@ 18.80 in	#6@ 37.61 in

Summary of Forces on Footing : Slab RESISTS sliding, stem is PINNED at footing

Forces acting on footing soil pressure

(taking moments about front of footing to find eccentricity)

Surcharge Over Heel	=	lbs	ft		ft-#
Axial Dead Load on Stem	=	300.0 lbs	1.75 ft	524.9	ft-#
Soil Over Toe	=	lbs	ft		ft-#
Adjacent Footing Load	=	lbs	ft		ft-#
Surcharge Over Toe	=	lbs	ft		ft-#
Stem Weight	=	2,312.5 lbs	1.75 ft	4,046.1	ft-#
Soil Over Heel	=	lbs	2.17 ft		ft-#
Footing Weight	=	352.0 lbs	1.08 ft	381.8	ft-#
Total Vertical Force	=	2,964.5 lbs	Moment =	4,952.8	ft-#

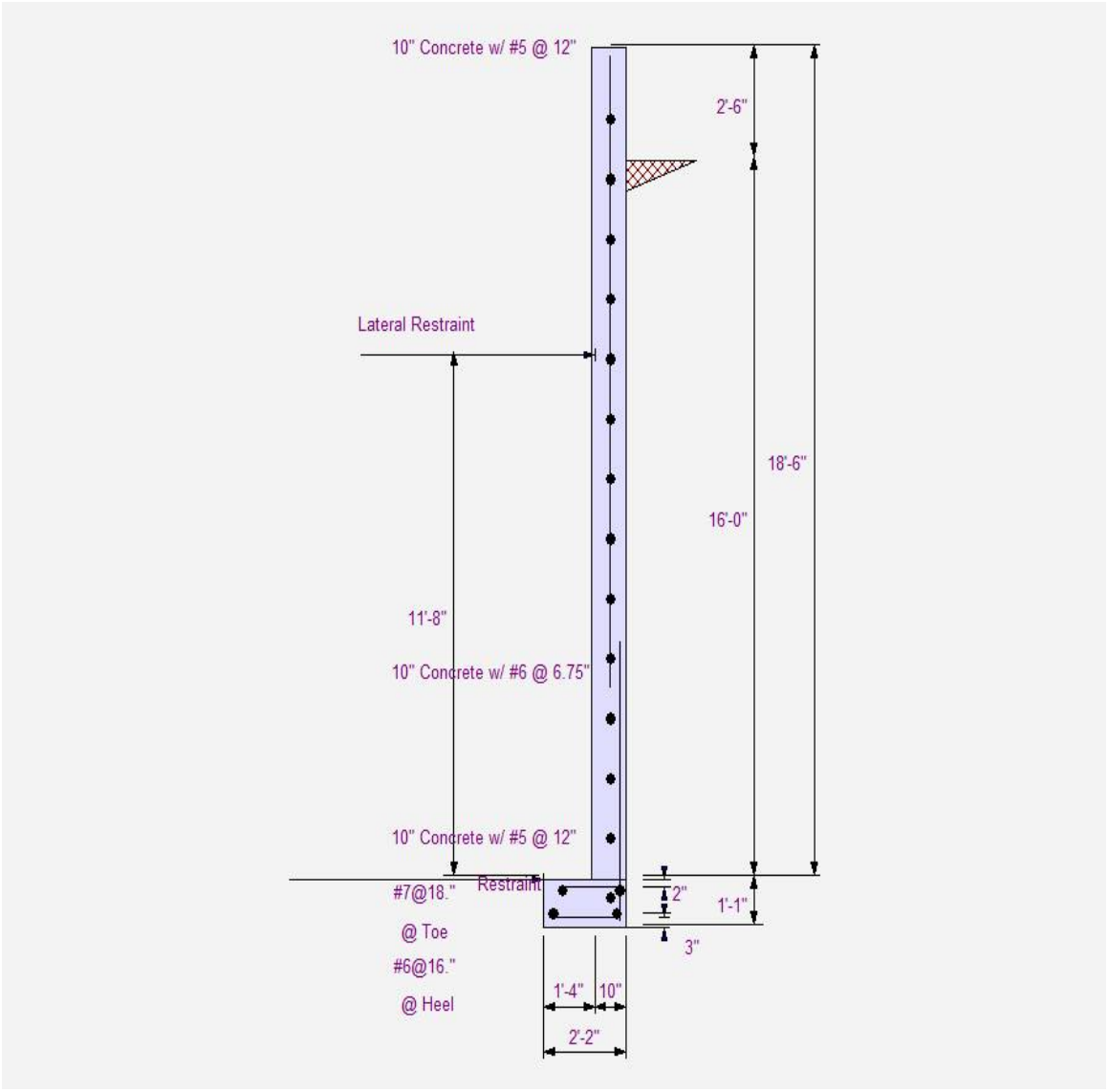
Net Mom. at Stem/Ftg Interface = -1,741.7 ft-#

Allow. Mom. @ Stem/Ftg Interface = 6,273.3 ft-#

Allow. Mom. Exceeds Applied Mom.? Yes

Therefore Uniform Soil Pressure = 1,368.5 psf

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.


10" Concrete w/ #5 @ 12"
2'-6"
Lateral Restraint
18'-6"
16'-0"
11'-8"
10" Concrete w/ #6 @ 6.75"
10" Concrete w/ #5 @ 12"
#7@18."
@ Toe
#6@16."
@ Heel
Restraint
2"
1'-1"
3"
1'-4"
10"
2'-2"

LUNDIN RESIDENCE
4041 West Mercer Way
Mercer Island, WA 98040

Quantum Job Number: 18689.01

RETAINING WALL CALCULATIONS

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Retaining wall\Site retainin

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Cantilevered Retaining Wall

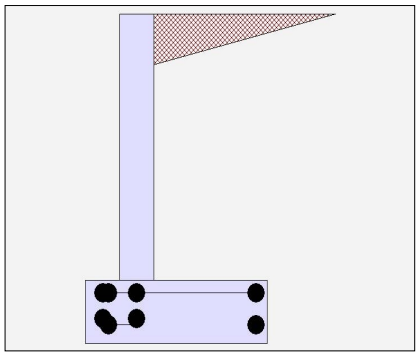
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	3.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	450.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.450
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform

Multiplier Used	=	7.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	30.333
Total Seismic Force	=	131.444

Seismic surcharge

Design Summary

Wall Stability Ratios

Overturning	=	2.67	OK
Sliding	=	1.14	Ratio < 1.5!
Total Bearing Load	=	1,218 lbs	
...resultant ecc.	=	4.94 in	
Soil Pressure @ Toe	=	879 psf	OK
Soil Pressure @ Heel	=	34 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,231 psf	
ACI Factored @ Heel	=	47 psf	
Footing Shear @ Toe	=	0.1 psi	OK
Footing Shear @ Heel	=	3.3 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	420.6 lbs
less 100% Passive Force	= -	68.8 lbs
less 100% Friction Force	= -	548.0 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 Stability	=	151.7 lbs NG

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

	Bottom
	Stem OK
Design Height Above Ftg ft =	0.00
Wall Material Above "Ht" =	Concrete
Design Method =	LRFD ASD LRFD
Thickness =	6.00
Rebar Size =	# 4
Rebar Spacing =	12.00
Rebar Placed at =	Center
Design Data	
fb/FB + fa/Fa =	**0.344**
Total Force @ Section	
Service Level lbs =	
Strength Level lbs =	449.2
Moment....Actual	
Service Level ft-# =	
Strength Level ft-# =	586.0
Moment.....Allowable =	1,705.6
Shear.....Actual	
Service Level psi =	
Strength Level psi =	12.5
Shear.....Allowable psi =	75.0
Anet (Masonry) in2 =	139.50
Rebar Depth 'd' in =	3.00
Masonry Data	
f'm psi =	
Fs psi =	
Solid Grouting =	
Modular Ratio 'n' =	
Wall Weight psf =	72.5
Short Term Factor =	
Equiv. Solid Thick. =	
Masonry Block Type =	Medium Weight
Masonry Design Method =	ASD
Concrete Data	
f'c psi =	2,500.0
Fy psi =	40,000.0

Seismic load is included, sliding is permitted to be taken as 1.1

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Retaining wall\Site retainin

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Cantilevered Retaining Wall

Code: IBC 2015,ACI 318-14,ACI 530-13

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing
As (based on applied moment) :	0.0728 in2/ft	
(4/3) * As :	0.0971 in2/ft	Min Stem T&S Reinf Area 0.504 in2
200bd/fy : 200(12)(3)/40000 :	0.18 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :
	==========	One layer of : Two layers of :
Required Area :	0.1296 in2/ft	#4@ 16.67 in #4@ 33.33 in
Provided Area :	0.2 in2/ft	#5@ 25.83 in #5@ 51.67 in
Maximum Area :	0.6096 in2/ft	#6@ 36.67 in #6@ 73.33 in

Footing Dimensions & Strengths

Toe Width	=	0.50 ft
Heel Width	=	2.17
Total Footing Width	=	2.67
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.50 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 145.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,231	47 psf
Mu' : Upward	=	145	409 ft-#
Mu' : Downward	=	18	843 ft-#
Mu: Design	=	127	435 ft-#
Actual 1-Way Shear	=	0.06	3.29 psi
Allow 1-Way Shear	=	40.00	40.00 psi

Toe Reinforcing = # 4 @ 16.00 in
Heel Reinforcing = # 4 @ 18.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area 0.58 in2
Min footing T&S reinf Area per foot 0.22 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 11.11 in	#4@ 22.22 in
#5@ 17.22 in	#5@ 34.44 in
#6@ 24.44 in	#6@ 48.89 in

Summary of Overturning & Resisting Forces & Moments

	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure =	328.6	1.44	474.7	Soil Over Heel =	641.8	1.83	1,176.7
Surcharge over Heel =				Sloped Soil Over Hee =			
Surcharge Over Toe =				Surcharge Over Heel =			
Adjacent Footing Load =				Adjacent Footing Load =			
Added Lateral Load =				Axial Dead Load on Stem =			
Load @ Stem Above Soil =				* Axial Live Load on Stem =			
Seismic Earth Load =	92.0	2.17	199.4	Soil Over Toe =			
=				Surcharge Over Toe =			
Total	420.6	**O.T.M.**	674.0	Stem Weight(s) =	253.8	0.75	190.3
=		=		Earth @ Stem Transitions =			
Resisting/Overturning Ratio		=	**2.67**	Footing Weight =	322.3	1.33	429.7
Vertical Loads used for Soil Pressure =		1,217.8 lbs		Key Weight =		1.50	
				Vert. Component =			
				Total =	1,217.8 lbs	**R.M.=**	1,796.8

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios be 1.1 per section 1807.2.3 of IBC 2009 or IBC 201

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

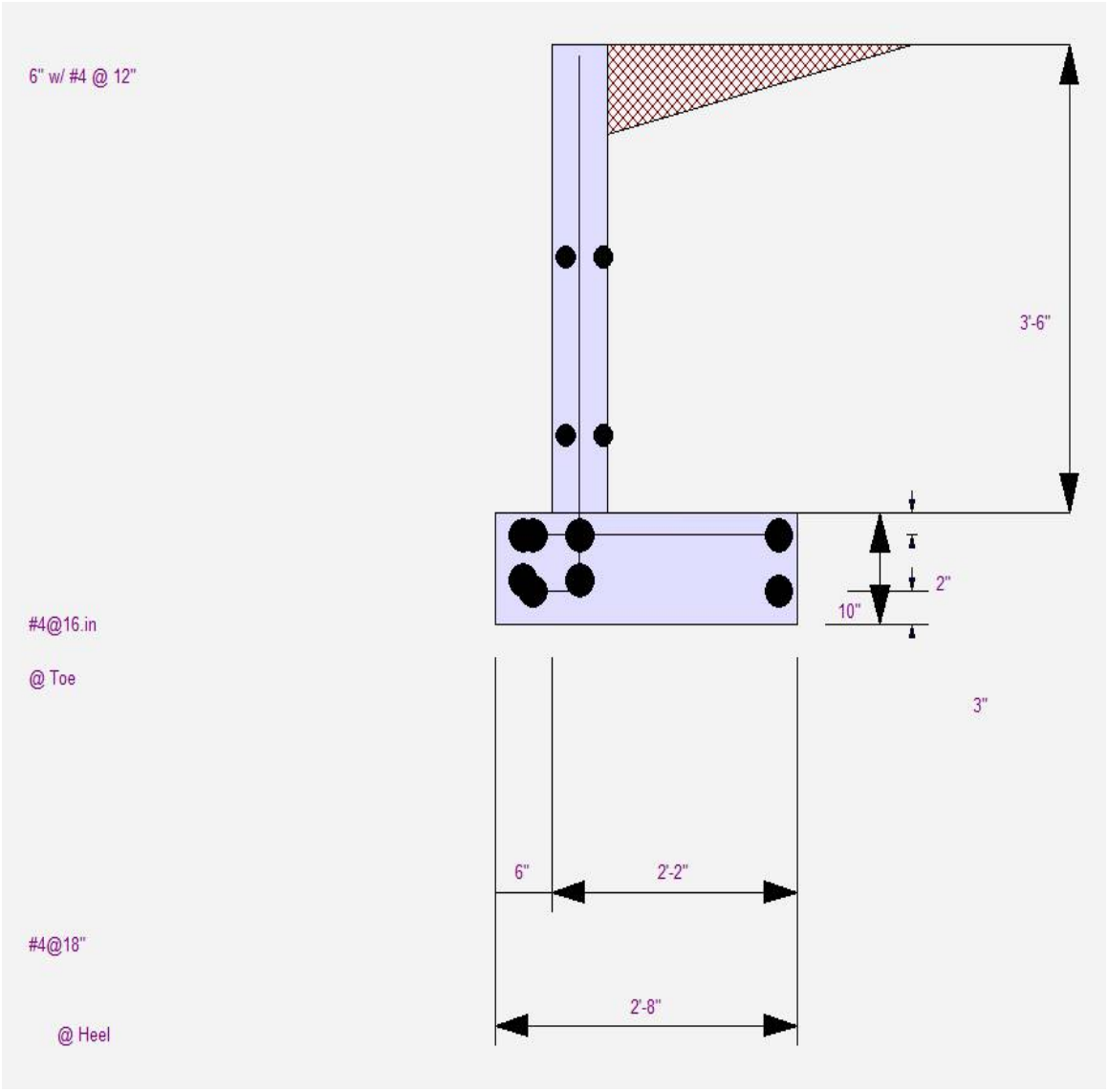
Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.032	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.


6" w/ #4 @ 12"
3'-6"
2"
10"
#4@16.in
@ Toe
3"
6"
2'-2"
#4@18"
2'-8"
@ Heel

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Retaining wall\Site retainin

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Cantilevered Retaining Wall

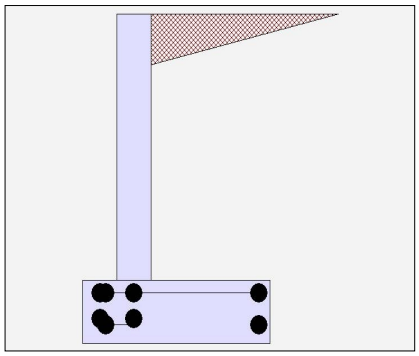
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	3.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	450.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.450
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	4.02	OK
Sliding	=	1.52	OK
Total Bearing Load	=	1,260 lbs	
...resultant ecc.	=	2.82 in	
Soil Pressure @ Toe	=	693 psf	OK
Soil Pressure @ Heel	=	223 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	971 psf	
ACI Factored @ Heel	=	312 psf	
Footing Shear @ Toe	=	0.1 psi	OK
Footing Shear @ Heel	=	1.6 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	328.6 lbs	
less 100% Passive Force	= -	68.8 lbs	
less 100% Friction Force	= -	566.9 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	LRFD	ASD	LRFD
Thickness	=	6.00		
Rebar Size	=	# 4		
Rebar Spacing	=	12.00		
Rebar Placed at	=	Center		
Design Data				
fb/FB + fa/Fa	=	**0.235**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	343.0		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	400.2		
Moment.....Allowable	=	1,705.6		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	9.5		
Shear.....Allowable	psi =	75.0		
Anet (Masonry)	in2 =		139.50	
Rebar Depth 'd'	in =	3.00		
Masonry Data				
f'm	psi =			
Fs	psi =			
Solid Grouting	=			
Modular Ratio 'n'	=			
Wall Weight	psf =	72.5		
Short Term Factor	=			
Equiv. Solid Thick.	=			
Masonry Block Type	=	Medium Weight		
Masonry Design Method	=	ASD		
Concrete Data				
f'c	psi =	2,500.0		
Fy	psi =	40,000.0		

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0497 in2/ft		
(4/3) * As :	0.0663 in2/ft	Min Stem T&S Reinf Area 0.504 in2	
200bd/fy : 200(12)(3)/40000 :	0.18 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1296 in2/ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.2 in2/ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.6096 in2/ft	#6@ 36.67 in	#6@ 73.33 in

Footing Dimensions & Strengths

Toe Width	=	0.50 ft
Heel Width	=	2.25
Total Footing Width	=	2.75
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.50 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 145.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	971	312 psf
Mu' : Upward	=	116	692 ft-#
Mu' : Downward	=	18	929 ft-#
Mu: Design	=	98	238 ft-#
Actual 1-Way Shear	=	0.06	1.56 psi
Allow 1-Way Shear	=	40.00	40.00 psi

Toe Reinforcing = # 4 @ 16.00 in
Heel Reinforcing = # 4 @ 18.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area 0.59 in2
Min footing T&S reinf Area per foot 0.22 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 11.11 in	#4@ 22.22 in
#5@ 17.22 in	#5@ 34.44 in
#6@ 24.44 in	#6@ 48.89 in

Summary of Overturning & Resisting Forces & Moments

	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure =	328.6	1.44	474.7	Soil Over Heel =	673.8	1.88	1,263.3
Surcharge over Heel =				Sloped Soil Over Heel =			
Surcharge Over Toe =				Surcharge Over Heel =			
Adjacent Footing Load =				Adjacent Footing Load =			
Added Lateral Load =				Axial Dead Load on Stem =			
Load @ Stem Above Soil =				* Axial Live Load on Stem =			
=				Soil Over Toe =			
				Surcharge Over Toe =			
Total	328.6	**O.T.M.**	474.7	Stem Weight(s) =	253.8	0.75	190.3
=		=		Earth @ Stem Transitions =			
				Footing Weight =	332.3	1.38	456.9
				Key Weight =		1.50	
				Vert. Component =			
				Total =	1,259.8 lbs	**R.M.=**	1,910.5

Resisting/Overturning Ratio = 4.02
Vertical Loads used for Soil Pressure = 1,259.8 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.025	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Retaining wall\Site retainin

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Cantilevered Retaining Wall

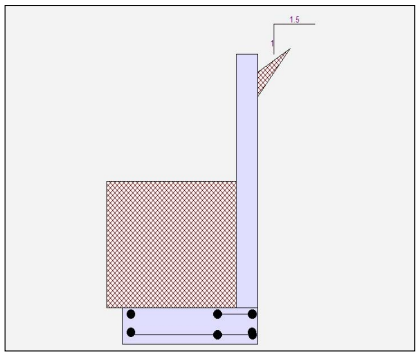
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	6.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	1.50
Height of Soil over Toe	=	42.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	4,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	450.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.450
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform
Multiplier Used = 7.000
(Multiplier used on soil density)

Uniform Seismic Force = 52.500
Total Seismic Force = 393.750

Seismic surcharge

Design Summary

Wall Stability Ratios

Overturning	=	1.10	Ratio < 1.5!
Sliding	=	3.89	OK
Total Bearing Load	=	1,281 lbs	
...resultant ecc.	=	21.65 in	
Soil Pressure @ Toe	=	3,055 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	4,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	4,277 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	3.4 psi	OK
Footing Shear @ Heel	=	1.2 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,260.0 lbs
less 100% Passive Force	= -	4,331.3 lbs
less 100% Friction Force	= -	576.4 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 Stability	=	0.0 lbs OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	LRFD	ASD	LRFD
Thickness	=	8.00		
Rebar Size	=	# 4		
Rebar Spacing	=	7.75		
Rebar Placed at	=	5.75 i		
Design Data				
fb/FB + fa/Fa	=	**0.718**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	1,524.3		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	3,672.2		
Moment.....Allowable	=	5,115.6		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	22.1		
Shear.....Allowable	psi =	75.0		
Anet (Masonry)	in2 =		139.50	
Rebar Depth 'd'	in =	5.75		
Masonry Data				
f'm	psi =			
Fs	psi =			
Solid Grouting	=			
Modular Ratio 'n'	=			
Wall Weight	psf =	96.7		
Short Term Factor	=			
Equiv. Solid Thick.	=			
Masonry Block Type	=	Medium Weight		
Masonry Design Method	=	ASD		
Concrete Data				
f'c	psi =	2,500.0		
Fy	psi =	40,000.0		

Seismic load is included, sliding is permitted to be taken as 1.1

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2254 in2/ft		
(4/3) * As :	0.3005 in2/ft	Min Stem T&S Reinf Area 1.344 in2	
200bd/fy : 200(12)(5.75)/40000 :	0.345 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.3005 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.3097 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.1684 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Dimensions & Strengths

Toe Width	=	3.50 ft
Heel Width	=	0.67
Total Footing Width	=	4.17
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.50 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 145.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	4,277	0 psf
Mu' : Upward	=	5,775	0 ft-#
Mu' : Downward	=	3,896	0 ft-#
Mu: Design	=	1,879	0 ft-#
Actual 1-Way Shear	=	3.44	1.24 psi
Allow 1-Way Shear	=	40.00	40.00 psi

Toe Reinforcing = # 4 @ 16.00 in
Heel Reinforcing = # 4 @ 18.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area 1.08 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Summary of Overturning & Resisting Forces & Moments

	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure =	984.4	2.50	2,460.9	Soil Over Heel =		4.17	
Surcharge over Heel =				Sloped Soil Over Heel =		4.17	
Surcharge Over Toe =				Surcharge Over Heel =			
Adjacent Footing Load =				Adjacent Footing Load =			
Added Lateral Load =				Axial Dead Load on Stem =			
Load @ Stem Above Soil =				* Axial Live Load on Stem =			
Seismic Earth Load =	275.6	3.75	1,033.6	Soil Over Toe =		1.75	
=				Surcharge Over Toe =			
Total	1,260.0	**O.T.M.**	3,494.5	Stem Weight(s) =	676.7	3.83	2,593.9
=		=		Earth @ Stem Transitions =			
				Footing Weight =	604.2	2.08	1,258.7
				Key Weight =		1.50	
				Vert. Component =			
				Total =	1,280.8 lbs	**R.M.=**	3,852.6

Resisting/Overturning Ratio = 1.10
Vertical Loads used for Soil Pressure = 1,280.8 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios be 1.1 per section 1807.2.3 of IBC 2009 or IBC 201

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

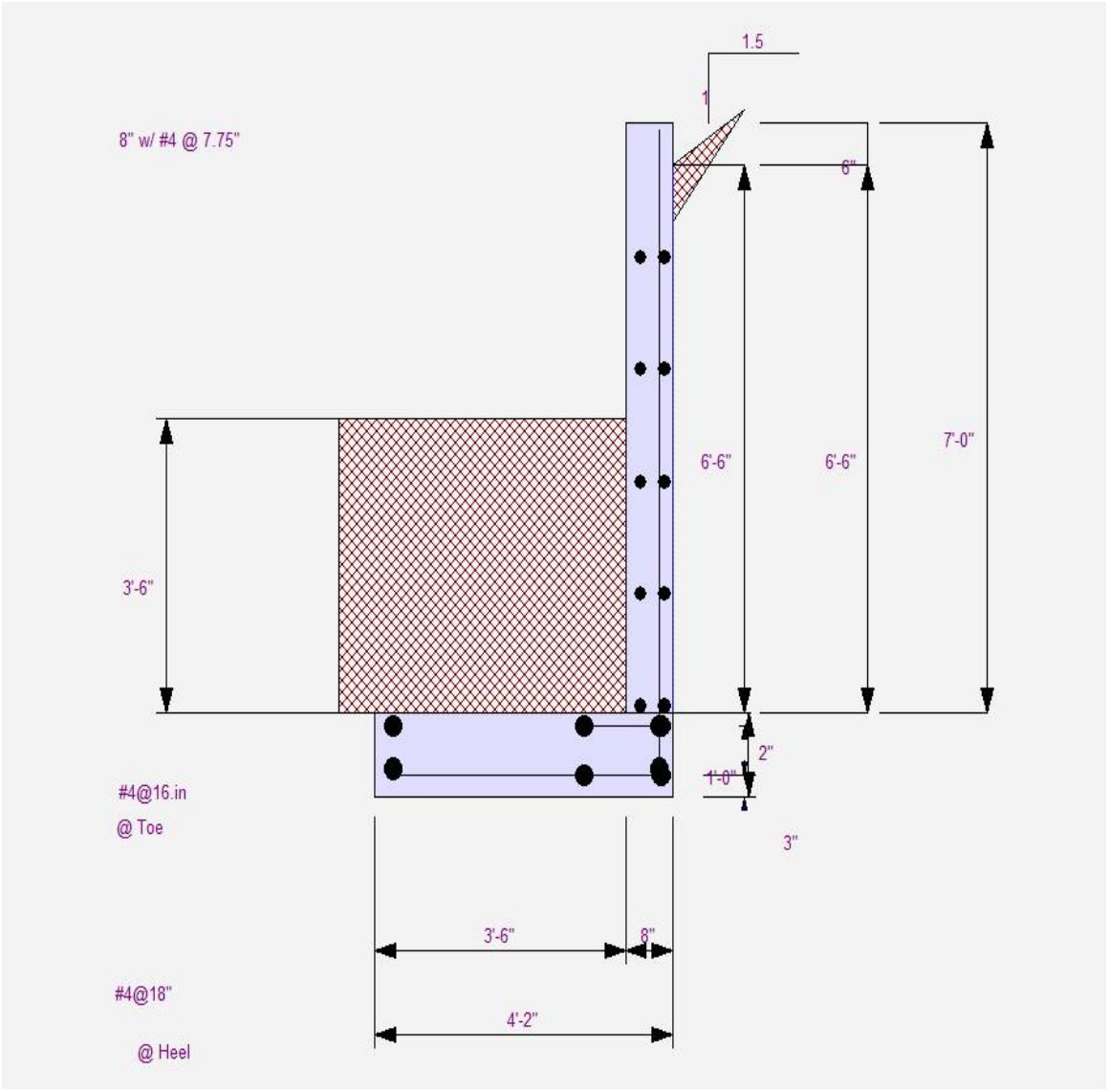
Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.143	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.


1.5
1
8" w/ #4 @ 7.75"
6"
7'-0"
6'-6"
6'-6"
3'-6"
2"
1'-0"
#4@16.in
@ Toe
3"
3'-6"
8"
#4@18"
4'-2"
@ Heel

This Wall in File: M:\Stuart Silk\18689 - Lundin Residence\Calculations\Retaining wall\Site retainin

RetainPro (c) 1987-2017, Build 11.17.07.27
License : KW-06057394
License To : QUANTUM CONSULTING ENGINEERS

Cantilevered Retaining Wall

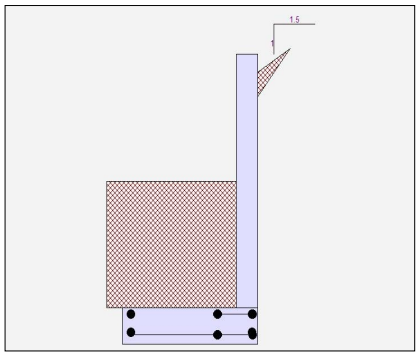
Code: IBC 2015,ACI 318-14,ACI 530-13

Criteria

Retained Height	=	6.50 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	1.50
Height of Soil over Toe	=	42.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	450.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.450
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Design Summary

Wall Stability Ratios

Overturning	=	1.57	OK
Sliding	=	4.99	OK
Total Bearing Load	=	1,281 lbs	
...resultant ecc.	=	11.96 in	
Soil Pressure @ Toe	=	786 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,100 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	3.7 psi	OK
Footing Shear @ Heel	=	1.2 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	984.4 lbs	
less 100% Passive Force	= -	4,331.3 lbs	
less 100% Friction Force	= -	576.4 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	IBC 2015,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

		Bottom	
		Stem OK	
Design Height Above Ftg	ft =	0.00	
Wall Material Above "Ht"	=	Concrete	
Design Method	=	LRFD	ASD LRFD
Thickness	=	8.00	
Rebar Size	=	# 4	
Rebar Spacing	=	8.00	
Rebar Placed at	=	5.75 i	
Design Data			
fb/FB + fa/Fa	=	**0.516**	
Total Force @ Section			
Service Level	lbs =		
Strength Level	lbs =	1,183.0	
Moment....Actual			
Service Level	ft-# =		
Strength Level	ft-# =	2,563.2	
Moment.....Allowable	=	4,962.6	
Shear.....Actual			
Service Level	psi =		
Strength Level	psi =	17.1	
Shear.....Allowable	psi =	75.0	
Anet (Masonry)	in2 =		139.50
Rebar Depth 'd'	in =	5.75	
Masonry Data			
f'm	psi =		
Fs	psi =		
Solid Grouting	=		
Modular Ratio 'n'	=		
Wall Weight	psf =	96.7	
Short Term Factor	=		
Equiv. Solid Thick.	=		
Masonry Block Type	=	Medium Weight	
Masonry Design Method	=	ASD	
Concrete Data			
f'c	psi =	2,500.0	
Fy	psi =	40,000.0	

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1573 in2/ft		
(4/3) * As :	0.2097 in2/ft	Min Stem T&S Reinf Area 1.344 in2	
200bd/fy : 200(12)(5.75)/40000 :	0.345 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.2097 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.3 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.1684 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Dimensions & Strengths

Toe Width	=	3.50 ft
Heel Width	=	0.67
Total Footing Width	=	4.17
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.50 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 145.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,100	0 psf
Mu' : Upward	=	4,328	0 ft-#
Mu' : Downward	=	3,896	0 ft-#
Mu: Design	=	432	0 ft-#
Actual 1-Way Shear	=	3.74	1.24 psi
Allow 1-Way Shear	=	40.00	40.00 psi

Toe Reinforcing = # 4 @ 16.00 in
Heel Reinforcing = # 4 @ 18.00 in
Key Reinforcing = None Spec'd

Other Acceptable Sizes & Spacings

Toe: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Heel: Not req'd: Mu < phi*5*lambda*sqrt(f'c)*Sm
Key: No key defined

Min footing T&S reinf Area 1.08 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Summary of Overturning & Resisting Forces & Moments

	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure =	984.4	2.50	2,460.9	Soil Over Heel =		4.17	
Surcharge over Heel =				Sloped Soil Over Heel =		4.17	
Surcharge Over Toe =				Surcharge Over Heel =			
Adjacent Footing Load =				Adjacent Footing Load =			
Added Lateral Load =				Axial Dead Load on Stem =			
Load @ Stem Above Soil =				* Axial Live Load on Stem =			
=				Soil Over Toe =		1.75	
				Surcharge Over Toe =			
Total	984.4	**O.T.M.**	2,460.9	Stem Weight(s) =	676.7	3.83	2,593.9
=		=		Earth @ Stem Transitions =			
				Footing Weight =	604.2	2.08	1,258.7
				Key Weight =		1.50	
				Vert. Component =			
				Total =	1,280.8 lbs	**R.M.=**	3,852.6

Resisting/Overturning Ratio = 1.57
Vertical Loads used for Soil Pressure = 1,280.8 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.037	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.