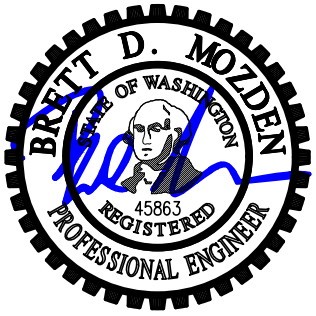
Structural Calculations For:

Stewart Remodel

4600 Forest Ave SE

Mercer Island, WA. 98040



Prepared for: Brandt Design Group

Job #: 01519-2021-08

Date: November 29, 2021

Criteria Sheet

Codes

Structural	IBC 2018
Loading	ASCE 7-16
Wood:	NDS 2018
Steel:	AISC 360-16
Concrete:	ACI 318-14
Masonry:	TMS 402/602-16

Project Location

Street & Number	4600 Forest Ave SE
City:	Mercer Island State: WA
ZIP:	98040
Latitude:	47.5640 N
Longitude:	-122.2302 W
Ground Elevation	122 ft

Occupancy Category

Risk Category: II ASCE 7 Table 1.5-1

Seismic Load Summary:

Analysis Procedure:	Equivalent Lateral Force Procedure		
Lateral System:	Light-frame (wood) Walls Sheathed with Wood Structural Panels Rated for Shear Resistance		
R:	6.50	C_d=	4
Base Shear V =	30 kips	Ω_o=	2.5
S_S=	1.436	S_1=	0.499
S_{DS}=	1.15	S_{D1}=	0.60
C_s=	0.177	I_E=	1.0

Story Information

# Stories Above Grade (Including Mezzanine Levels)	3

Horizontal and Vertical Irregularities:

Is the building a "Regular Structure"? (No horizontal or vertical irregularities)	No

Wind Load Summary:

V=	98	K_{ZT}=	1.00
Exposure =	D		

Dead Loads:

Roof			Floor		
Roofing	2.5	psf	Finish Floor	1	psf
1/2" Sheathing	1.8	psf	3/4" Sheathing	2.7	psf
Trusses @ 24" oc	2.5	psf	Joists @ 16" oc	2.2	psf
Misc./Mech.	1.5	psf	Misc./Mech.	2	psf
Ceiling Finish	2.8	psf	Ceiling Finish	2.8	
Solar Panels	4			10.7	psf
	15	psf	Use	12	psf
Use	15	psf			

Roof Deck		
Roofing	2.5	psf
1/2" Sheathing	1.8	psf
Purlins	1.37	psf
Misc./Mech.	1.5	psf
2x t&g	4.37	psf
Solar Panels	4	
	15.5	psf
Use	20	psf

Live Loads:

Snow	25	psf	Deck	60	psf
Floor	40	psf			

Soils:

Soils Report Provided? Yes

pin piles

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Seismic Design

ASCE 7-16 Seismic Analysis Equivalent Lateral Force Procedure

Seismic Force Resisting System Per Table 12.2-1		
	System	Bearing Wall Systems
	Type:	Light-frame (wood) Walls Sheathed with Wood Structural Panels Rated for Shear Resistance

Seismic Design Cat.	D
Risk Category	II
Site Class	D (Default)
Diaphragm Flexibility	Flexible

I, II, or III, or IV per Table 1.5-1
Assumed default soil properties, per 11.4.3.

Section 12.8.1.3 Exceptions

Regular Structure	No
≤ 5 Stories above grade	Yes
T ≤ 0.5s	Yes
ρ = 1.0	No
Not Site Class E or F	Yes
Risk Category I or II	Yes

If all exceptions are met, S_{DS} may be taken as 1, but not less than 0.7*(Calculated S_{DS})

S_S	1.436 g	2% in 50 yr, Latitude & Longitude lookup
S_1	0.499 g	2% in 50 yr, Latitude & Longitude lookup
R	6.50	
C_d	4.0	
Ω_o	2.5	
I_e	1.00	Table 1.5-2
h_n	30.3 ft	
Ct	0.02	Table 12.8-2
x	0.75	Table 12.8-2
T_a	0.26 sec	
T	0.26 sec	Eq. 12.8-7
T_0	0.10 sec	
T_S	0.52 sec	
T_L	6.00 sec	
F_a	1.20	Table 11.4-1
F_v	1.80	Table 11.4-2
S_{MS}	1.72 g	Eq. 11.4-1
S_{M1}	0.90 g	Eq. 11.4-2
S_{DS}	1.149 g	Eq. 11.4-3
S_{D1}	0.599 g	Eq. 11.4-4
C_s	***0.177 Controls***	Eq. 12.8-2
	0.357	Eq. 12.8-3 need not exceed, $I < I_L$
	0.010	Eq. 12.8-5 or 12.8-6 minimum
C_s, design	0.177	
Bldg. Weight	170.1 k	
$V = C_S W$	30.1 k	Eq. 12.8-1, Strength Level Base Shear
$V = C_{Sasd} W$	21.0 k	Eq. 12.8-1 ASD Base Shear

Building Period Per Alternate Analysis

T (sec)	

Per Geotech Report

F_a	
F_v	

$$T_a = C_t h_n^x \quad \text{Eq. 12.8.7}$$

$$S_{MS} = F_a S_S \quad \text{Eq. 11.4-1}$$
$$S_{M1} = F_v S_1 \quad \text{Eq. 11.4-2}$$
$$S_{DS} = {}^2/_3\, S_{MS} \quad \text{Eq. 11.4-3}$$
$$S_{D1} = {}^2/_3\, S_{M1} \quad \text{Eq. 11.4-4}$$

$$C_S = \frac{S_{DS}}{(R/I_e)} \quad \text{Eq. 12.8-2}$$
$$C_S = \frac{S_{D1}}{T(R/I_e)} \quad \text{Eq. 12.8-3}$$
$$C_S = \frac{S_{D1} T_L}{T^2(R/I_e)} \quad \text{Eq. 12.8-4}$$
$$C_S \geq 0.044 S_{DS} I_e \quad \text{Eq. 12.8-5}$$
$$C_S \geq 0.01 \quad \text{Eq. 12.8-5}$$
$$C_S \geq 0.5 \frac{S_1}{(R/I_e)} \quad \text{Eq. 12.8-6}$$

$$C_{VX} = w_x h_x^k / \sum_{i=1}^{n} w_x h_i^k \quad \text{Eq. 12.8-12}$$

$$F_{px} = {}^{\sum_{i=x}^{n} F_i}/_{\sum_{i=x}^{n} w_i}\, w_{px} \quad \text{Eq. 12.10-1}$$
$$F_{px} \geq 0.2 S_{DS} I_e w_{px} \quad \text{Eq. 12.10-2}$$
$$F_{px} \leq 0.4 S_{DS} I_e w_{px} \quad \text{Eq. 12.10-3}$$

Vertical Distribution ASD ρ= 1.3 k= 1.000

Level	h_x (ft)	W_x (k)	h_x^k (ft)	$W_x h_x^k$	Story Shear ASD C_{vx} (%)	Story Shear ASD F_x (k)	Story Shear ASD SV (k)	Diaphragm Force (ρ not included) $F_{px,calc}$	$F_{px,min}$	$F_{px,max}$	$F_{px,design}$	$\gamma = F_{px}/F_x$
Roof	30.3	44.64	30.3	1350	0.437	12.0	**12.0**	9.2	7.2	14.4	**9.2**	0.77
Upper	18.5	60.774	18.5	1124	0.364	10.0	**21.9**	9.7	9.8	19.5	**9.8**	0.98
Main	9.5	65	9.5	614	0.199	5.4	**27.4**	8.0	10.4	20.8	**10.4**	1.91
Σ		170.1		3089		**27.4**						

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Wind Design - MWFRS

ASCE 7 Chapter 27 - Directional Procedure

Design Method	ASD

Wind Coefficients

Exposure	D	
V=	98	mph
K_d=	0.85	Table 26.6-1
K_h=	1.16	Table 26.10-1
K_e=	1.00	Table 26.9-1
G=	0.85	26.9.4

Location and Building Dimensions

Calculate Kzt?	Yes	
Kzt	1.00	
Roof Type	Hip	
Roof Angle - Transverse Dir	36	degrees
Roof Angle - Long Dir	36	degrees
Ground to top of roof	34	ft
Bot of roof to top of roof	7.5	ft
Mean Roof Height, h	30.25	ft
Short Plan Dimension	56.5	ft
Long Plan Dimension	78.5	ft
Parapet ?	No	
Ground to top of parapet		ft
Average Parapet Height		ft
Ht of 2nd Level Above Grade	0	ft

Velocity Pressure at Mean Roof Height, q_h =	24.2	psf

Transverse Wind Pressures

L/B = 0.72 h/L = 0.54

Pressure Coefficients from Figure 27.3-1:

Bldg Face	C_p
Windward Wall	0.8
Leeward Wall	-0.50
Windward Roof	-0.18 / 0.3
Leeward Roof	-0.60

Wall Pressures (Unfactored): ASD

Ht	K_z	q_z	$P_{ww\ walls}$	$P_{lwwalls}$	P_{walls} (psf)
0-15	1.03	21.43	14.57	10.29	**14.9**
15-20	1.08	22.47	15.28	10.29	**15.3**
20-25	1.12	23.30	15.85	10.29	**15.7**
25-30	1.16	24.13	16.41	10.29	**16.0**
30-40	1.22	25.38	17.26	10.29	**16.5**
41-50	1.27	26.42	17.97	10.29	**17.0**
51-60	1.31	27.26	18.53	10.29	**17.3**
61-70	1.34	27.88	18.96	10.29	**17.6**
71-80	1.38	28.71	19.52	10.29	**17.9**
81-90	1.4	29.13	19.81	10.29	**18.1**
91-100	1.43	29.75	20.23	10.29	**18.3**

15.7

Roof Pressures (Unfactored) ASD

Windward		Leeward	Horiz Proj (psf)
Max	Min		
6.2	-3.7	-12.4	**6.55**

Longitudinal Wind Pressures

L/B = 1.39 h/L = 0.39

Pressure Coefficients from Figure 27.4-1:

Bldg Face	C_p
Windward Wall	0.8
Leeward Wall	-0.42
Windward Roof	-0.1 / 0.35
Leeward Roof	-0.60

Wall Pressures (Unfactored): ASD

Ht	K_z	q_z	$P_{ww\ walls}$	$P_{lwwalls}$	P_{walls} (psf)
0-15	1.03	21.43	14.57	8.69	**13.96**
15-20	1.08	22.47	15.28	8.69	**14.38**
20-25	1.12	23.30	15.85	8.69	**14.72**
25-30	1.16	24.13	16.41	8.69	**15.06**
30-40	1.22	25.38	17.26	8.69	**15.57**
41-50	1.27	26.42	17.97	8.69	**15.99**
51-60	1.31	27.26	18.53	8.69	**16.33**
61-70	1.34	27.88	18.96	8.69	**16.59**
71-80	1.38	28.71	19.52	8.69	**16.93**
81-90	1.4	29.13	19.81	8.69	**17.10**
91-100	1.43	29.75	20.23	8.69	**17.35**

Roof Pressures (Unfactored) ASD

Windward		Leeward	Horiz Proj (psf)
Max	Min		
7.2	-2.0	-12.4	**6.91**

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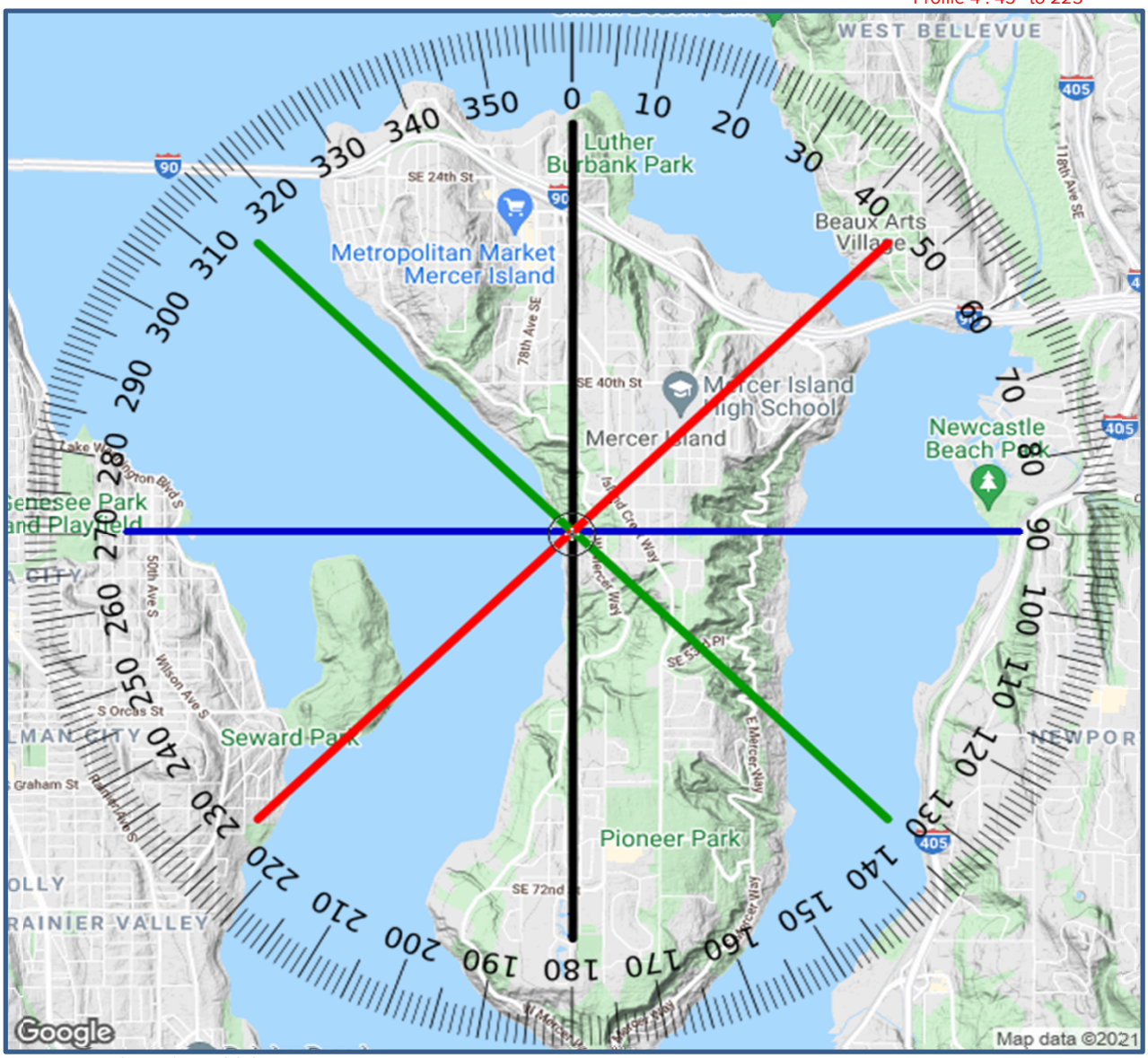
Site Address

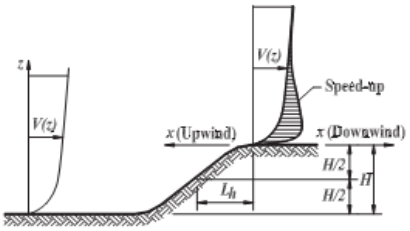
Address	4600 Forest Ave SE		Wind Radius	2.00	Miles
City:	Mercer Islanc State:	WA	Angle	0	°
Lat Long	47.564024 -122.2302		Exposure	D	

Profile 1 : 0 ° to 180 °
Profile 2 : 270 ° to 90 °
Profile 3 : 315 ° to 135 °
Profile 4 : 45 ° to 225 °

SITE MAP



Topography from Figure 26.8-1



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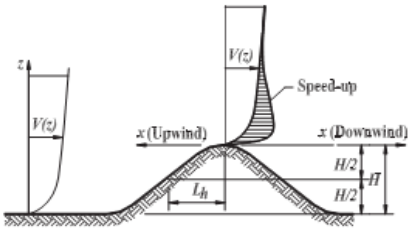
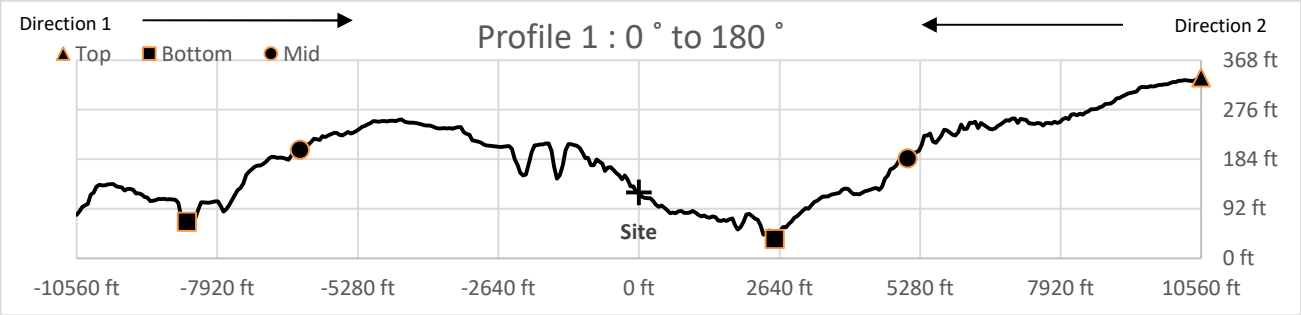
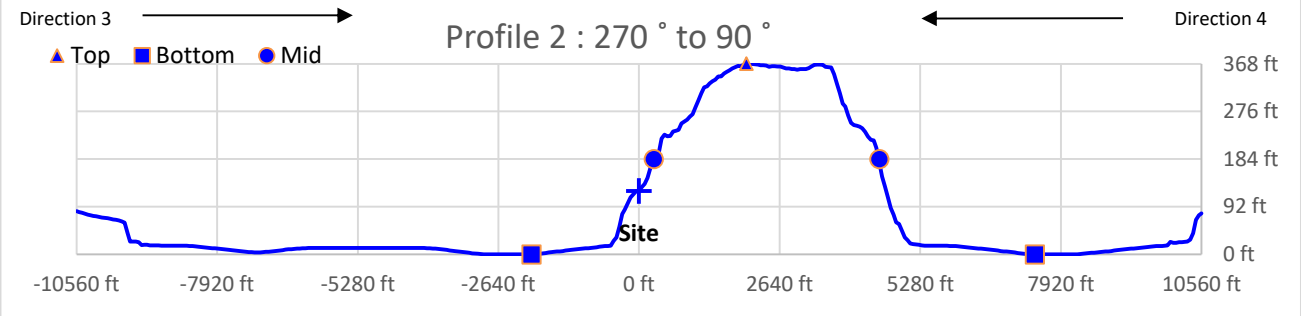


2-D RIDGE OR 3-D AXISYMMETRICAL HILL

$$K_{zt} = (1 + K_1 K_2 K_3)^2$$
$$K_1 = \text{Per Figure}$$
$$K_2 = (1 - |x|/\mu L_h)$$
$$K_3 = e^{-\gamma z / L_h}$$
$$K_{zt} = 1, \text{ If } H/Lh \le 0.2$$

PER FIGURE 26.8-1





Direction 1 - 0 ˚to Site

Site Conditions (26.8.1)

1. Unubstructed	Yes	
2. Isolated	No	Kzt=1

	Ridge

Direction 2 - Site to 180 ˚

Site Conditions (26.8.1)

1. Unubstructed	Yes	
2. Isolated	No	Kzt=1

	Ridge

Direction 3 - 270 ˚to Site

Site Conditions (26.8.1)

1. Unubstructed	Yes	
2. Isolated	Yes	
3. Upper Half Hill	No	Kzt=1
4. H/Lh ≥ 0.2	Yes	
5. H≥ 15'	Yes	

Terrain Data

Terrain	Hill
Top of Hill Dist.	2016
Bott. of Hill Dist.	-2016
L @ H/2	275
Site	upwind
Top of Hill Elev.	368
Bott. of Hill Elev.	0
Site Elev.	122.3
Site Dist.	0
H/2	184

Kzt Calculations

H=	368
Lh=	1741
x=	2016
z=	30.25
μ=	1.5
γ=	4
K1 value =	1.15
K1=	0.24
K2=	0.23
k3=	0.93
H/Lh =	0.21
Kzt =	1.00

Direction 4 - Site to 90 ˚

Site Conditions (26.8.1)

1. Unubstructed	Yes	
2. Isolated	Yes	
3. Upper Half Hill	No	Kzt=1
4. H/Lh ≥ 0.2	No	Kzt=1
5. H≥ 15'	Yes	

Terrain Data

Terrain	Ridge
Top of Hill Dist.	2016
Bott. of Hill Dist.	7429
L @ H/2	4511
Site	downwnd
Top of Hill Elev.	368
Bott. of Hill Elev.	0
Site Elev.	122.3
Site Dist.	0
H/2	184

Kzt Calculations

H=	368
Lh=	2495
x=	2016
z=	30.25
μ=	1.5
γ=	3
K1 value =	1.55
K1=	0.23
K2=	0.46
k3=	0.96
H/Lh =	0.15
Kzt =	1.00

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Stewart Residence

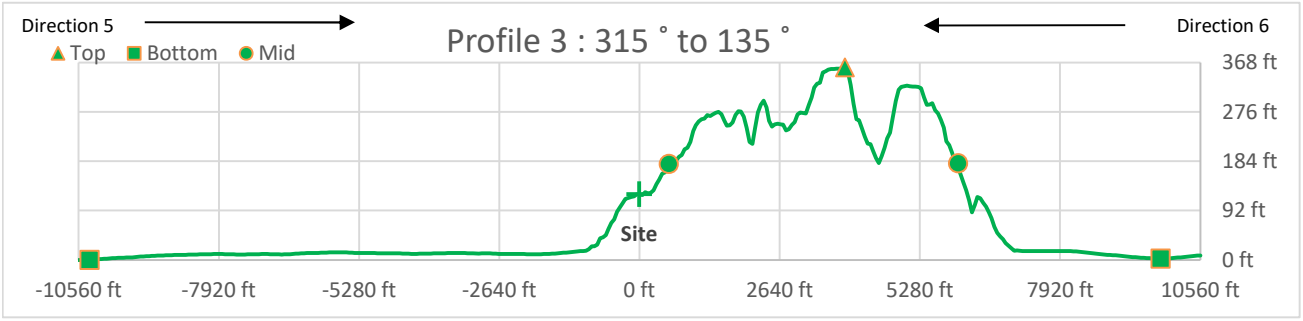
Kzt Calculations

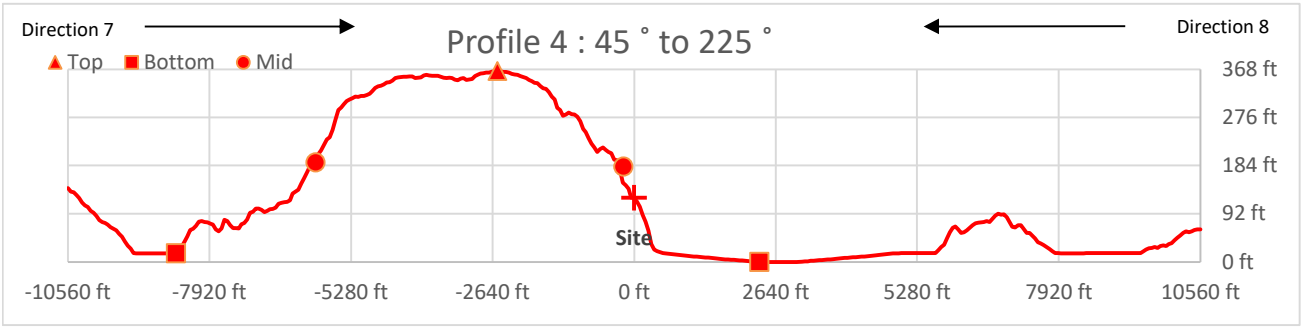
DATE 11/29/2021

PROJ. #

DESIGN JWJ

SHEET 5





Direction 5 - 315 ˚to Site

Site Conditions (26.8.1)

1. Unubstructed	Yes	
2. Isolated	Yes	
3. Upper Half Hill	No	Kzt=1
4. H/Lh ≥ 0.2	No	Kzt=1
5. H≥ 15'	Yes	

Terrain Data

Terrain	Ridge
Top of Hill Dist.	3874
Bott. of Hill Dist.	-10348
L @ H/2	550
Site	upwind
Top of Hill Elev.	359
Bott. of Hill Elev.	0
Site Elev.	122.3
Site Dist.	0
H/2	179

Kzt Calculations

H=	359
Lh=	3324
x=	3874
z=	30.25
μ=	1.5
γ=	3
K1 value =	1.55
K1=	0.17
K2=	0.22
k3=	0.97
H/Lh =	0.11
Kzt =	1.00

Direction 6 - Site to 135 ˚

Site Conditions (26.8.1)

1. Unubstructed	Yes	
2. Isolated		
3. Upper Half Hill	No	Kzt=1
4. H/Lh ≥ 0.2	No	Kzt=1
5. H≥ 15'	Yes	

Terrain Data

Terrain	Ridge
Top of Hill Dist.	3874
Bott. of Hill Dist.	9817
L @ H/2	6000
Site	downwnd
Top of Hill Elev.	359
Bott. of Hill Elev.	2
Site Elev.	122.3
Site Dist.	0
H/2	181

Kzt Calculations

H=	357
Lh=	2126
x=	3874
z=	30.25
μ=	1.5
γ=	3
K1 value =	1.55
K1=	0.26
K2=	0.00
k3=	0.96
H/Lh =	0.17
Kzt =	1.00

Direction 7 - 45 ˚to Site

Site Conditions (26.8.1)

1. Unubstructed	Yes	
2. Isolated	Yes	
3. Upper Half Hill	No	Kzt=1
4. H/Lh ≥ 0.2	No	Kzt=1
5. H≥ 15'	Yes	

Terrain Data

Terrain	Ridge
Top of Hill Dist.	-2547
Bott. of Hill Dist.	-8544
L @ H/2	-5943
Site	downwnd
Top of Hill Elev.	364
Bott. of Hill Elev.	16
Site Elev.	122.3
Site Dist.	0
H/2	190

Kzt Calculations

H=	348
Lh=	3396
x=	2547
z=	30.25
μ=	1.5
γ=	3
K1 value =	1.55
K1=	0.16
K2=	0.50
k3=	0.97
H/Lh =	0.10
Kzt =	1.00

Direction 8 - Site to 225 ˚

Site Conditions (26.8.1)

1. Unubstructed	Yes	
2. Isolated	Yes	
3. Upper Half Hill	No	Kzt=1
4. H/Lh ≥ 0.2	No	Kzt=1
5. H≥ 15'	Yes	

Terrain Data

Terrain	Ridge
Top of Hill Dist.	-2547
Bott. of Hill Dist.	2335
L @ H/2	-200
Site	upwind
Top of Hill Elev.	364
Bott. of Hill Elev.	0
Site Elev.	122.3
Site Dist.	0
H/2	182

Kzt Calculations

H=	364
Lh=	2347
x=	2547
z=	30.25
μ=	1.5
γ=	3
K1 value =	1.55
K1=	0.24
K2=	0.28
k3=	0.96
H/Lh =	0.16
Kzt =	1.00

Wind Base Shear Calc

Project: Stewart Residence

East/West Direction

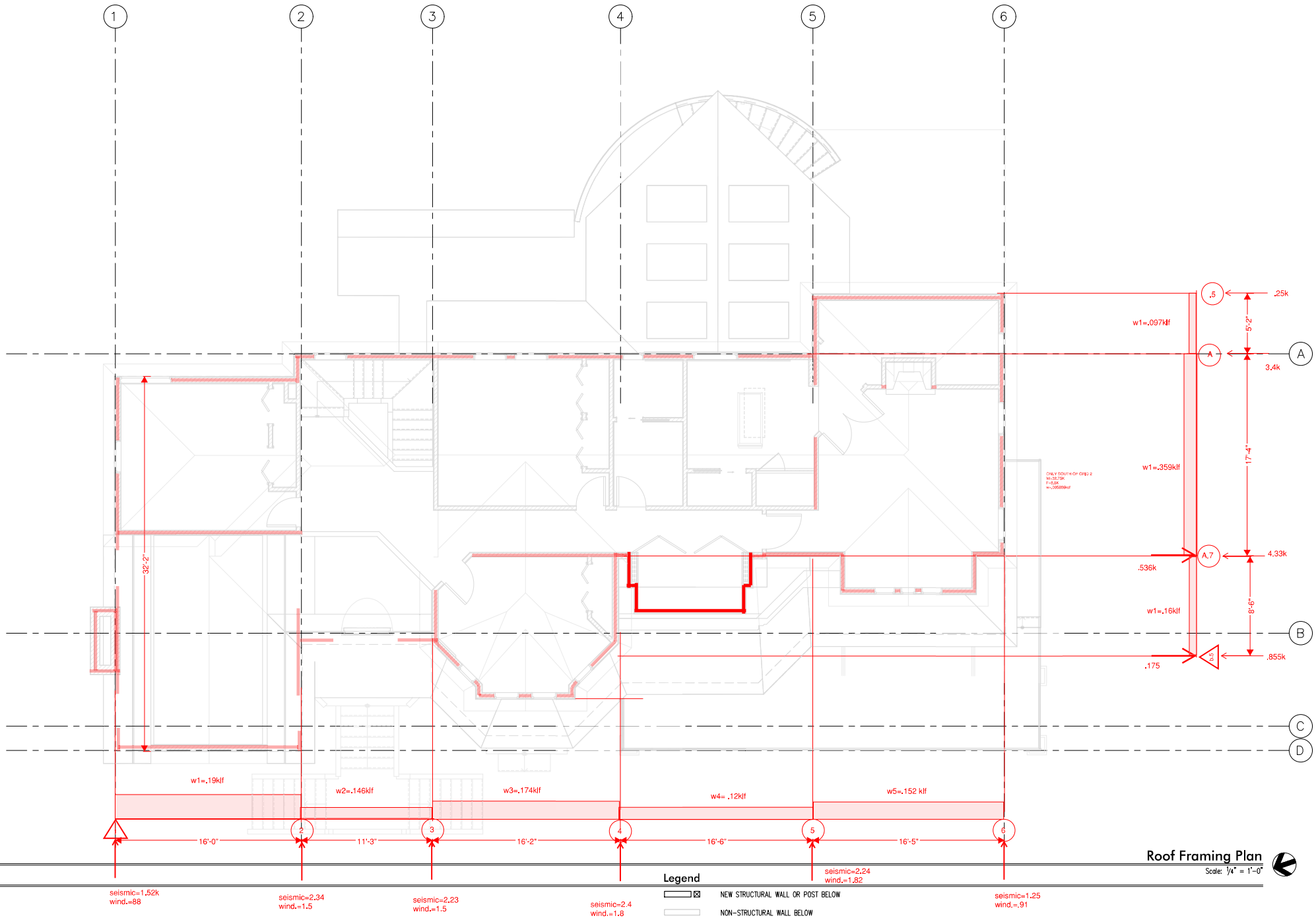
Level	Load (psf)	Height (ft)/ or Area (ft2)	Length (ft)	Force (k)	Total Force at Level (k)	Controlling Force
main	9.6	6	61.5	3.54	10.37	Wind Controls
(ww only below m	14.9	6	17	1.52		
	14.9	3	78.5	3.51		
	15.3	1.5	78.5	1.80		
Upper	15.3	3.5	78.5	4.20	10.37	Wind Controls
	15.7	5	78.5	6.16		
				0.00		
				0.00		
Roof	16	4	78.5	5.02	8.40	Seismic Controls
	6.55	516	1	3.38		
				0.00		
				0.00		

Total Base Shear **29.14** Wind controls

North/south Direction

Level	Load (psf)	Height (ft)/ or Area (ft2)	Length (ft)	Force (k)	Total Force at Level (k)	Controlling Force
House	15.7	1336	1	20.98	20.98	Seismic Controls
				0.00		
				0.00		
				0.00		
				0.00	0.00	
				0.00		
				0.00		
				0.00		
				0.00	0.00	
				0.00		
				0.00		
				0.00		

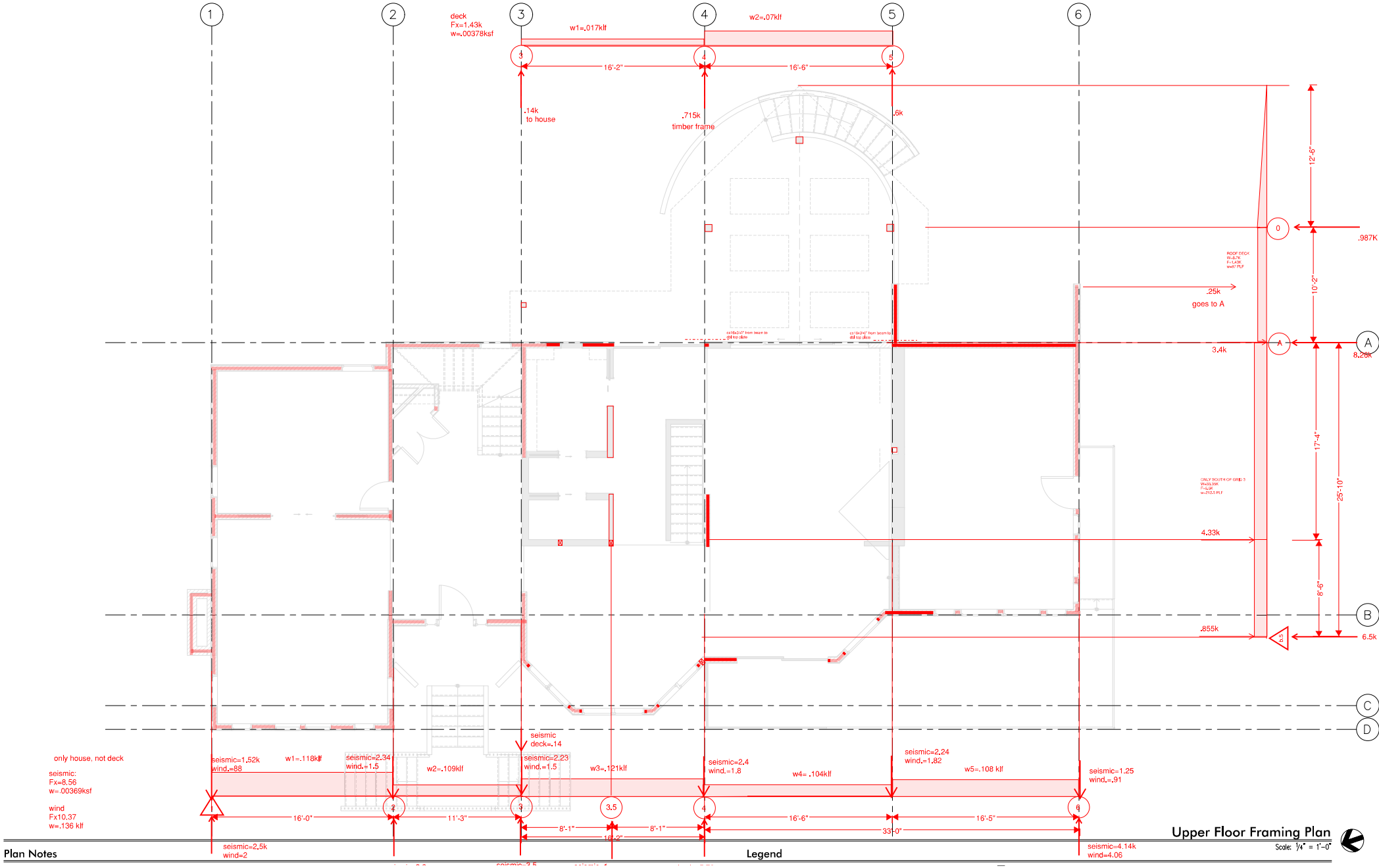
Total Base Shear **20.98** Seismic Controls

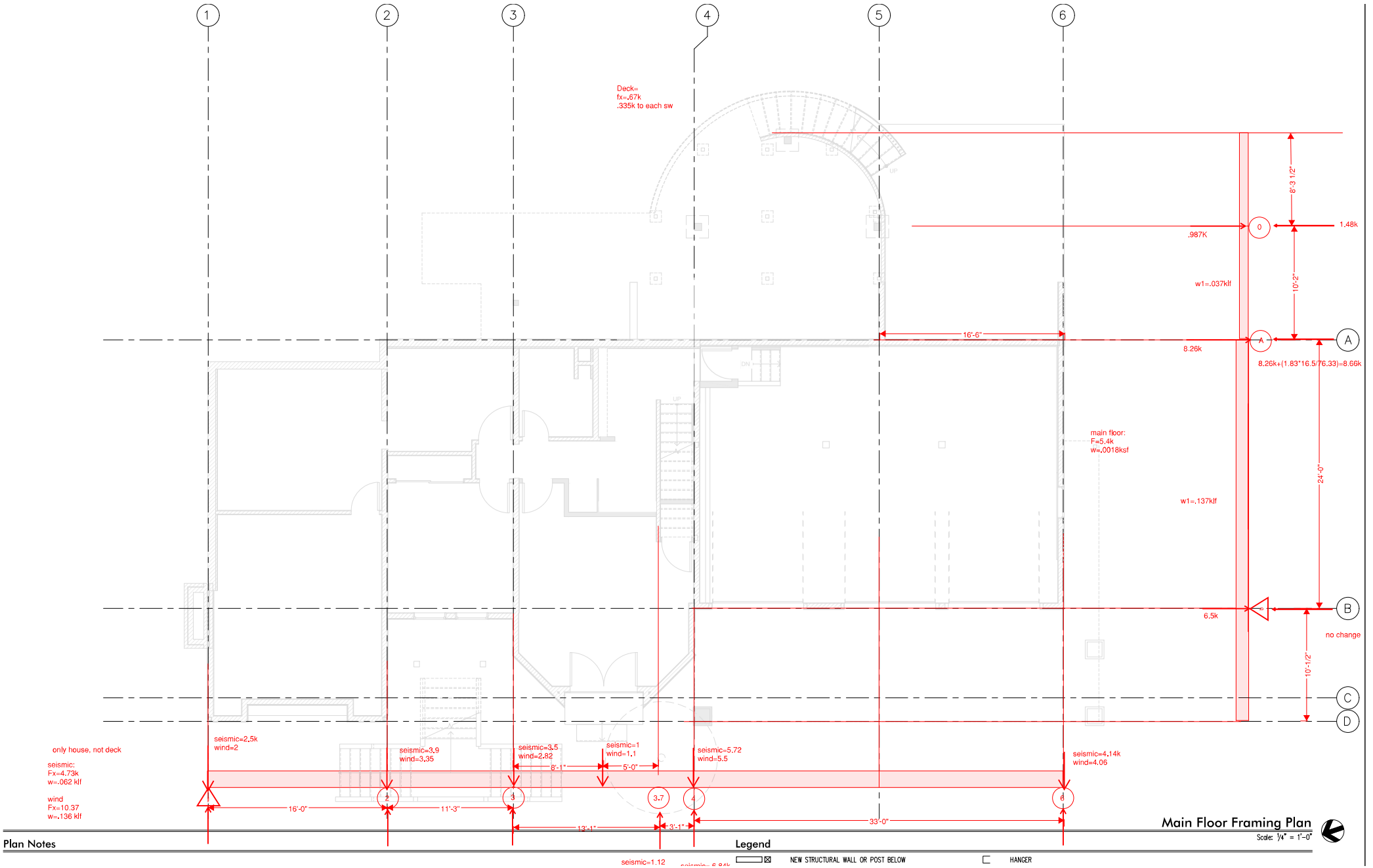


Notes

Roof Framing Plan

Scale: 1/4" = 1'-0"


1
2
3
4
5
6
A
B
C
D
deck
Fx=1.43k
w=.00378ksf
w1=.017klf
w2=.07klf
16'-2"
16'-6"
.14k
to house
.715k
timber frame
.6k
.987K
.25k
goes to A
3.4k
8.26k
4.33k
.855k
6.5k
12'-6"
10'-2"
17'-4"
25'-10"
8'-6"
only house, not deck
seismic:
Fx=8.56
w=.00369ksf
wind
Fx10.37
w=.136 klf
seismic=1.52k
wind.=88
w1=.118klf
seismic=2.34
wind.=1.5
w2=.109klf
seismic
deck=.14
seismic=2.23
wind.=1.5
w3=.121klf
seismic=2.4
wind.=1.8
w4=.104klf
seismic=2.24
wind.=1.82
w5=.108 klf
seismic=1.25
wind.=.91
16'-0"
11'-3"
8'-1"
8'-1"
16'-2"
16'-6"
16'-5"
33'-0"
seismic=2.5k
wind=2
seismic=4.14k
wind=4.06
Upper Floor Framing Plan
Scale: 1/4" = 1'-0"
Plan Notes
Legend



Main Floor Framing Plan

Scale: 1/4" = 1'-0"

Plan Notes

Legend

NEW STRUCTURAL WALL OR POST BELOW

HANGER

North South Shear Wall Design

Project: Stewart Residence

Controlling Force= Seismic

Sds= 1.149

Upper Floor

Grid:	0	A	B.5	
Load (k)	**0.99**	**8.26**	**6.50**	
Height (ft)		8.00	8.00	
Shortest Length (ft)		16.5	3	
Total Length (ft)		16.5	7.43	
h/b ratio		0.48	2.67	
Shear (plf)		500.6	874.8	
Shear increase due to ratio (plf)	Timber	500.6	1166.4	
Wall	Frame	**W2**	**2W2**	
OT (lb)		4005	6999	
Dead load (PLF)		96	96	
OT-(.6-.14sds)DL (lb)		**3657**	**6935**	
HD		hdu4	(2)hdu4, cmst12	

Main Floor

Grid:	0	A	B.5	
Load this level (k)	0.49	0.39		
Load Total (k)	1.48	**8.66**		
Load total (k) R=1.5	**6.41**	**n/a**		
Height (ft)	3.00	2.00		
Shortest Length (ft)	5.33	16.5		
Total Length (ft)	10.67	16.5		
h/b ratio	0.56	0.12	No	
Shear (plf)	601.1	524.8	change to	
Shear increase due to ratio (plf)	601.1	524.8	existing	
Wall	**2W3**	**W2**	framing	
OT (lb)	1803	1050		
OT Total (lb)	1803	5055		
Dead load (PLF)	30	28		
OT-(.6-.14sds)DL (lb)	**1768**	**948**		
OT-(.6-.14sds)DL Total(lb)	**1768**	**4605**		
HD	hdu4	HDU4		

East West Shear Wall Design

Project: Stewart Residence

Controlling Force= Seismic

Sds= 1.149

Upper Floor

Grid:	**3**	**3.5**	**4**	
Load (k)	**4.00**	**1.00**	**5.74**	
Height (ft)	8.00	8.00	8.00	
Shortest Length (ft)	9	4.5	4.58	
Total Length (ft)	9	9.17	4.58	
h/b ratio	0.89	1.78	1.75	
Shear (plf)	444.4	109.1	1253.3	
Shear increase due to ratio (plf)	444.4	109.1	1253.3	
Wall	**W3**	**W6**	**2W2-10**	
OT (lb)	3556	872	10026	
Dead load (PLF)	189	80	275	
OT-(.6-.14sds)DL (lb)	**3182**	**793**	**9193**	
HD	(2) cs16	CS16	(2) hdu4	

Upper Floor Roof Deck

4	**5**
0.72	**0.60**
Timber Frame	8.00
	5.67
	5.67
	1.41
	105.8
	105.8
	W6
	847
	80
	747
	hdu2

Main Floor

Grid:	**3**	**3.7**	**4**	
Load this level (k)	1.13	1.12	1.12	
Load Total (k)	**4.63**	**1.12**	**6.84**	
Load total (k) R=1.5	**n/a**	**n/a**	**n/a**	
Height (ft)	8.50	8.50	8.50	
Shortest Length (ft)	8.75	12.67	20.25	
Total Length (ft)	20.75	12.67	20.25	
h/b ratio	0.97	0.67	0.42	
Shear (plf)	223.1	88.4	337.8	
Shear increase due to ratio (plf)	223.1	88.4	337.8	
Wall	**W6**	**W6**	**W4**	
OT (lb)	1897	751	2871	
OT Total (lb)	5452	751	2871	
Dead load (PLF)	229	160	85	
OT-(.6-.14sds)DL (lb)	**1457**	**306**	**2493**	
OT-(.6-.14sds)DL Total(lb)	**4638**	**306**	**2493**	
HD	HDU4	n/A	HDU4	

Main Floor Roof Deck

4	**5**
0.34	0.34
1.05	0.94
4.55	**n/a**
3.00	3.00
10.33	5.67
10.33	5.67
0.29	0.53
440.5	164.9
440.5	164.9
W3	**W6**
1321	495
1321	1341
30	30
1253	**457**
1253	**1204**
hdu2	hdu2

East West Shear Wall Design

Project: Stewart Residence

Controlling Force= Wind

0

Upper Floor

Grid:	**3**	**3.5**	**4**	
Load (k)	**2.82**	**1.10**	**5.50**	
Height (ft)	8.00	8.00	8.00	
Shortest Length (ft)	9	4.5	4.58	
Total Length (ft)	9	9.17	4.58	
h/b ratio	0.89	1.78	1.75	
Shear (plf)	313.3	120.0	1200.9	
Shear increase due to ratio (plf)	313.3	120.0	1200.9	
Wall	**W4**	**W6**	**2W2**	
OT (lb)	2507	960	9607	
Dead load (PLF)	189	80	275	
OT-(.6)DL (lb)	**1996**	**852**	**8672**	
HD	(2) cs16	CS16	(2) hdu4	

Main Floor

Grid:	**3**	**3.7**	**4**	
Load this level (k)				
Load Total (k)	**4.90**	**1.78**	**7.95**	
Load total (k) R=1.5	**n/a**	**n/a**	**n/a**	
Height (ft)	8.50	8.50	8.50	
Shortest Length (ft)	8.75	12.67	20.25	
Total Length (ft)	20.75	12.67	20.25	
h/b ratio	0.97	0.67	0.42	
Shear (plf)	236.1	140.5	392.6	
Shear increase due to ratio (plf)	236.1	140.5	392.6	
Wall	**W6**	**W6**	**W4**	
OT (lb)	2007	1194	3337	
OT Total (lb)	4514	1194	3337	
Dead load (PLF)	229	160	85	
OT-(.6-.14sds)DL (lb)	**1406**	**586**	**2821**	
OT-(.6-.14sds)DL Total(lb)	**3402**	**586**	**2821**	
HD	HDU4	n/A	HDU4	

OPEN BUILDING

27.3-2 $p = q_h G C_N$ = 32.9 PSF

q_h = 24.2 psf

G = .85

C_N = $C_{N,max}$ 1.6

C+C 30.7-1 $p = q_h G C_N$ = 65.8 PSF UP

↳ 39.5 PSF ALL

q_h = 24.2 psf

G = .85

C_N = 3.2 MAX

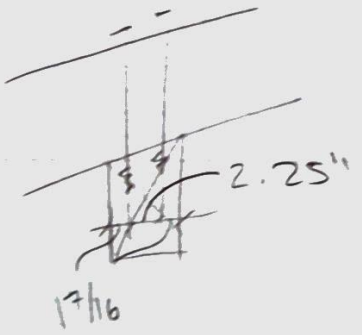
UPLIFT & BURLING

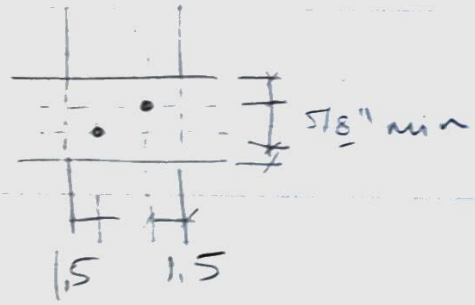
.6D - .6W = 54PLF - 178PLF = -124PLF

R_1 = -.4K R_2 = -1.03K

SDWS W_{max} = (590lb)1.6 = 944lb

(2) SCREWS SDWS22100DB





GM
40
46

STRUCTURAL ENGINEERING

PROJECT STEWART

DATE

PROJ # JWJ

DESIGN

SHEET

SWENSON SAY FAGET
SEATTLE 2124 Third Ave Suite 100 Seattle WA 98121 | 206 443 6212
TACOMA 914 Broadway Suite 100 Tacoma WA 98402 | 253 284 9470

TIMBER FRAME HSS 6x6x1/2

$V_{max} = .715k$ ALL R=6.5

$= 3.1k$ ALL R=1.5

$M = 3.1k(8.5') = 26.4k\text{-}ft$ $M/\Omega = 45.9k\text{-}ft$

$P_{max} = 6K$ $P/\Omega = 229k$

$I = .6 < 1.0$

Deflection

$$\frac{C_d \Delta}{I} = \frac{1.5\left(.783''/.7\right)}{1} = 1.67 < .02h_{sx} = 2.04''$$

STEWART

PROJECT

DATE

PROJ # JWJ

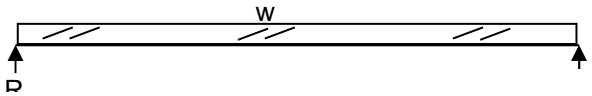
DESIGN

SHEET

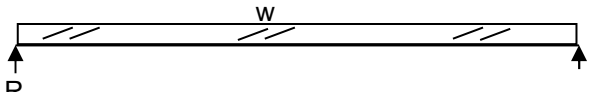
STRUCTURAL ENGINEERING

SWENSON SAY FAGET
SEATTLE 2124 Third Ave Suite 100 Seattle WA 98121 O 206.443.6212
TACOMA 934 Broadway Suite 100 Tacoma WA 98402 O 253.284.9470

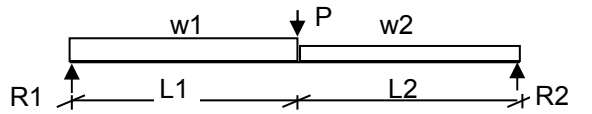
Beam		B1		HF	2	x 8
w=	80	plf		R=	300	lbs
L=	7.5	ft		M=	563	ft-lbs
b=	1.50	in		Fb=	514	psi
d=	7.25	in		Fv=	35	psi
E=	1300	ksi		Δ=	0.09	in
Cv=	1.00	≤1.0		l /	979	



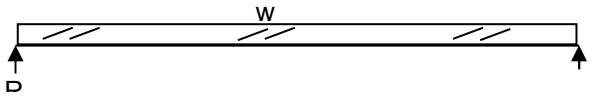
Beam		B2		HF	3	x 6
w=	173	plf		R=	606	lbs
L=	7	ft		M=	1,060	ft-lbs
b=	3.00	in		Fb=	841	psi
d=	5.50	in		Fv=	48	psi
E=	1300	ksi		Δ=	0.17	in
Cv=	1.00	≤1.0		l /	486	



Beam		B3		HF	3	x 12
w1=	138	plf		R1 =	581	lbs
w2=	138	plf		R2 =	1,019	lbs
L1=	6	ft		M =	1,191	lb-ft
L2=	1	ft		Fb =	226	psi
X=	3.6	ft		Fv =	40	psi
P=	606	lbs		Δ=	0.03	in
b=	3.00	in		l /	3,432	
d=	11.25	in		Cv=	1.00	
E=	1,300	ksi				



Beam		B4		PSL	3 1/2	x 9 1/4
w=	430	plf		R=	2,150	lbs
L=	10	ft		M=	5,375	ft-lbs
b=	3.50	in		Fb=	1,292	psi
d=	9.25	in		Fv=	84	psi
E=	2000	ksi		Δ=	0.21	in
Cv=	1.00	≤1.0		l /	573	



STRUCTURAL ENGINEERING

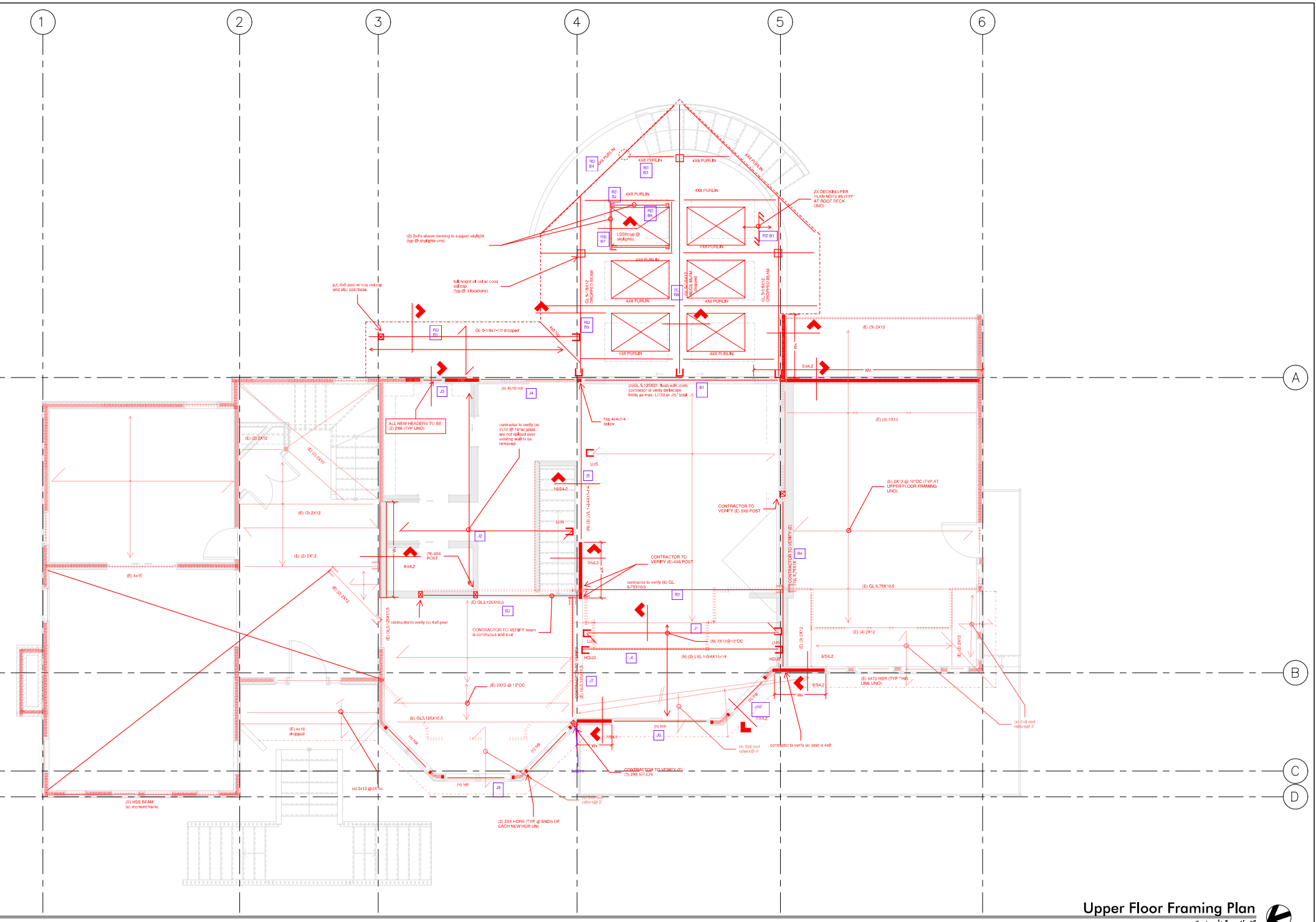
2124 Third Avenue . Suite 100 . Seattle . WA 98121
www.swensonsayfaget.com
Office: 206.443.6212
Fax: 206.443.4870

Project: Stewart Roof Gravity Calcs — *Date:* 11/29/21

DL=15psf LL=25 psf — Project #:

Deflection: DL=L/240 LL=L/360 — Design: JWJ

Sheet: 1

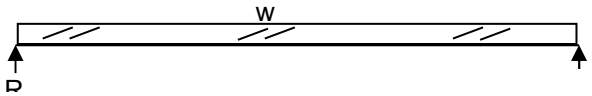


Upper Floor Framing Plan

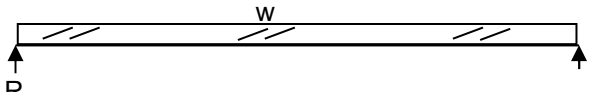
Scale: 1/4" = 1'-0"

Legend

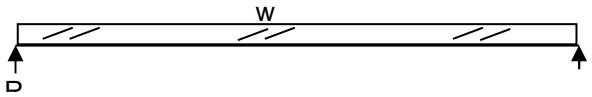
Beam		J1		HF	2	x 12	
w=	52	plf		R=	442	lbs
L=	17	ft		M=	1,879	ft-lbs
b=	1.50	in		Fb=	712	psi
d=	11.25	in		Fv=	35	psi
E=	1300	ksi		Δ=	0.42	in
Cv=	1.00	≤1.0		I /	483	



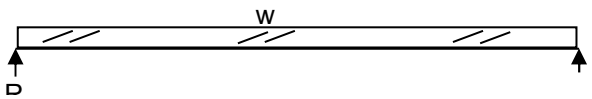
Beam		J2		HF	2	x 12	
w=	69.3333333	plf		R=	555	lbs
L=	16	ft		M=	2,219	ft-lbs
b=	1.50	in		Fb=	841	psi
d=	11.25	in		Fv=	44	psi
E=	1300	ksi		Δ=	0.44	in
Cv=	1.00	≤1.0		I /	435	



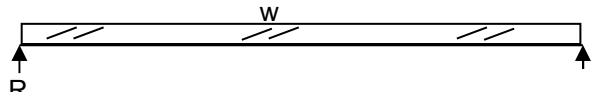
Beam		J3		HF	3	x 8	
w=	443.416667	plf		R=	443	lbs
L=	2	ft		M=	222	ft-lbs
b=	3.00	in		Fb=	101	psi
d=	7.25	in		Fv=	12	psi
E=	1300	ksi		Δ=	0.00	in
Cv=	1.00	≤1.0		I /	18621	



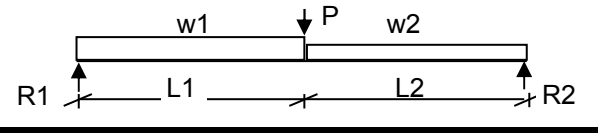
Beam		J4		DF-L	4	x 10	
w=	443.416667	plf		R=	1,774	lbs
L=	8	ft		M=	3,547	ft-lbs
b=	3.50	in		Fb=	853	psi
d=	9.25	in		Fv=	66	psi
E=	1700	ksi		Δ=	0.10	in
Cv=	1.00	≤1.0		I /	922	



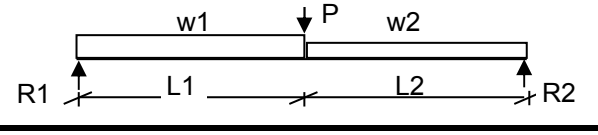
Beam		J5		PSL	5 1/4	x 11 1/4	
w=	832	plf		R=	5,408	lbs
L=	13	ft		M=	17,576	ft-lbs
b=	5.25	in		Fb=	1,905	psi
d=	11.25	in		Fv=	118	psi
E=	2000	ksi		Δ=	0.43	in
Cv=	1.00	≤1.0		I /	364	



Beam		J6		PSL	3 1/2	x 11 1/4	
w1=	333	plf		R1 =	2,554	lbs
w2=	69	plf		R2 =	1,529	lbs
L1=	11	ft		M =	9,775	lb-ft
L2=	6	ft		Fb =	1,589	psi
X=	8.5	ft		Fv =	85	psi
P=	-	lbs		Δ=	0.59	in
b=	3.50	in		I /	346	
d=	11.25	in		Cv=	1.00	
E=	2,000	ksi				



Beam		J7		GL	5 1/8	x 10 1/2	
w1=	1,245	plf		R1 =	7,209	lbs
w2=	1,180	plf		R2 =	6,851	lbs
L1=	5	ft		M =	19,833	lb-ft
L2=	6	ft		Fb =	2,527	psi<2760
X=	5.0	ft		Fv =	171	psi
P=	1,967	lbs		Δ=	0.38	in
b=	5.13	in		I /	313	
d=	10.50	in		Cv=	1.00	
E=	1,800	ksi				



SSF STRUCTURAL ENGINEERING

2124 Third Avenue . Suite 100 . Seattle . WA 98121
www.swensonsayfaget.com
Office: 206.443.6212
Fax: 206.443.4870

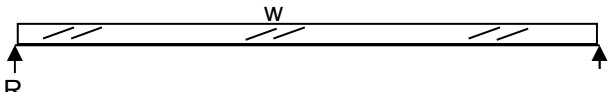
Project: Stewart Upper Floor Gravity Calcs — *Date:* 11/29/21

DL=12psf LL=40 psf — Project #:

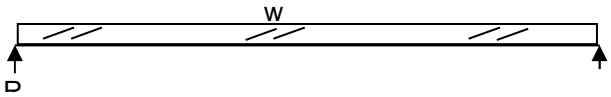
Deflection: DL=L/240 LL=L/360 — Design: JWJ

Sheet: 1

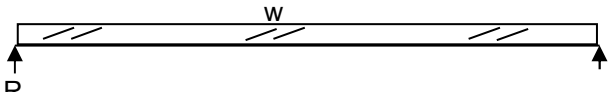
Beam		J8			HF	3	x 8	
w=	195	plf			R=	536	lbs
L=	5.5	ft			M=	737	ft-lbs
b=	3.00	in			Fb=	337	psi
d=	7.25	in			Fv=	29	psi
E=	1300	ksi			Δ=	0.03	in
Cv=	1.00	≤1.0			l /	2036	



Beam		J9			HF	3	x 8	
w=	200	plf			R=	800	lbs
L=	8	ft			M=	1,600	ft-lbs
b=	3.00	in			Fb=	731	psi
d=	7.25	in			Fv=	47	psi
E=	1300	ksi			Δ=	0.15	in
Cv=	1.00	≤1.0			l /	645	



Beam		J10			HF	3	x 8	
w=	603	plf			R=	1,206	lbs
L=	4	ft			M=	1,206	ft-lbs
b=	3.00	in			Fb=	551	psi
d=	7.25	in			Fv=	58	psi
E=	1300	ksi			Δ=	0.03	in
Cv=	1.00	≤1.0			l /	1712	



STRUCTURAL ENGINEERING

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Office: 206.443.6212
Fax: 206.443.4870

Project: Stewart Upper Floor Gravity Calcs — *Date:* 11/29/21

DL=12psf LL=40 psf — Project #:

Deflection: DL=L/240 LL=L/360 — Design: JWJ

Sheet:

Beam Analysis

Beam:		B1					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.382**	**0.233**			0.615	**0**
	w_2	**-0.382**	**-0.233**			-0.615	**6**
	w_3	**0.382**	**0.233**			0.615	**10**
	w_4					0.000	
	w_5					0.000	
	w_6					0.000	
	w_7					0.000	
	w_8					0.000	
	w_9					0.000	
	w_{10}					0.000	
Trapezoidal (k/ft/ft)	t_1					0.000	
	t_2					0.000	
	t_3					0.000	
	t_4					0.000	
	t_5					0.000	
	t_6					0.000	
Point (k)	P_1	**1.528**	**0.932**			2.460	**6.00**
	P_2	**1.47**	**1.83**			3.300	**8.00**
	P_3	**1.528**	**0.932**			2.460	**10.00**
	P_4					0.000	
	P_5					0.000	
	P_6					0.000	
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**16.00**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	7.797	**0.00**
R_2	7.797	**16.00**
R_3	0.000	**16.00**
R_4	0.000	**16.00**
R_5	0.000	**16.00**
R_6	0.000	**16.00**
R_7	0.000	**16.00**
R_8	0.000	**16.00**
R_9	0.000	**16.00**
R_{10}	0.000	**16.00**

Demand Output		
Location, ft		**10.00**
Shear, k	V	-1.65
Moment, k-ft	M =	35.72
Deflection, in	D =	-0.22
Δ/Span		L/869

Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

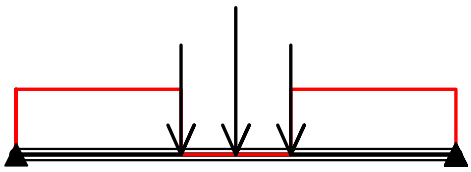
Stresses @ Input Location	
f_v (psi)	-23
f_b (psi)	1138

Max/Min Stresses	
f_{v_MAX} (psi)	109
f_{v_MIN} (psi)	-109
f_{b_MAX} (psi)	1242
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**5.125**
d (in)	**21**
I (in^4)	3955.2
S (in^3)	376.69
A (in^2)	107.63
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	7.8	-7.8	-	39	-0.239 (↓)	8	L/803	-0.103 (↓)	8	L/1864

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PROJECT	Stewart	DATE	*11/29/2021*
	Upper Floor	PROJ. #	
		DESIGN	JWJ
		SHEET	1

Beam Analysis

Beam:		b2					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.147**	**0.027**	**0.231**		0.405	
	w_2					0.000	
	w_3					0.000	
	w_4					0.000	
	w_5					0.000	
	w_6					0.000	
	w_7					0.000	
	w_8					0.000	
	w_9					0.000	
	w_{10}					0.000	
Trapezoidal (k/ft/ft)	t_1					0.000	
	t_2					0.000	
	t_3					0.000	
	t_4					0.000	
	t_5					0.000	
	t_6					0.000	
Point (k)	P_1	**2.1**	**3.174**	**1.94**		7.214	**12.50**
	P_2					0.000	
	P_3					0.000	
	P_4					0.000	
	P_5					0.000	
	P_6					0.000	
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Support Locations and Reactions		
# of Supports		3
Total Beam Length		**13.00**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	0.040	**0.00**
R_2	4.387	**4.50**
R_3	8.048	**13.00**
R_4	0.000	**13.00**
R_5	0.000	**13.00**
R_6	0.000	**13.00**
R_7	0.000	**13.00**
R_8	0.000	**13.00**
R_9	0.000	**13.00**
R_{10}	0.000	**13.00**

Demand Output		
Location, ft		**2.85**
Shear, k	V	-1.11
Moment, k-ft	M =	-1.53
Deflection, in	D =	0.01
Δ/Span		L/5581

Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

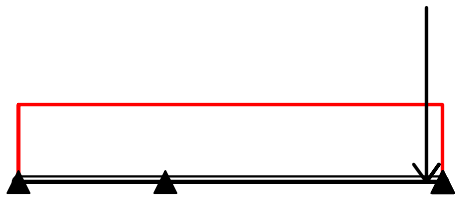
Stresses @ Input Location	
f_v (psi)	-51
f_b (psi)	-319

Max/Min Stresses		
f_{v_MAX} (psi)	100	
f_{v_MIN} (psi)	-304	OK
f_{b_MAX} (psi)	775	W/ X/D
f_{b_MIN} (psi)	-683	

Beam Properties	
E (ksi)	**1800**
b (in)	**3.125**
d (in)	**10.5**
I (in^4)	301.46
S (in^3)	57.422
A (in^2)	32.813
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	0.038	-1.49	-3.27	0.002	0.01 (↑)	2.9	L/5398	0.002 (↑)	2.7	L/26988
Span 2	2.18	-6.65	-3.27	3.71	-0.086 (↓)	9.5	L/1183	-0.02 (↓)	9.7	L/5086

SST STRUCTURAL ENGINEERING

PROJECT Stewart
Upper Floor

DATE *11/29/2021*
PROJ. #
DESIGN JWJ
SHEET 2

Beam Analysis

Beam:							
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.035**				0.035	**0**
	w_2	**0.540**				0.540	**11**
	w_3					0.000	
	w_4					0.000	
	w_5					0.000	
	w_6					0.000	
	w_7					0.000	
	w_8					0.000	
	w_9					0.000	
	w_{10}					0.000	
Trapezoidal (k/ft/ft)	t_1					0.000	
	t_2					0.000	
	t_3					0.000	
	t_4					0.000	
	t_5					0.000	
	t_6					0.000	
Point (k)	P_1	**2.15**				2.150	**0.50**
	P_2	**2.15**				2.150	**11.00**
	P_3					0.000	
	P_4					0.000	
	P_5					0.000	
	P_6					0.000	
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**16.25**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	3.518	**0.00**
R_2	4.180	**16.25**
R_3	0.000	**16.25**
R_4	0.000	**16.25**
R_5	0.000	**16.25**
R_6	0.000	**16.25**
R_7	0.000	**16.25**
R_8	0.000	**16.25**
R_9	0.000	**16.25**
R_{10}	0.000	**16.25**

Demand Output		
Location, ft		**10.00**
Shear, k	V	1.02
Moment, k-ft	M =	13.02
Deflection, in	D =	-0.47
Δ/Span		L/416

Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

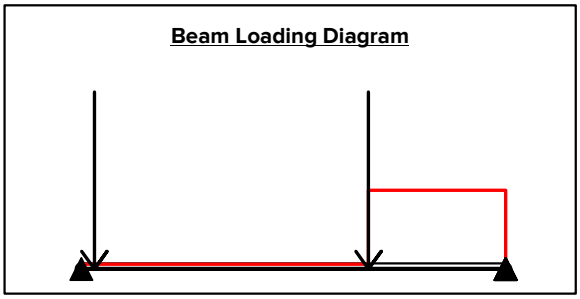
Stresses @ Input Location	
f_v (psi)	22
f_b (psi)	1260

Max/Min Stresses	
f_{v_MAX} (psi)	74
f_{v_MIN} (psi)	-88
f_{b_MAX} (psi)	1354
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**6.75**
d (in)	**10.5**
I (in^4)	651.16
S (in^3)	124.03
A (in^2)	70.875
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	3.52	-4.18	-	14	-0.481 (↓)	8.8	L/405	0	0	L/∞

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PROJECT	Stewart	DATE	*11/29/2021*
	Upper Floor	PROJ. #	
		DESIGN	JWJ
		SHEET	3

Beam Analysis

Beam:							
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**1.178**				1.178	**0**
	w_2	**-0.749**				-0.749	**7.5**
	w_3					0.000	
	w_4					0.000	
	w_5					0.000	
	w_6					0.000	
	w_7					0.000	
	w_8					0.000	
	w_9					0.000	
	w_{10}					0.000	
Trapezoidal (k/ft/ft)	t_1					0.000	
	t_2					0.000	
	t_3					0.000	
	t_4					0.000	
	t_5					0.000	
	t_6					0.000	
Point (k)	P_1	**6.556**				6.556	**7.50**
	P_2	**1.53**				1.530	**12.25**
	P_3					0.000	
	P_4					0.000	
	P_5					0.000	
	P_6					0.000	
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**13.50**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	10.008	**0.00**
R_2	9.487	**13.50**
R_3	0.000	**13.50**
R_4	0.000	**13.50**
R_5	0.000	**13.50**
R_6	0.000	**13.50**
R_7	0.000	**13.50**
R_8	0.000	**13.50**
R_9	0.000	**13.50**
R_{10}	0.000	**13.50**

Demand Output		
Location, ft		**10.00**
Shear, k	V	-6.46
Moment, k-ft	M =	27.13
Deflection, in	D =	-0.15
Δ/Span		L/1053

Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

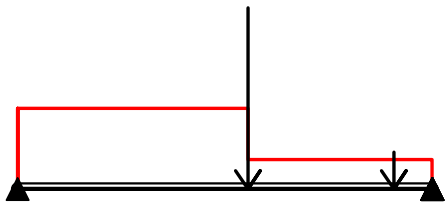
Stresses @ Input Location	
f_v (psi)	-80
f_b (psi)	893

Max/Min Stresses	
f_{v_MAX} (psi)	123
f_{v_MIN} (psi)	-117
f_{b_MAX} (psi)	1379
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**6.75**
d (in)	**18**
I (in^4)	3280.5
S (in^3)	364.5
A (in^2)	121.5
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	10	-9.49	-	41.9	-0.213 (↓)	6.8	L/761	0	0	L/∞

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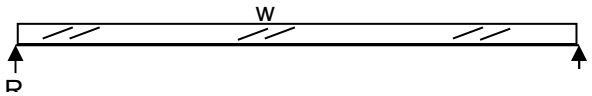
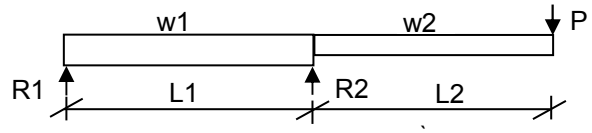
PROJECT Stewart
Upper Floor

DATE 11/29/2021
PROJ. #
DESIGN JWJ
SHEET 4

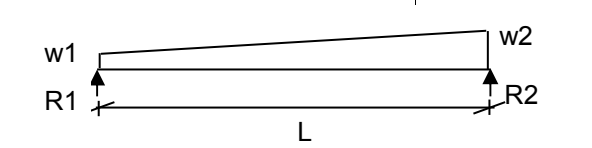
Beam		B1		HF	6	x 2
w=	22.5	plf		R=	51	lbs
L=	4.5	ft		M=	57	ft-lbs
b=	5.50	in		Fb=	331	psi
d=	1.50	in		Fv=	9	psi
E=	1300	ksi		Δ=	0.10	in
Cv=	1.00	≤1.0		l /	523	



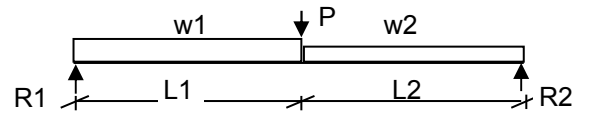
Beam		B2		DF-L	4	x 8
w1=	124	plf		R1=	401	lbs
w2=	124	plf		R2=	1,025	lbs
L1=	8.0	ft		M+=	649	lb-ft
L2=	3.5	ft		M-=	760	lb-ft
X=	4.00	ft		Fb=	297	psi
P=	-	lbs		Fv=	31	psi
b=	3.50	in		Δspan=	0.033	in
d=	7.25	in		l span/	2,936	
E=	1,700	ksi		Δcant=	0.00	in
Cv=	1.00			l cant/	58,891	



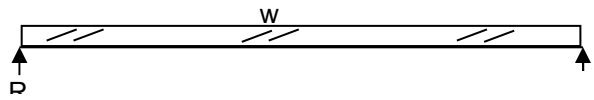
Beam		B3		DF-L	4	x 8
w1=	84	plf		R1 =	253	lbs
w2=	169	plf		R2 =	316	lbs
L=	5	ft		M =	318	lb-ft
b=	3.50	in		Fb =	124	psi
d=	7.25	in		Fv =	12	psi
E=	1,700	ksi		Δ=	0.01	in
Cv=	1.00			l /	8,733	



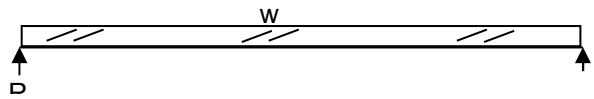
Beam		B4		HF	4	x 8
w1=	90	plf		R1 =	622	lbs
w2=	90	plf		R2 =	622	lbs
L1=	6	ft		M =	2,057	lb-ft
L2=	6	ft		Fb =	805	psi
X=	5.5	ft		Fv =	34	psi
P=	253	lbs		Δ=	0.29	in
b=	3.50	in		l /	457	
d=	7.25	in		Cv=	1.00	
E=	1,300	ksi				



Beam		B5		GL	5 1/8	x 7 1/2
w=	130	plf		R=	1,053	lbs
L=	16.2	ft		M=	4,265	ft-lbs
b=	5.13	in		Fb=	1,065	psi
d=	7.50	in		Fv=	38	psi
E=	1800	ksi		Δ=	0.62	in
Cv=	1.00	≤1.0		l /	313	



Beam		B6		HF	3	x 4
w=	90	plf		R=	225	lbs
L=	5	ft		M=	281	ft-lbs
b=	3.00	in		Fb=	551	psi
d=	3.50	in		Fv=	28	psi
E=	1300	ksi		Δ=	0.09	in
Cv=	1.00	≤1.0		l /	661	



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Fax: 206.443.4870

Project: Roof Deck Gravity Calcs

DL=20psf LL=25 psf

Deflection: DL=L/240 LL=L/360

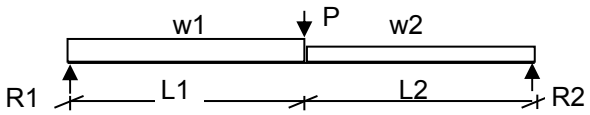
Date: 11/29/21

Project #:

Design: JWJ

Sheet:

Beam		B7			HF 3 x 4	
w1=	23	plf		R1 =	276	lbs
w2=	23	plf		R2 =	276	lbs
L1=	2	ft		M =	563	lb-ft
L2=	2	ft		Fb =	1,103	psi<1466
X=	2.3	ft		Fv =	38	psi
P=	450	lbs		Δ=	0.12	in
b=	3.00	in		I /	447	
d=	3.50	in		Cv=	1.00	
E=	1,300	ksi				



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Project: Roof Deck Gravity Calcs

DL=20psf LL=25 psf

Deflection: DL=L/240 LL=L/360

Date: 11/29/21

Project #:

Design: JWJ

Sheet:

Beam Analysis

Beam:		B8 Ridge beam					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1					0.000	
	w_2					0.000	
	w_3					0.000	
	w_4					0.000	
	w_5					0.000	
	w_6					0.000	
	w_7					0.000	
	w_8					0.000	
	w_9					0.000	
	w_{10}					0.000	
Trapezoidal (k/ft/ft)	t_1					0.000	
	t_2					0.000	
	t_3					0.000	
	t_4					0.000	
	t_5					0.000	
	t_6					0.000	
Point (k)	P_1	**0.72**		**0.9**		1.620	**1.50**
	P_2	**0.72**		**0.9**		1.620	**5.75**
	P_3	**0.72**		**0.9**		1.620	**10.00**
	P_4	**0.72**		**0.9**		1.620	**14.25**
	P_5	**0.28**		**0.35**		0.630	**17.75**
	P_6	**0.53**		**0.7**		1.230	**22.25**
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**22.25**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	3.293	**0.00**
R_2	5.047	**17.75**
R_3	0.000	**17.75**
R_4	0.000	**17.75**
R_5	0.000	**17.75**
R_6	0.000	**17.75**
R_7	0.000	**17.75**
R_8	0.000	**17.75**
R_9	0.000	**17.75**
R_{10}	0.000	**17.75**

Demand Output		
Location, ft		**10.00**
Shear, k	V	0.05
Moment, k-ft	M =	12.28
Deflection, in	D =	-0.49
Δ/Span		L/438

Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

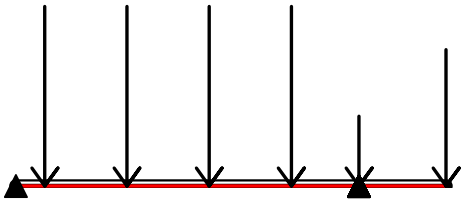
Stresses @ Input Location	
f_v (psi)	1
f_b (psi)	1198

Max/Min Stresses	
f_{v_MAX} (psi)	80
f_{v_MIN} (psi)	-78
f_{b_MAX} (psi)	1200
f_{b_MIN} (psi)	-540

Beam Properties	
E (ksi)	**1800**
b (in)	**5.125**
d (in)	**12**
I (in^4)	738
S (in^3)	123
A (in^2)	61.5
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	3.29	-3.19	-5.54	12.3	-0.504 (↓)	8.5	L/422	0	0	L/∞
Right Cantilever	1.23	-	-5.54	-	0.279 (↑)	22.3	L/386	0	17.8	L/∞

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Beam Analysis

Beam:	B9 Edge dropped beams					
Load	Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft) w_1					0.000	
w_2					0.000	
w_3					0.000	
w_4					0.000	
w_5					0.000	
w_6					0.000	
w_7					0.000	
w_8					0.000	
w_9					0.000	
w_{10}					0.000	
Trapezoidal (k/ft/ft) t_1					0.000	
t_2					0.000	
t_3					0.000	
t_4					0.000	
t_5					0.000	
t_6					0.000	
Point (k) P_1	**0.74**		**0.93**		1.670	**1.50**
P_2	**0.74**		**0.93**		1.670	**5.75**
P_3	**0.74**		**0.93**		1.670	**10.00**
P_4	**0.853**		**0.981**		1.834	**14.75**
P_5	**0.468**		**0.585**		1.053	**3.5**
P_6					0.000	
P_7					0.000	
P_8					0.000	
P_9					0.000	
P_{10}					0.000	

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**14.75**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	1.943	**0.00**
R_2	5.954	**10.00**
R_3	0.000	**10.00**
R_4	0.000	**10.00**
R_5	0.000	**10.00**
R_6	0.000	**10.00**
R_7	0.000	**10.00**
R_8	0.000	**10.00**
R_9	0.000	**10.00**
R_{10}	0.000	**10.00**

Demand Output		
Location, ft		**10.00**
Shear, k	V	-2.45
Moment, k-ft	M =	-8.71
Deflection, in	D =	0.00
Δ/Span		L/

Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

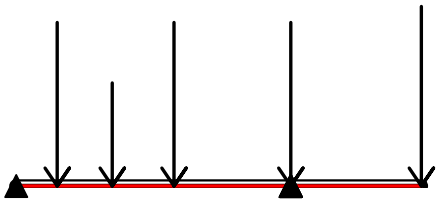
Stresses @ Input Location	
f_v (psi)	-60
f_b (psi)	-850

Max/Min Stresses	
f_{v_MAX} (psi)	47
f_{v_MIN} (psi)	-60
f_{b_MAX} (psi)	337
f_{b_MIN} (psi)	-850

Beam Properties	
E (ksi)	**1800**
b (in)	**5.125**
d (in)	**12**
I (in^4)	738
S (in^3)	123
A (in^2)	61.5
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	1.94	-2.45	-8.71	3.45	-0.023 (↓)	3.4	L/5202	0	0	L/∞
Right Cantilever	1.83	-	-8.71	-	-0.14 (↓)	14.8	L/814	0	10	L/∞

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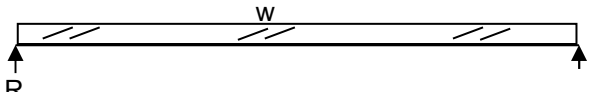
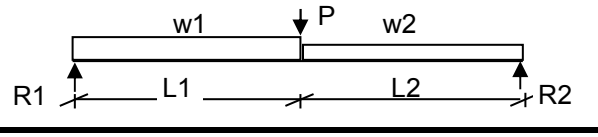
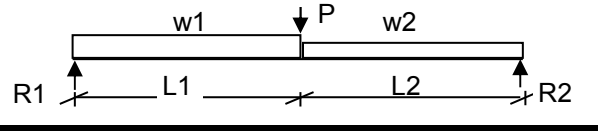
Beam		J1		PSL	1 1/2 x 7 1/4	
w=	100	plf		R=	313	lbs
L=	6.25	ft		M=	488	ft-lbs
b=	1.50	in		Fb=	446	psi
d=	7.25	in		Fv=	35	psi
E=	1235	ksi		Δ=	0.06	in
Cv=	1.00	≤1.0		I /	1285	



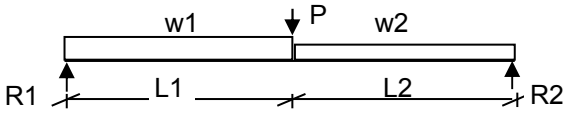
Beam		J2		GL	3 1/8 x 10 1/2	
w1=	529	plf		R1 =	3,005	lbs
w2=	329	plf		R2 =	2,179	lbs
L1=	3	ft		M =	6,951	lb-ft
L2=	9	ft		Fb =	1,453	psi
X=	5.8	ft		Fv =	116	psi
P=	800	lbs		Δ=	0.32	in
b=	3.13	in		I /	433	
d=	10.50	in		Cv=	1.00	
E=	1,800	ksi				



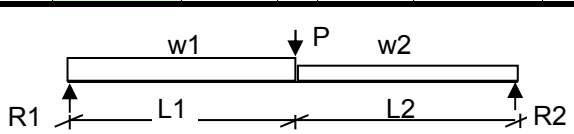
Beam		J3		GL	3 1/8 x 9	
w1=	100	plf		R1 =	2,287	lbs
w2=	100	plf		R2 =	1,692	lbs
L1=	4	ft		M =	8,350	lb-ft
L2=	6	ft		Fb =	2,375	psi
X=	5.0	ft		Fv =	118	psi
P=	2,979	lbs		Δ=	0.36	in
b=	3.13	in		I /	331	
d=	9.00	in		Cv=	1.00	
E=	1,800	ksi				



Beam		J4		GL	3 1/8 x 7 1/2	
w1=	100	plf		R1 =	1,220	lbs
w2=	100	plf		R2 =	980	lbs
L1=	4	ft		M =	4,080	lb-ft
L2=	6	ft		Fb =	1,671	psi
X=	5.0	ft		Fv =	74	psi
P=	1,200	lbs		Δ=	0.32	in
b=	3.13	in		I /	375	
d=	7.50	in		Cv=	1.00	
E=	1,800	ksi				

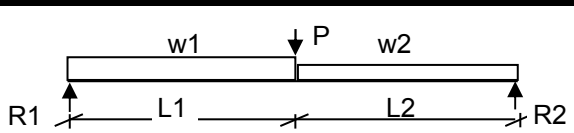


Beam		J5		GL	6 3/4 x 22 1/2	
w1=	225	plf		R1 =	6,401	lbs
w2=	375	plf		R2 =	6,866	lbs
L1=	11	ft		M =	61,655	lb-ft
L2=	24	ft		Fb =	1,299	psi
X=	17.5	ft		Fv =	61	psi
P=	1,792	lbs		Δ=	1.20	in
b=	6.75	in		I /	351	
d=	22.50	in		Cv=	0.87	
E=	1,800	ksi				



Steel Size					W6X25	
I =	53.6	in^4		Fy=	50	ksi
Δ =	8.881	in		Mn/Ω =	47.4	k-ft
I /	47			Vn/Ω =	56.0	kips

Beam		J6		GL	3 1/8 x 10 1/2	
w1=	-	plf		R1 =	7,462	lbs
w2=	-	plf		R2 =	2,634	lbs
L1=	3	ft		M =	22,387	lb-ft
L2=	9	ft		Fb =	4,678	psi
X=	5.8	ft		Fv =	341	psi
P=	10,096	lbs		Δ=	0.72	in
b=	3.13	in		I /	190	
d=	10.50	in		Cv=	1.00	
E=	1,800	ksi				



SSF STRUCTURAL ENGINEERING

2124 Third Avenue . Suite 100 . Seattle . WA 98121
www.swensonsayfaget.com
Office: 206.443.6212
Fax: 206.443.4870

Project: Stewart Main Floor Gravity Calcs

DL=12psf LL=40 psf | deck LL=60psf

Deflection: DL=L/240 LL=L/360

Date: 11/29/21

Project #:

Design: JWJ

Sheet: 1

Beam Analysis

Beam:	B1					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.069**				0.069	**0**
	w_2					0.000	
	w_3					0.000	
	w_4					0.000	
	w_5					0.000	
	w_6					0.000	
	w_7					0.000	
	w_8					0.000	
	w_9					0.000	
	w_{10}					0.000	
Trapezoidal (k/ft/ft)	t_1					0.000	
	t_2					0.000	
	t_3					0.000	
	t_4					0.000	
	t_5					0.000	
	t_6					0.000	
Point (k)	P_1	**0.04**				0.040	**3.25**
	P_2	**4.4**				4.400	**7.75**
	P_3					0.000	
	P_4					0.000	
	P_5					0.000	
	P_6					0.000	
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**12.50**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	2.135	**0.00**
R_2	3.172	**12.50**
R_3	0.000	**12.50**
R_4	0.000	**12.50**
R_5	0.000	**12.50**
R_6	0.000	**12.50**
R_7	0.000	**12.50**
R_8	0.000	**12.50**
R_9	0.000	**12.50**
R_{10}	0.000	**12.50**

Demand Output		
Location, ft		**10.00**
Shear, k	V	-3.00
Moment, k-ft	M =	7.71
Deflection, in	D =	-0.23
Δ/Span		L/666

Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

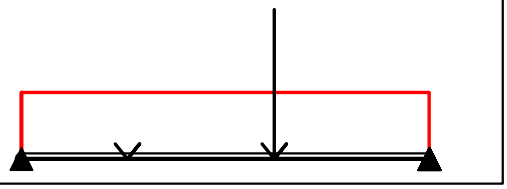
Stresses @ Input Location	
f_v (psi)	-84
f_b (psi)	983

Max/Min Stresses	
f_{v_MAX} (psi)	59
f_{v_MIN} (psi)	-88
f_{b_MAX} (psi)	1822
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**5.125**
d (in)	**10.5**
I (in^4)	494.4
S (in^3)	94.172
A (in^2)	53.813
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	2.13	-3.17	-	14.3	-0.367 (↓)	6.6	L/409	0	0	L/∞

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SEATTLE 2124 Third Ave, Suite 100, Seattle, WA 98121 | O 206.443.6212
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STRUCTURAL ENGINEERING

PROJECT Stewart
Main Floor

DATE 11/29/2021
PROJ. #
DESIGN JWJ
SHEET 1

Beam Analysis

Beam:							
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.598**				0.598	
	w_2					0.000	
	w_3					0.000	
	w_4					0.000	
	w_5					0.000	
	w_6					0.000	
	w_7					0.000	
	w_8					0.000	
	w_9					0.000	
	w_{10}					0.000	
Trapezoidal (k/ft/ft)	t_1					0.000	
	t_2					0.000	
	t_3					0.000	
	t_4					0.000	
	t_5					0.000	
	t_6					0.000	
Point (k)	P_1	**15.6**				15.600	**5.25**
	P_2					0.000	**2.83**
	P_3					0.000	**6.75**
	P_4					0.000	
	P_5					0.000	
	P_6					0.000	
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**10.50**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	10.940	**0.00**
R_2	10.940	**10.50**
R_3	0.000	**10.50**
R_4	0.000	**10.50**
R_5	0.000	**10.50**
R_6	0.000	**10.50**
R_7	0.000	**10.50**
R_8	0.000	**10.50**
R_9	0.000	**10.50**
R_{10}	0.000	**10.50**

Demand Output		
Location, ft		**10.00**
Shear, k	V	-10.64
Moment, k-ft	M =	5.39
Deflection, in	D =	-0.03
Δ/Span		L/4812

Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

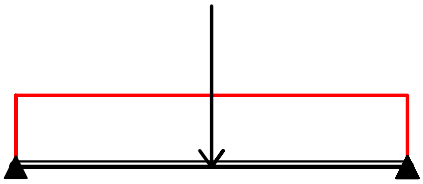
Stresses @ Input Location	
f_v (psi)	-173
f_b (psi)	234

Max/Min Stresses	
f_{v_MAX} (psi)	177
f_{v_MIN} (psi)	-177
f_{b_MAX} (psi)	2133
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**5.125**
d (in)	**18**
I (in^4)	2490.8
S (in^3)	276.75
A (in^2)	92.25
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	10.9	-10.9	0	49.2	-0.181 (↓)	5.3	L/696	0	0	L/∞

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