Structural Calculations For:

Eckels Andersen

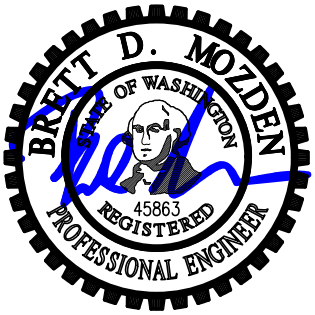
3413 72nd Pl SE

Mercer Island, WA, 98040

Prepared for: Salt Studio LLC

Job #: 10213-2023-02

Date: May 9, 2024



SSF STRUCTURAL ENGINEERING

SEATTLE 2124 Third Avenue, Suite 100, Seattle, WA 98121
TACOMA 934 Broadway, Suite 100, Tacoma, WA 98402
CENTRAL WA 414 N Pearl Street, Suite 8, Ellensburg, WA 98926

206.443.6212
ssfengineers.com

Criteria Sheet

Codes

Structural	IBC 2021
Loading	ASCE 7-16
Wood:	NDS 2018 / SDPWS 2021
Steel:	AISC 360-16
Concrete:	ACI 318-19
Masonry:	TMS 402/602-16

Project Location

Street & Number	3413 72nd Pl SE		
City:	Mercer Island	State:	WA
ZIP:	98040		
Latitude:	47.5796	N	
Longitude:	-122.2424	W	
Ground Elevation	299	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 =	5 kips	Ω_o=	2.5
S_S=	1.411	S_1=	0.491
S_{DS}=	1.13	S_{D1}=	0.89
C_s=	0.174	I_E=	1.0

Story Information

# Stories Above Grade (Including Mezzanine Levels)	2

Horizontal and Vertical Irregularities:

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

Wind Load Summary:

V=	98	K_{ZT}=	1.60
Exposure =	C		

Dead Loads:

Roof			Floor		
Roofing	1	psf	Finish Floor	2	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	5	psf		11.7	psf
	15	psf	Use	12	psf
Use	15	psf	Add'l Seismic Weight	12	psf
Add'l Seismic Weight	6	psf	Seismic Weight	24	psf
Seismic Weight	21	psf			

Roof - 6" max sloped rigid			Deck		
Rigid insulation	9.0	psf	IPE	8.5	psf, in lieu of finish floor
Use	24.0	psf (30 psf seismic)	Use	20.0	psf (32 psf seismic)

Live Loads:

Floor	40	psf	Deck	60	psf

Snow Loading Criteria:

Ground Snow, p_g	20	psf	Flat Roof Snow Load, p_f	25.0	psf
Exposure Factor, C_e	1.00		Sloped Roof Snow Load, p_s	25.0	psf
Thermal Factor, C_t	1.00		Slope Factor, C_s	0.61	

Importance Factor, I_s 1.00

Soils:

Allowable Bearing	1500	psf	Active	55/35	pcf (Restrained/Unrestrained)
Sliding, μ	0.3		Seismic Surcharge	8H	
Passive	250	pcf			

Soils Report Provided?	No	To be approved by the authority having jurisdiction, per 11.8.2 exception.
Site Specific Ground Motion Hazard Analysis Provided?	No	

SSF STRUCTURAL ENGINEERING

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

Eckels Anderson	
Criteria	
DATE	5/7/2024
PROJ. #	10213-2023-02
DESIGN	LAN
SHEET	1

Seismic Design

ASCE 7-16 Seismic Analysis | Equivalent Lateral Force Procedure | Apply Section 12.8.1.3 (Where Applicable)? Yes

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	I, II, or III, or IV per Table 1.5-1
Site Class	D (Default)	Assumed default soil properties, per 11.4.3.
Diaphragm Flexibility	Flexible	

Section 12.8.1.3

1. Regular Structure	No
2. ≤ 5 Stories above grade	Yes
3. T ≤ 0.5s	Yes
4. ρ = 1.0	No
5. Not Site Class E or F	Yes
6. Risk Category I or II	Yes

If all items above are met, S_{DS} may be taken as 1.0, but not less than 0.7*(Calculated S_{DS})

S_S	1.411 g	2% in 50 yr, Latitude & Longitude lookup
S_1	0.491 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	19.3 ft	
Ct	0.02	Table 12.8-2
x	0.75	Table 12.8-2
T_a	0.18 sec	
T	0.18 sec	Eq. 12.8-7
T_0	0.16 sec	
T_S	0.79 sec	
T_L	6.00 sec	
F_a	1.20	Table 11.4-1
F_v	1.81	Table 11.4-2
S_{MS}	1.69 g	Eq. 11.4-1
S_{M1}	1.33 g	Eq. 11.4-2
S_{DS}	1.129 g	Eq. 11.4-3
S_{D1}	0.888 g	Eq. 11.4-4
C_s	***0.174 Controls***	Eq. 12.8-2
	0.741	Eq. 12.8-3 need not exceed, T < T_L
	0.010	Eq. 12.8-5 or 12.8-6 minimum
C_s, design	0.174	
Bldg. Weight	28.6 k	
V = C_SW	5.0 k	Eq. 12.8-1, Strength Level Base Shear
V = C_{Sasd}W	3.5 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			Diaphragm Force (ρ not included)				
					C_{vx} (%)	F_x (k)	SV (k)	$F_{px,calc}$	$F_{px,min}$	$F_{px,max}$	$F_{px,design}$	γ=F_{px}/F_x
Roof	19.3	10.6	19.3	205	0.551	2.49	**2.49**	1.92	1.67	3.35	**1.92**	0.77
Upper	9.3	18.0	9.3	167	0.449	2.03	**4.52**	2.19	2.85	5.70	**2.85**	1.40
Σ		28.6		371		**4.52**						

Wind Design - MWFRS

ASCE 7 Chapter 27 - Directional Procedure

Design Method	ASD

Wind Coefficients

Exposure	C	
V=	98	mph
K_d=	0.85	Table 26.6-1
K_h=	0.90	Table 27.3-1
K_e=	0.99	Table 26.9-1
G=	0.85	26.9.4

Transverse Wind Pressures

L/B = 0.62 h/L = 0.92

Pressure Coefficients from Figure 27.4-1:

Bldg Face	C_p
Windward Wall	0.8
Leeward Wall	-0.50
Windward Roof	-1.12 / -0.18
Leeward Roof	-0.63

Location and Building Dimensions

Calculate Kzt?	No	
Kzt	1.60	
Roof Type	Gable	
Roof Slope - Transverse Dir	12	degrees
Roof Slope - Long Dir	0	degrees
Ground to top of roof	20.3	ft
Bot of roof to top of roof	2	ft
Mean Roof Height, h	19.3333	ft
Short Plan Dimension	21.0833	ft
Long Plan Dimension	33.75	ft
Parapet ?	No	
Ground to top of parapet		ft
Average Parapet Height		ft

Velocity Pressure at Mean Roof Height, q_h =	29.6	psf

Wall Pressures (Unfactored): ASD

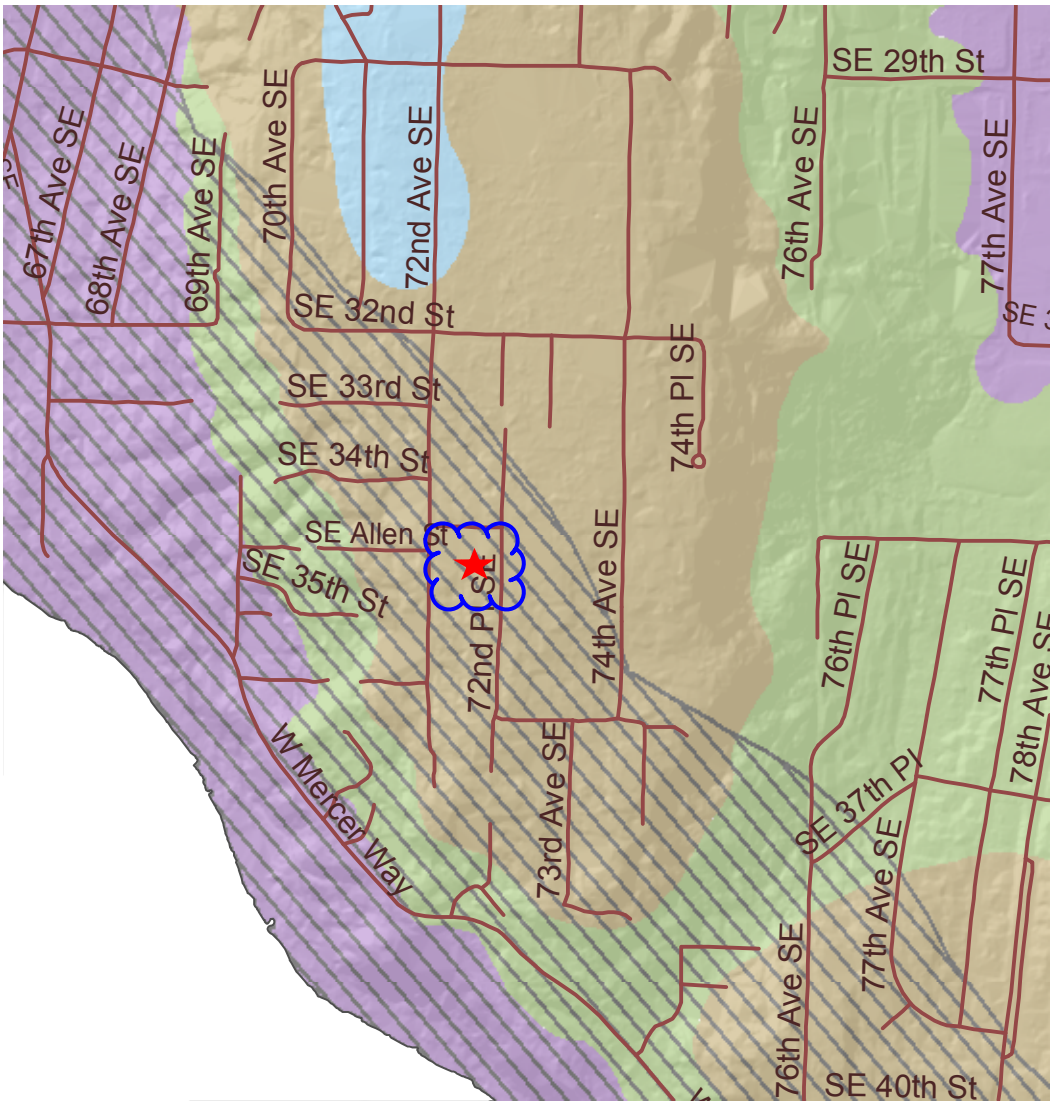
Ht	K_z	q_z	$P_{ww\ walls}$	$P_{lwwalls}$	**P_{walls} (psf)**
0-15	0.85	28.12	19.12	12.59	**19.0**
15-20	0.9	29.77	20.24	12.59	**19.7**
20-25	0.94	31.09	21.14	12.59	**20.2**
25-30	0.98	32.42	22.04	12.59	**20.8**
30-40	1.04	34.40	23.39	12.59	**21.6**
41-50	1.09	36.05	24.52	12.59	**22.3**
51-60	1.13	37.38	25.42	12.59	**22.8**
61-70	1.17	38.70	26.32	12.59	**23.3**
71-80	1.21	40.02	27.22	12.59	**23.9**
81-90	1.24	41.02	27.89	12.59	**24.3**
91-100	1.26	41.68	28.34	12.59	**24.6**

Roof Pressures (Unfactored) ASD

Windward		Leeward	**Horiz Proj (psf)**
Max	Min		
-4.5	-28.2	-15.9	**6.85**

SWENSON SAY FAGÉT
ssfengineers.com
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

Kzt and Exposure Category



WIND SPEED-UP (TOPOGRAPHIC EFFECT) - K_zt Factor :

K_zt Factor	
	$K_zt = 1.0$
	$K_zt = 1.3$
	$K_zt = 1.6$
	$K_zt = 1.9$

WIND EXPOSURE CATEGORIES:

Wind Exposure Category	
	Exposure 'C' (1500 feet from Lake)
	Exposure 'B' (all other areas)

SWENSON SAY FAGÉT
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926
206.443.6212
ssfengineers.com

STRUCTURAL ENGINEERING

Eckels Andersen
PROJECT

04/11/2024
DATE

10213-2023-02
PROJ. #

LAN
DESIGN

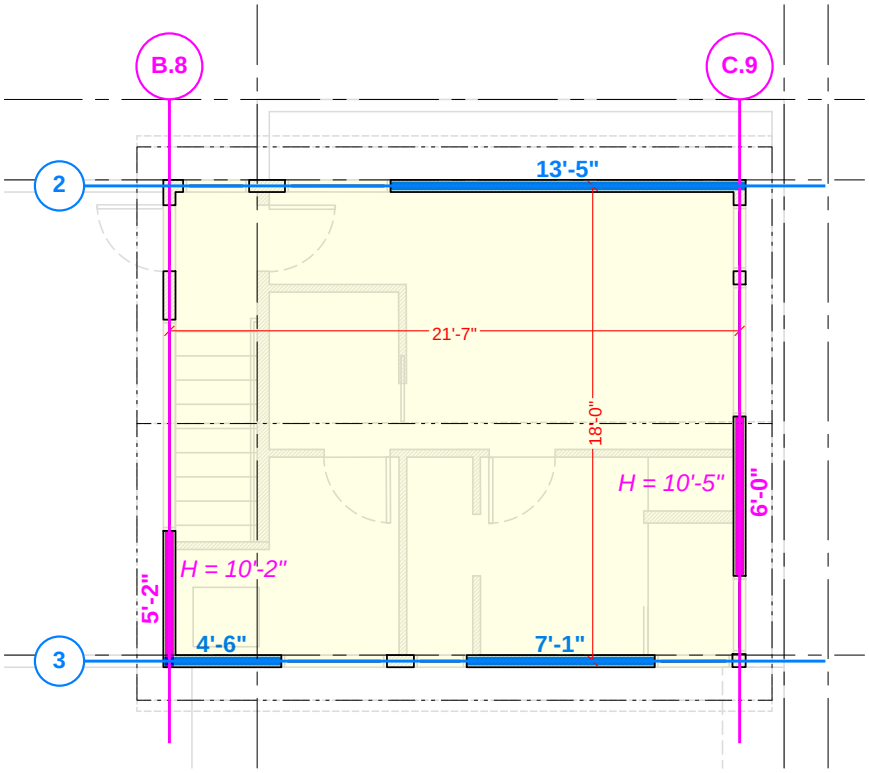
4
SHEET

Lateral Design - N/S Direction

ROOF

WIND --- Vx = 2.34 kips
w = 2.34 k / 21.58 ft
w = 109 plf

EQ --- Vx = 2.49 kips
w = 2.49 k / 21.58 ft
w = 116 plf



	Line B.8	*Line C.9*
V (k) W/EQ	1.17 / 1.25	1.17 / 1.25
V cum (k) W/EQ	1.17 / 1.25	1.17 / 1.25
L (ft) W/EQ	5.17 / 5.17	6.00 / 6.00
V (plf) W/EQ	227 / 242	195 / 209
SW type	W6	W6
OT (k)	2.46	2.17
0.6DL (k)	0.23	0.28
OT cum (k)	2.23	1.89
HD	CS14	CS14

SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

Lateral Design - N/S Direction

ROOF (DIAPHRAGM DESIGN)

WIND --- Vx = 2.34 kips
Vpx = 2.34 kips

EQ --- Vx = 2.49 kips
Vpx = 2.49*0.77*1.25
Vpx = 2.40 kips

DIAPHRAGM CAPACITY

unblocked -- 234 plf W/ 168 plf EQ

	Line B.8	***Line C.9***
V (k) W/EQ	1.17 / 1.20	1.17 / 1.20
Attach. L (ft)	18.50	18.50
V (plf) W/EQ	64 / 65	64 / 65
Unblocked OK?	YES	YES

INCLUDES STRUT LENGTH+ WALL LENGTH →

DRAG STRUT - LINE B.8

v line = 65 plf / v wall = 232 plf

Loc (ft)	Load (k)
0.00	0.00
5.17	-0.86
18.50	0.00

max load to strut = 0.86 kips
strut level = 0.86*(2.5/1.25) = 1.73 kips
strut use = top plate

DRAG STRUT - LINE C.9

v line = 65 plf / v wall = 200 plf

Loc (ft)	Load (k)
0.00	0.00
3.50	0.23
9.50	-0.58
18.50	0.00

max load to strut = 0.58 kips
strut level = 0.58*(2.5/1.25) = 1.17 kips
strut use = top plate

SSF STRUCTURAL ENGINEERING
SWENSON SAY FAGÉT
SEATTLE TACOMA CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926
206.443.6212
ssfengineers.com

Lateral Design - N/S Direction

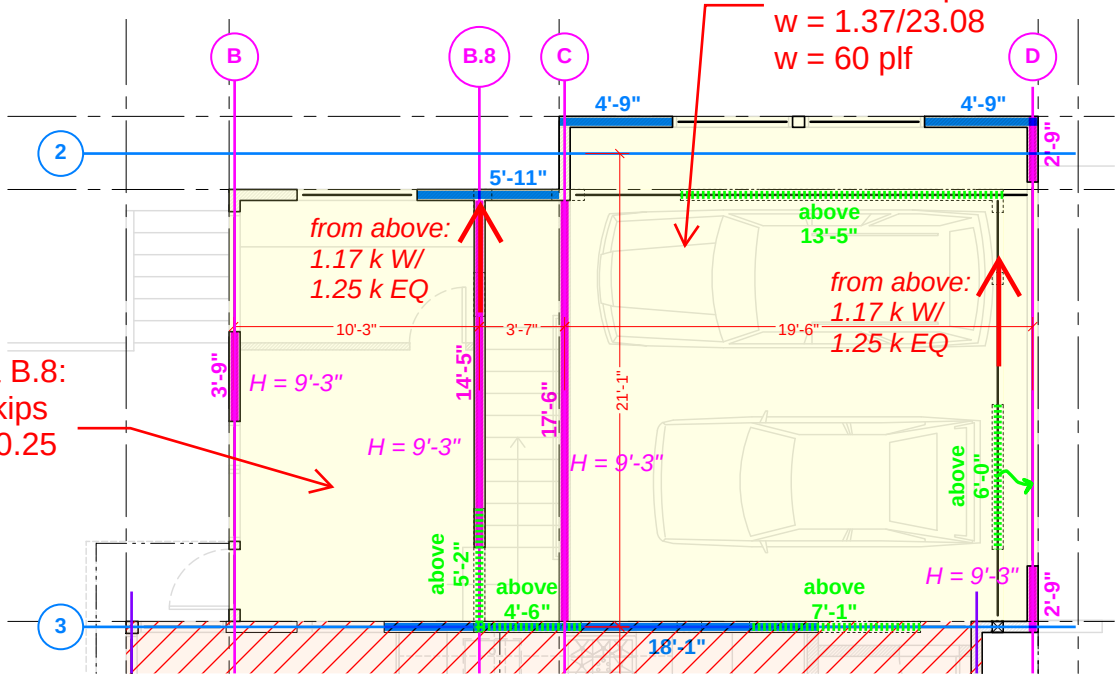
UPPER FLOOR - NEW

WIND --- Vx = 4.16 kips
w = 4.16 k / 33.33 ft
w = 125 plf

EQ --- Vx = 2.03 kips
varies

BTWN B.8 & D:
Vx = 1.37 kips
w = 1.37/23.08
w = 60 plf

BTWN B & B.8:
Vx = 0.66 kips
w = 0.66/10.25
w = 65 plf



	Line B	Line B.8	Line C	Line D
V (k) W/EQ	0.64 / 0.33	0.87 / 0.44	1.45 / 0.70	1.22 / 0.59
V cum (k) W/EQ	0.64 / 0.33	2.04 / 1.69	1.45 / 0.70	2.39 / 1.84
L (ft) W/EQ	3.75 / 3.75	14.42 / 14.42	17.50 / 17.50	5.50 / 3.28
V (plf) W/EQ	171 / 88	142 / 117	83 / 40	435 / 561
SW type	W6	W6	W6	W2
OT (k)	1.61	1.31	0.77	4.02
0.6DL (k)	0.18	0.48	-	0.11
OT cum (k)	1.43	-	-	3.91
HD	HDU2	-	-	HDU4

SWENSON SAY FAGÉT
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926
206.443.6212
ssfengineers.com

Lateral Design - N/S Direction

UPPER FLOOR (DIAPHRAGM DESIGN)

WIND --- Vx = 4.16 kips
Vpx = 4.16 kips

EQ --- Vx = 2.03 kips
Vpx = 2.03*1.40*1.25
Vpx = 3.55 kips

DIAPHRAGM CAPACITY

unblocked -- 234 plf W/ 168 plf EQ

	Line B	***Line B.8***	***Line C***	***Line D***
V (k) W/EQ	0.64 / 0.58	0.87 / 0.77	1.45 / 1.23	2.39 / 2.59
Attach. L (ft)	3.75	14.42	17.50	21.50
V (plf) W/EQ	171 / 155	142 / 54	83 / 71	111 / 120
Unblocked OK?	YES	YES	YES	YES

INCLUDES STRUT LENGTH + WALL LENGTH

INCLUDES LOAD FROM OFFSET WALL ABOVE

DRAG STRUT - LINE D

v line = 120 plf / v wall = 471 plf

Loc (ft)	Load (k)
0.00	0.00
2.75	-0.96
18.75	0.96
21.50	0.00

max load to strut = 0.96 kips
strut level = 0.96*(2.5/1.25) = 1.93 kips
strut use = CS14 strap

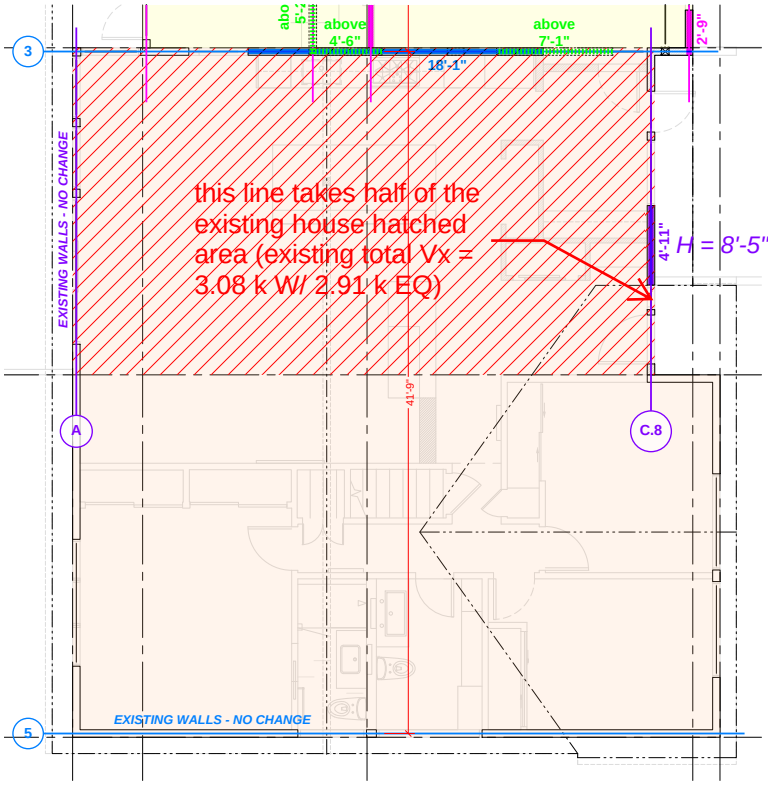
SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

Lateral Design - N/S Direction

UPPER FLOOR - EXISTING

WIND --- Vx = 3.08 kips

EQ --- Vx = 2.91 kips



	Line A	*Line C.8*
V (k) W/EQ	no changes	1.54 / 1.46
V cum (k) W/EQ	to this line	1.54 / 1.46
L (ft) W/EQ	-	4.92 / 4.92
V (plf) W/EQ	-	313 / 297
SW type	-	W4
OT (k)	-	2.64
0.6DL (k)	-	0.28
OT cum (k)	-	2.36
HD	-	HDU4

SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

Lateral Design - N/S Direction

UPPER FLOOR (DIAPHRAGM DESIGN)

WIND --- Vx = 3.08 kips
Vpx = 3.08 kips

EQ --- Vx = 2.91 kips
Vpx = 2.91*1.00*1.25
Vpx = 3.64 kips

DIAPHRAGM CAPACITY

unblocked -- 234 plf W/ 168 plf EQ

	Line A	***Line C.8***
V (k) W/EQ	no change	1.54 / 1.82
Attach. L (ft)	to this line	19.58
V (plf) W/EQ	-	79 / 93
Unblocked OK?	-	YES

INCLUDES STRUT LENGTH+ WALL LENGTH →

DRAG STRUT - LINE C.8

v line = 93 plf / v wall = 370 plf

Loc (ft)	Load (k)
0.00	0.00
3.50	0.51
9.50	-0.86
18.50	0.00

max load to strut = 0.86 kips
strut level = 0.86*(2.5/1.25) = 1.71 kips
strut use = top plate

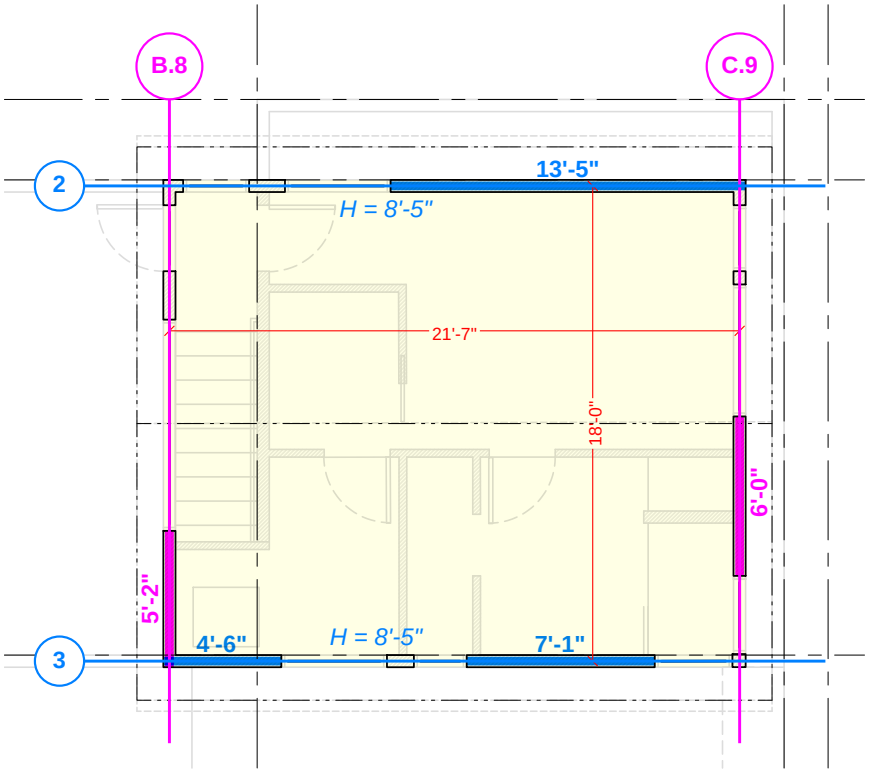
SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

Lateral Design - E/W Direction

ROOF

WIND --- Vx = 2.01 kips
w = 2.01 k / 18.00 ft
w = 112 plf

EQ --- Vx = 2.49 kips
w = 2.49 k / 18.00 ft
w = 138 plf



	Line 3	Line 2
V (k) W/EQ	1.01 / 1.25	1.01 / 1.25
V cum (k) W/EQ	1.01 / 1.25	1.01 / 1.25
L (ft) W/EQ	11.58 / 11.58	13.42 / 13.42
V (plf) W/EQ	87 / 108	75 / 93
SW type	W6	W6
OT (k)	0.90	0.78
0.6DL (k)	-	-
OT cum (k)	-	-
HD	-	-

SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

Lateral Design - E/W Direction

ROOF (DIAPHRAGM DESIGN)

WIND --- Vx = 2.01 kips
Vpx = 2.01 kips

EQ --- Vx = 2.49 kips
Vpx = 2.49*0.77*1.25
Vpx = 2.40 kips

DIAPHRAGM CAPACITY

unblocked -- 234 plf W/ 168 plf EQ

	Line 3	***Line 2***
V (k) W/EQ	1.01 / 1.20	1.01 / 1.20
Attach. L (ft)	11.58	13.42
V (plf) W/EQ	87 / 104	76 / 90
Unblocked OK?	YES	YES

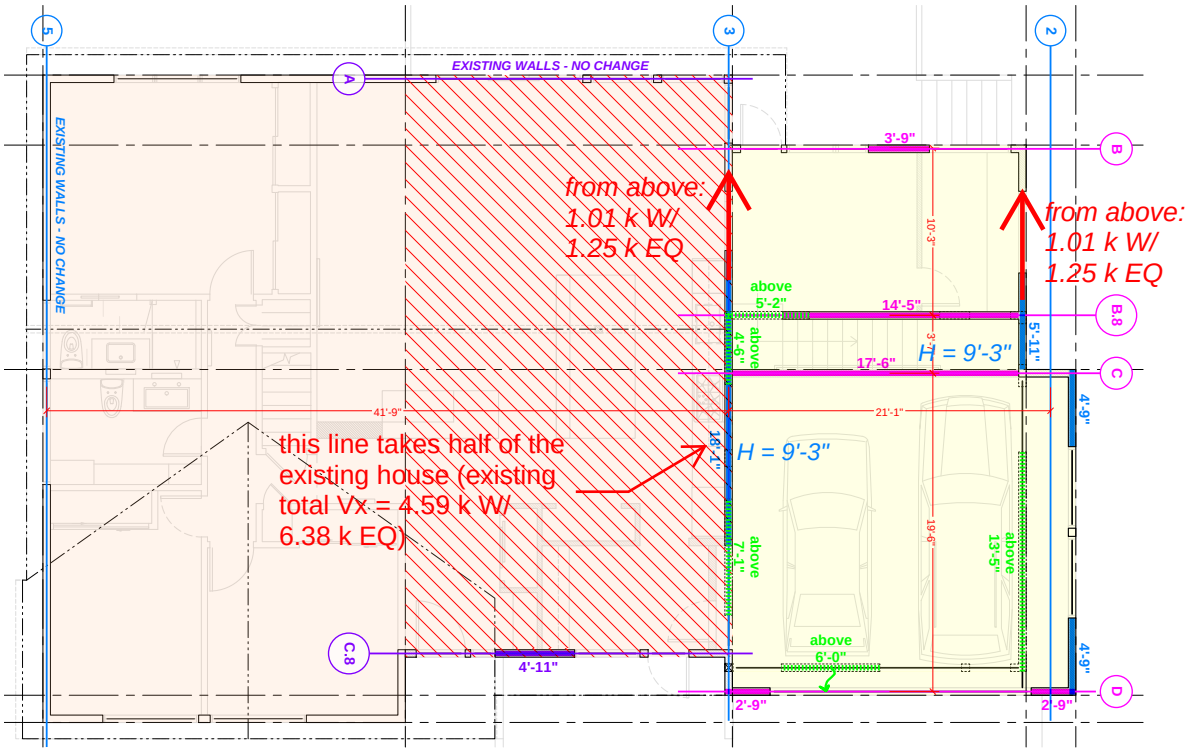
SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

Lateral Design - N/S Direction

UPPER FLOOR

WIND --- Vx = 3.50 kips
w = 3.50 k / 21.08 ft
w = 166 plf

EQ --- Vx = 2.03 kips
w = 2.03 k / 21.08 ft
w = 96 plf



	Line 5	*Line 3*	*Line 2*
V (k) W/EQ	no changes	4.05 / 4.21	1.75 / 1.02
V cum (k) W/EQ	to this line	5.09 / 5.46	2.76 / 2.27
L (ft) W/EQ	-	18.08 / 18.08	15.42 / 15.42
V (plf) W/EQ	-	282 / 302	179 / 147
SW type	-	W4	W6
OT (k)	-	2.79	1.66
0.6DL (k)	-	0.68	0.19
OT cum (k)	-	2.11	1.47
HD	-	HDU2	HDU2

SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

Lateral Design - N/S Direction

UPPER FLOOR (DIAPHRAGM DESIGN)

WIND --- Vx = 3.50 kips
Vpx = 3.50 kips

EQ --- Vx = 2.03 kips
Vpx = 2.03*1.40*1.25
Vpx = 3.55 kips

DIAPHRAGM CAPACITY

unblocked -- 234 plf W/ 168 plf EQ

	Line 5	***Line 3***	***Line 2***
V (k) W/EQ	no change	4.05 / 5.78	2.76 / 3.35
Attach. L (ft)	to this line	varies	33.75
V (plf) W/EQ	-	122 / 170	82 / 99
Unblocked OK?	-	YES	YES

INCLUDES STRUT LENGTH + WALL LENGTH

INCLUDES LOAD FROM OFFSET WALL ABOVE

DRAG STRUT - LINE 3

attach from L (existing) = 35.67 ft
W = 2.30 k / 35.67 ft = 65 plf
EQ = 3.99 k / 35.67 ft = 112 plf
attach from R (new) = 30.67 ft
W = 1.75 k / 30.67 ft = 57 plf
EQ = 1.79 k / 30.67 ft = 59 plf
total attach
W = 122 plf
EQ = 171 plf
^^OK as unblocked

v line = 184 plf / v wall = 320 plf

Loc (ft)	Load (k)
0.00	0.00
6.50	-1.20
25.00	1.26
31.42	0.00

max load to strut = 1.26 kips
strut level = 1.26*(2.5/1.25) = 2.51 kips
strut use = CS14 strap

SSF STRUCTURAL ENGINEERING
SWENSON SAY FAGÉT
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926
SEATTLE TACOMA CENTRAL WA
206.443.6212
ssfengineers.com

Lateral Design - N/S Direction

UPPER FLOOR (DIAPHRAGM DESIGN)

DRAG STRUT - LINE 2

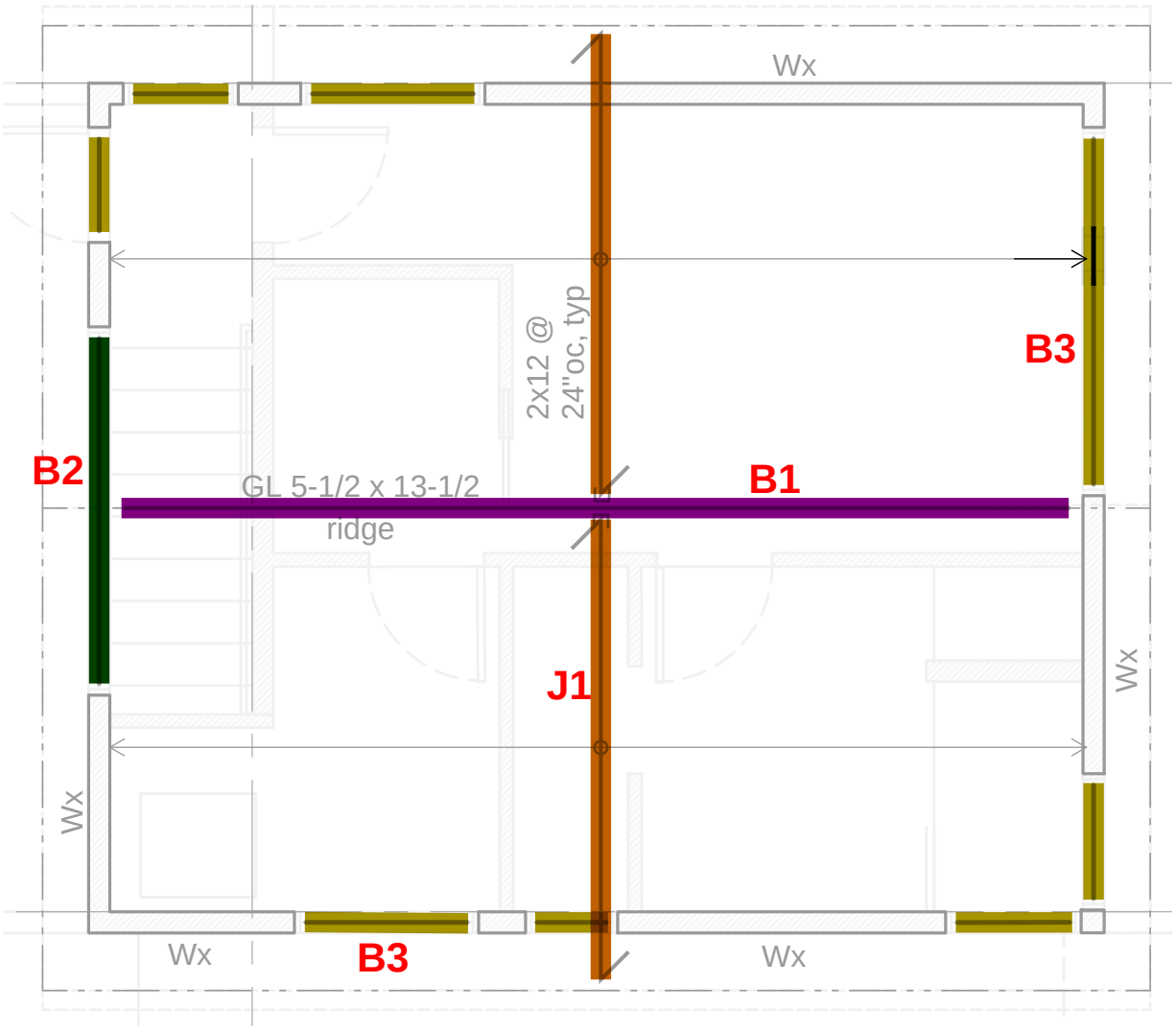
v line = 99 plf / v wall = 217 plf

Loc (ft)	Load (k)
0.00	0.00
7.83	0.78
19.00	-0.48
29.00	0.56
33.75	0.00

max load to strut = 0.78 kips
strut level = 0.78*(2.5/1.25) = 1.56 kips
strut use = top plate

SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

Gravity Key Plan - Roof

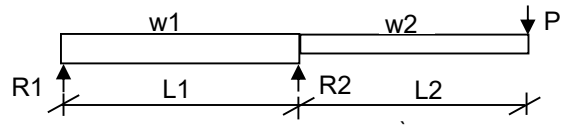


SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

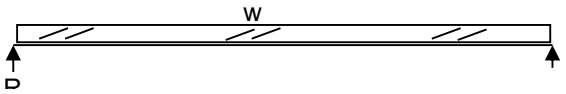
STRUCTURAL ENGINEERING

PROJECT	Eckels Andersen
DATE	04/15/2024
PROJ. #	10213-2023-02
DESIGN	LAN
SHEET	16

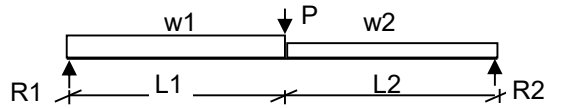
Beam		J1			HF 2 x 12	
w1=	80	plf		R1=	350	lbs
w2=	80	plf		R2=	490	lbs
L1=	9.00	ft		M+=	766	lb-ft
L2=	1.50	ft		M-=	90	lb-ft
X=	4.50	ft		Fb=	348	psi
P=	-	lbs		Fv=	31	psi
b=	1.25	in		Δspan=	0.057	in
d=	11.25	in		l span/	1,889	
E=	1,300	ksi		Δcant=	(0.03)	in
Cv=	1.00			l cant/	(1,259)	



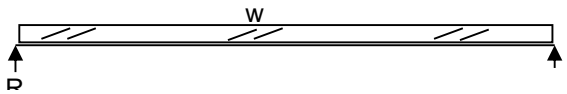
Beam		B1			GL 5 1/2 x 13 1/2	
w=	360	plf		R=	3,915	lbs
L=	21.75	ft		M=	21,288	ft-lbs
b=	5.50	in		Fb=	1,529	psi
d=	13.50	in		Fv=	71	psi
E=	1800	ksi		Δ=	0.89	in
Cv=	0.98	≤1.0		l /	292	



Beam		B2			DF 6 x 10	
w1=	90	plf		R1 =	2,340	lbs
w2=	90	plf		R2 =	2,340	lbs
L1=	4.25	ft		M =	9,132	lb-ft
L2=	4.25	ft		Fb =	1,325	psi
X=	4.3	ft		Fv =	65	psi
P=	3,915	lbs		Δ=	0.15	in
b=	5.50	in		l /	660	
d=	9.50	in		Cv=	1.00	
E=	1,600	ksi				



Beam		B3			HF 3 x 8	
w=	90	plf		R=	383	lbs
L=	8.50	ft		M=	813	ft-lbs
b=	3.00	in		Fb=	371	psi
d=	7.25	in		Fv=	23	psi
E=	1300	ksi		Δ=	0.09	in
Cv=	1.00	≤1.0		l /	1195	



STRUCTURAL ENGINEERING

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

Project: Eckels Andersen

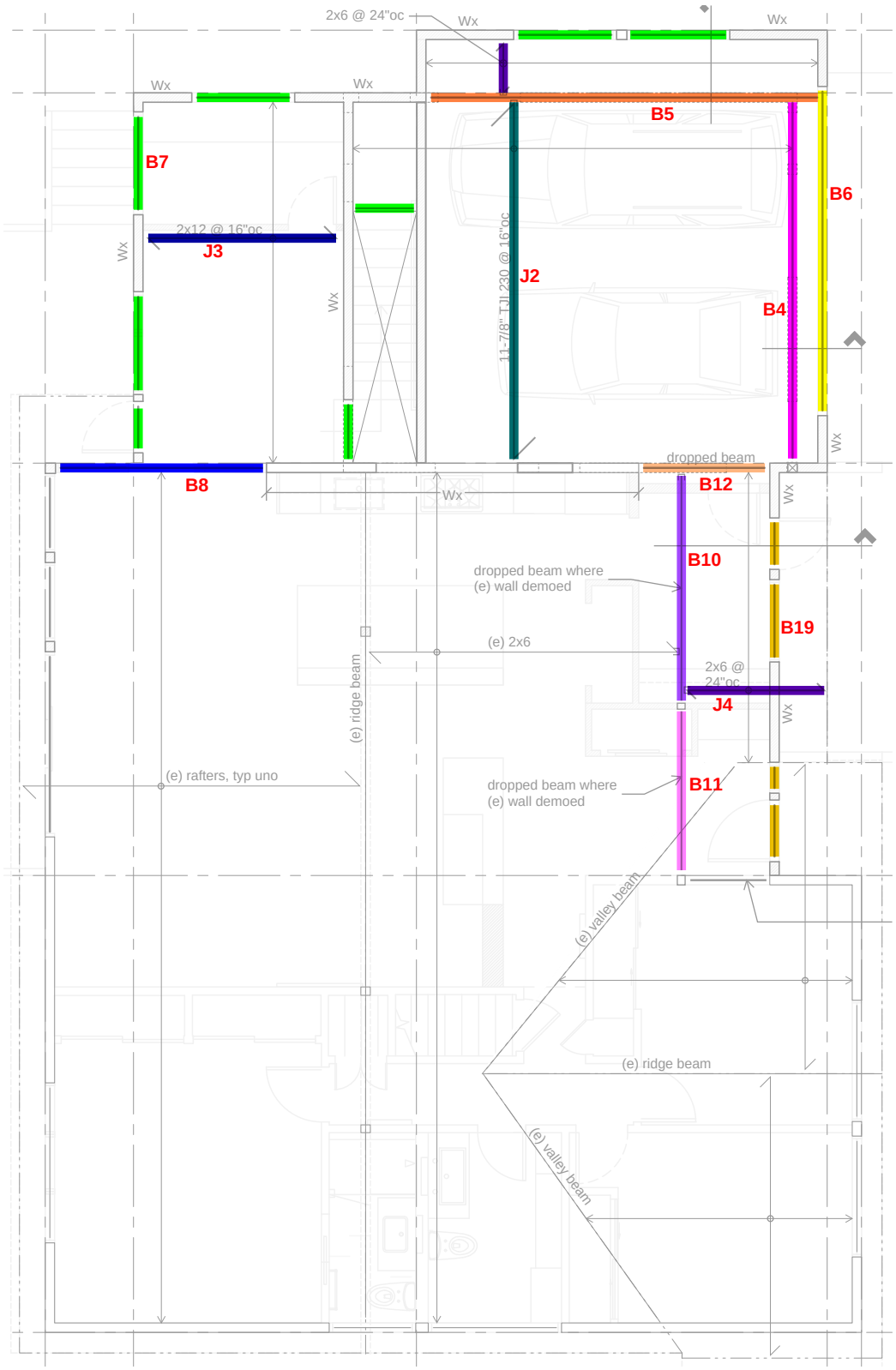
Date: 04/19/24

Project #: 10213-2023-02

Design: LAN

Sheet: 17

Gravity Key Plan - Upper Floor

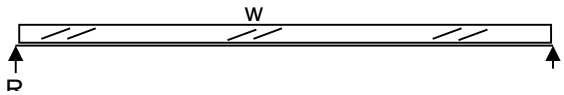


SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

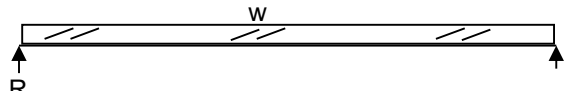
STRUCTURAL ENGINEERING

PROJECT	Eckels Andersen
DATE	04/15/2024
PROJ. #	10213-2023-02
DESIGN	LAN
SHEET	18

Beam		J2		HF	2	x 12
w=	69	plf		R=	624	lbs
L=	18.00	ft		M=	2,808	ft-lbs
b=	1.50	in		Fb=	1,065	psi
d=	11.25	in		Fv=	50	psi
E=	1300	ksi		Δ=	0.71	in
Cv=	1.00	≤1.0		l /	305	

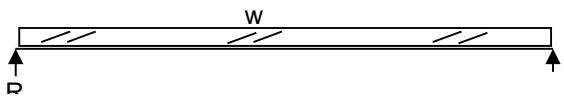


Beam		B7		HF	3	x 8
w=	410	plf		R=	1,076	lbs
L=	5.25	ft		M=	1,413	ft-lbs
b=	3.00	in		Fb=	645	psi
d=	7.25	in		Fv=	57	psi
E=	1300	ksi		Δ=	0.06	in
Cv=	1.00	≤1.0		l /	1113	

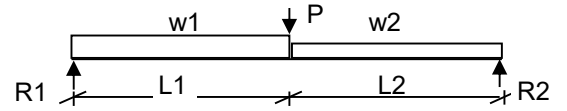


TJI Size	11.88	in		RE 1.75	11.875 TJI 210	
EI =	315	in^4		Ma=	3795	lb-ft
Δ =	0.570	in		Va=	1655	lbs
l /	379			Ra=	1005	lbs

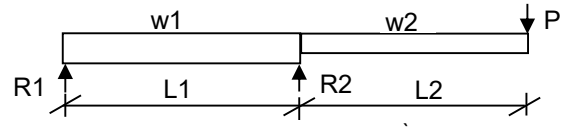
Beam		J3A		HF	2	x 9
w=	107	plf		R=	547	lbs
L=	10.25	ft		M=	1,401	ft-lbs
b=	1.50	in		Fb=	830	psi
d=	9.00	in		Fv=	52	psi
E=	1300	ksi		Δ=	0.22	in
Cv=	1.00	≤1.0		l /	550	



Beam		B8		HF	3	x 8
w1=	80	plf		R1 =	437	lbs
w2=	88	plf		R2 =	456	lbs
L1=	3.92	ft		M =	1,163	lb-ft
L2=	6.58	ft		Fb =	531	psi
X=	5.3	ft		Fv =	28	psi
P=	-	lbs		Δ=	0.19	in
b=	3.00	in		l /	667	
d=	7.25	in		Cv=	1.00	
E=	1,300	ksi				



Beam		J4		HF	2	x 6
w1=	80	plf		R1=	121	lbs
w2=	80	plf		R2=	446	lbs
L1=	4.50	ft		M+=	91	lb-ft
L2=	2.58	ft		M-=	267	lb-ft
X=	2.25	ft		Fb=	424	psi
P=	-	lbs		Fv=	37	psi
b=	1.50	in		Δspan=	0.006	in
d=	5.50	in		l span/	9,461	
E=	1,300	ksi		Δcant=	0.04	in
Cv=	1.00			l cant/	1,396	



STRUCTURAL ENGINEERING

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

Project: Eckels Anderson

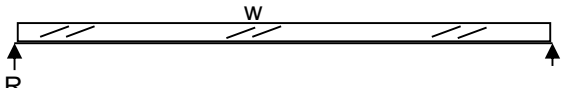
Date: 05/07/24

Project #: 10213-2023-02

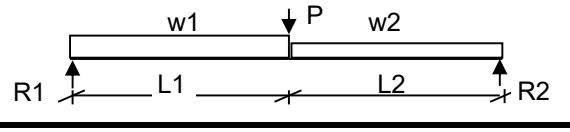
Design: LAN

Sheet: 19

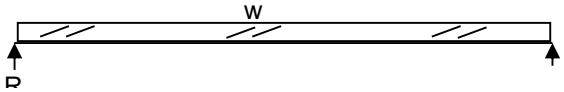
Beam		B10		LVL	5 1/4 x 7 1/2	
w=	400	plf		R=	2,350	lbs
L=	11.75	ft		M=	6,903	ft-lbs
b=	5.25	in		Fb=	1,683	psi
d=	7.50	in		Fv=	80	psi
E=	2000	ksi		Δ=	0.46	in
Cv=	1.00	≤1.0		l /	303	



Beam		B11		LVL	15 3/4 x 7 1/2	
w1=	350	plf		R1 =	4,242	lbs
w2=	400	plf		R2 =	2,785	lbs
L1=	2.50	ft		M =	9,511	lb-ft
L2=	6.00	ft		Fb =	773	psi
X=	4.3	ft		Fv =	51	psi
P=	3,752	lbs		Δ=	0.10	in
b=	15.75	in		l /	1,021	
d=	7.50	in		Cv=	1.00	
E=	2,000	ksi				



Beam		B19		HF	3 x 6	
w=	240	plf		R=	540	lbs
L=	4.50	ft		M=	608	ft-lbs
b=	3.00	in		Fb=	482	psi
d=	5.50	in		Fv=	39	psi
E=	1300	ksi		Δ=	0.04	in
Cv=	1.00	≤1.0		l /	1318	



STRUCTURAL ENGINEERING

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

Project: Eckels Andersen

Date: 04/19/24

Project #: 10213-2023-02

Design: LAN

Sheet: 20

Beam Analysis

Beam:		B4 gravity					
Load		Dead	Live	Snow	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.204**	**0.027**	**0.106**		0.337	
	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					0.000	
	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		2
Total Beam Length		**18.00**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	3.037	**0.00**
R_2	3.037	**18.00**
R_3	0.000	**18.00**
R_4	0.000	**18.00**
R_5	0.000	**18.00**
R_6	0.000	**18.00**
R_7	0.000	**18.00**
R_8	0.000	**18.00**
R_9	0.000	**18.00**
R_{10}	0.000	**18.00**

Demand Output		
Location, ft		**10.00**
Shear, k		-0.34
Moment, k-ft	M =	13.50
Deflection, in	D =	-0.54
Δ/Span		L/403

Load Factors	
Dead	**1.00**
Live	**1.00**
Snow	**1.00**
Seismic	**1.00**

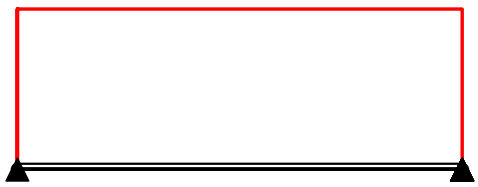
Stresses @ Input Location	
f_v (psi)	-8
f_b (psi)	1313

Max/Min Stresses	
f_{v_MAX} (psi)	73
f_{v_MIN} (psi)	-73
f_{b_MAX} (psi)	1332
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**2000**
b (in)	**5.25**
d (in)	**11.875**
I (in^4)	732.62
S (in^3)	123.39
A (in^2)	62.344
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	3.04	-3.04	-	13.7	-0.544 (↓)	9	L/397	-0.043 (↓)	9	L/5023

SWENSON SAY FAGÉT
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
ssfengineers.com

Beam Analysis

Beam:	B4 EQ					
Load	Dead	Live	Snow	Seismic	Factored	Location
Distributed (k/ft) w_1	**0.209**	**0.027**	**0.125**		0.323	
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				**-4.15**	-3.115	**3.42**
P_2				**4.15**	3.115	**9.17**
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		**18.00**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	1.910	**0.00**
R_2	3.900	**18.00**
R_3	0.000	**18.00**
R_4	0.000	**18.00**
R_5	0.000	**18.00**
R_6	0.000	**18.00**
R_7	0.000	**18.00**
R_8	0.000	**18.00**
R_9	0.000	**18.00**
R_{10}	0.000	**18.00**

Demand Output		
Location, ft		**10.00**
Shear, k		-1.32
Moment, k-ft	M =	20.87
Deflection, in	D =	-0.72
Δ/Span		L/300

Load Factors	
Dead	**1.00**
Live	**0.75**
Snow	**0.75**
Seismic	**0.75**

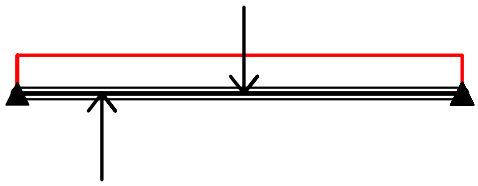
Stresses @ Input Location	
f_v (psi)	-32
f_b (psi)	2030

Max/Min Stresses	
f_{v_MAX} (psi)	46
f_{v_MIN} (psi)	-94
f_{b_MAX} (psi)	2120
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**2000**
b (in)	**5.25**
d (in)	**11.875**
I (in^4)	732.62
S (in^3)	123.39
A (in^2)	62.344
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	1.91	-3.9	-	21.8	-0.856 (↓)	9.4	L/252	-0.043 (↓)	9	L/5023

SWENSON SAY FAGÉT
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
ssfengineers.com

Beam Analysis

Beam:		B5 gravity					
Load		Dead	Live	Snow	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.341**	**0.360**	**0.194**		0.756	**0**
	w_2	**-0.194**		**-0.153**		-0.309	**0.75**
	w_3	**0.194**		**0.153**		0.309	**5.00**
	w_4	**-0.194**		**-0.153**		-0.309	**18.00**
	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	**0.195**	**0.325**			0.439	**0.75**
	P_2	**0.195**	**0.325**			0.439	**5.00**
	P_3	**1.840**	**0.240**	**0.960**		2.740	**18.00**
	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		**19.50**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	7.196	**0.00**
R_2	9.393	**19.50**
R_3	0.000	**19.50**
R_4	0.000	**19.50**
R_5	0.000	**19.50**
R_6	0.000	**19.50**
R_7	0.000	**19.50**
R_8	0.000	**19.50**
R_9	0.000	**19.50**
R_{10}	0.000	**19.50**

Demand Output		
Location, ft		**10.00**
Shear, k		0.07
Moment, k-ft	M =	37.24
Deflection, in	D =	-0.58
Δ/Span		L/405

Load Factors	
Dead	**1.00**
Live	**0.75**
Snow	**0.75**
Seismic	**1.00**

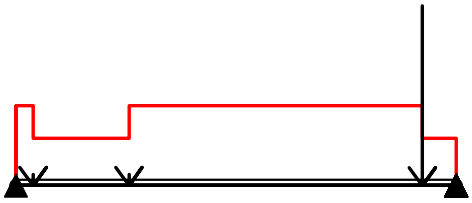
Stresses @ Input Location	
f_v (psi)	1
f_b (psi)	1362

Max/Min Stresses	
f_{v_MAX} (psi)	82
f_{v_MIN} (psi)	-107
f_{b_MAX} (psi)	1360
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**8.75**
d (in)	**15**
I (in^4)	2460.9
S (in^3)	328.13
A (in^2)	131.25
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	7.2	-9.39	-	37.2	-0.684 (↓)	9.9	L/342	-0.284 (↓)	9.7	L/824

SWENSON SAY FAGÉT
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
ssfengineers.com

Beam Analysis

Beam:	B5 EQ					
Load		Dead	Live	Snow	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.341**	**0.360**	**0.194**		0.756	**0**
	w_2	**-0.194**		**-0.153**		-0.309	**0.75**
	w_3	**0.194**		**0.153**		0.309	**5.00**
	w_4	**-0.194**		**-0.153**		-0.309	**18.00**
	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	**0.195**	**0.325**			0.439	**0.75**
	P_2	**0.195**	**0.325**			0.439	**5.00**
	P_3	**1.840**	**0.240**	**0.960**	**1.330**	3.738	**18.00**
	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		**19.50**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	7.273	**0.00**
R_2	10.314	**19.50**
R_3	0.000	**19.50**
R_4	0.000	**19.50**
R_5	0.000	**19.50**
R_6	0.000	**19.50**
R_7	0.000	**19.50**
R_8	0.000	**19.50**
R_9	0.000	**19.50**
R_{10}	0.000	**19.50**

Demand Output		
Location, ft		**10.00**
Shear, k		0.14
Moment, k-ft	M =	38.01
Deflection, in	D =	-0.59
Δ/Span		L/395

Load Factors	
Dead	**1.00**
Live	**0.75**
Snow	**0.75**
Seismic	**0.75**

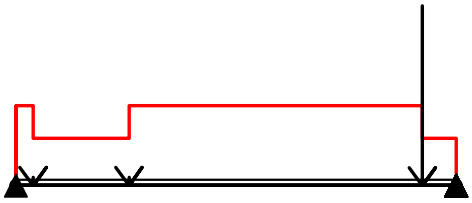
Stresses @ Input Location	
f_v (psi)	2
f_b (psi)	1390

Max/Min Stresses	
f_{v_MAX} (psi)	83
f_{v_MIN} (psi)	-118
f_{b_MAX} (psi)	1390
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**8.75**
d (in)	**15**
I (in^4)	2460.9
S (in^3)	328.13
A (in^2)	131.25
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	7.27	-10.3	-	38	-0.702 (↓)	9.9	L/333	-0.284 (↓)	9.7	L/824

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
ssfengineers.com

Beam Analysis

Beam:		B6 gravity					
Load		Dead	Live	Snow	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.024**		**0.025**		0.049	
	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	**4.68**	**3.83**	**2.46**		10.970	**15.67**
	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		2
Total Beam Length		**16.25**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	0.792	**0.00**
R_2	10.974	**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		0.30
Moment, k-ft	M =	5.47
Deflection, in	D =	-0.18
Δ/Span		L/1109

Load Factors	
Dead	**1.00**
Live	**1.00**
Snow	**1.00**
Seismic	**1.00**

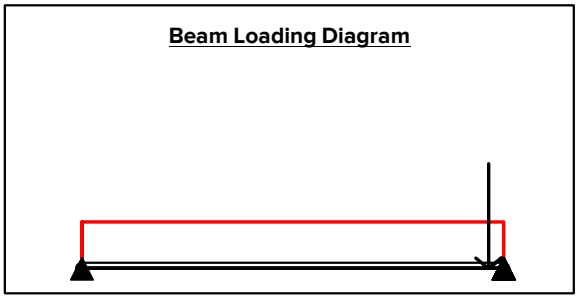
Stresses @ Input Location	
f_v (psi)	7
f_b (psi)	532

Max/Min Stresses	
f_{v_MAX} (psi)	19
f_{v_MIN} (psi)	-265
f_{b_MAX} (psi)	621
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**2000**
b (in)	**5.25**
d (in)	**11.875**
I (in^4)	732.62
S (in^3)	123.39
A (in^2)	62.344
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	0.792	-11	-	6.39	-0.179 (↓)	9	L/1089	-0.045 (↓)	9.4	L/4333

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
ssfengineers.com

Beam Analysis

Beam:		B6 EQ					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.024**	**0.025**			0.043	
	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	**4.68**	**3.83**	**2.46**	**1.23**	10.320	**15.67**
	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		2
Total Beam Length		**16.25**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	0.718	**0.00**
R_2	10.297	**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		0.29
Moment, k-ft	M =	5.04
Deflection, in	D =	-0.16
Δ/Span		L/1203

Load Factors	
Dead	**1.00**
Live	**0.75**
Roof Live	**0.75**
Seismic	**0.75**

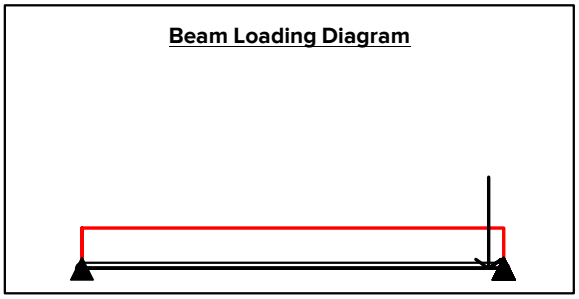
Stresses @ Input Location	
f_v (psi)	7
f_b (psi)	490

Max/Min Stresses	
f_{v_MAX} (psi)	17
f_{v_MIN} (psi)	-248
f_{b_MAX} (psi)	584
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**2000**
b (in)	**5.25**
d (in)	**11.875**
I (in^4)	732.62
S (in^3)	123.39
A (in^2)	62.344
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	0.718	-10.3	0	6	-0.193 (↓)	9	L/1010	-0.071 (↓)	8.9	L/2746

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
ssfengineers.com

Beam Analysis

Beam:		B12					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.317**	**0.360**	**0.178**		0.855	**0.00**
	w_2	**-0.194**		**-0.153**		-0.347	**4.33**
	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	**0.881**	**1.469**			2.350	**2.25**
	P_2	**0.149**	**0.249**			0.398	**4.33**
	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		**6.50**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	4.323	**0.00**
R_2	3.231	**6.50**
R_3	0.000	**6.50**
R_4	0.000	**6.50**
R_5	0.000	**6.50**
R_6	0.000	**6.50**
R_7	0.000	**6.50**
R_8	0.000	**6.50**
R_9	0.000	**6.50**
R_{10}	0.000	**6.50**

Demand Output		
Location, ft		**3.25**
Shear, k		-0.81
Moment, k-ft	M =	7.18
Deflection, in	D =	-0.22
Δ/Span		L/352

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

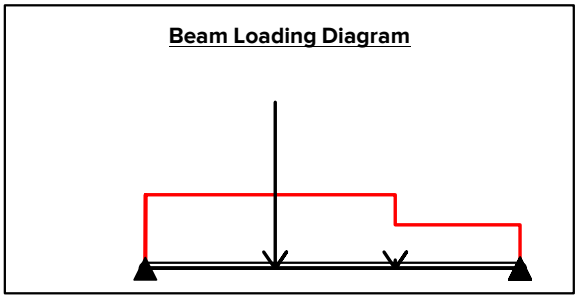
Stresses @ Input Location	
f_v (psi)	-46
f_b (psi)	2627

Max/Min Stresses	
f_{v_MAX} (psi)	247
f_{v_MIN} (psi)	-185
f_{b_MAX} (psi)	2765
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**2000**
b (in)	**3.5**
d (in)	**7.5**
I (in^4)	123.05
S (in^3)	32.813
A (in^2)	26.25
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section	NONE

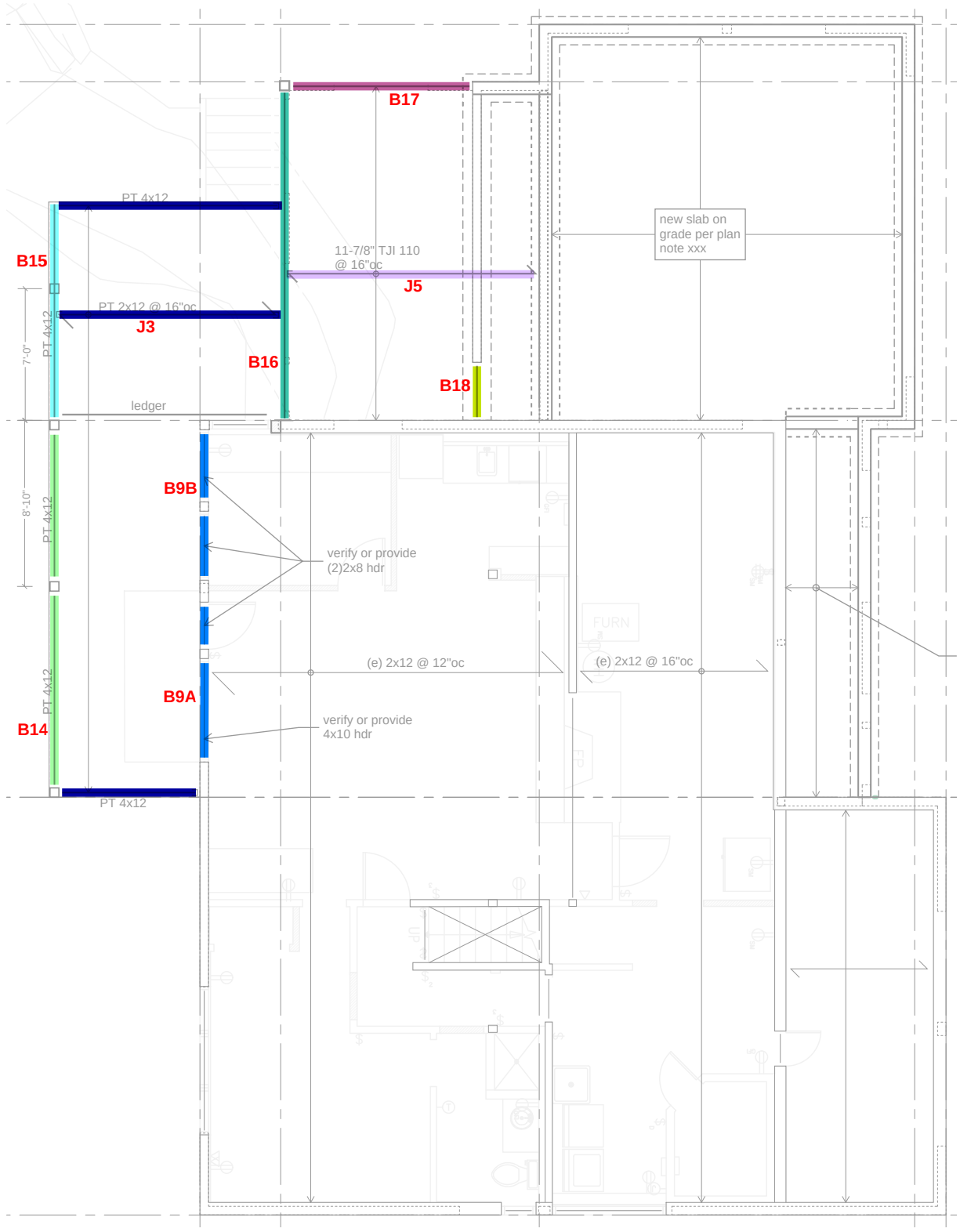
Beam Loading Diagram



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	4.32	-3.23	0	7.56	-0.222 (↓)	3.1	L/351	-0.119 (↓)	3.1	L/655

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

Gravity Key Plan - Main Floor



SWENSON SAY FAGÉT
206.443.6212
ssfengineers.com
SEATTLE
TACOMA
CENTRAL WA
2124 Third Avenue, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402
414 N Pearl Street, Suite 8, Ellensburg, WA 98926

STRUCTURAL ENGINEERING

Eckels Andersen
PROJECT

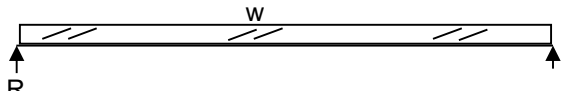
04/15/2024
DATE

10213-2023-02
PROJ. #

LAN
DESIGN

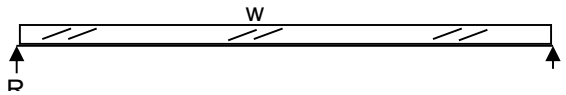
28
SHEET

Beam		J5		HF	2	x 12
w=	69	plf		R=	355	lbs
L=	10.25	ft		M=	911	ft-lbs
b=	1.50	in		Fb=	345	psi
d=	11.25	in		Fv=	26	psi
E=	1300	ksi		Δ=	0.07	in
Cv=	1.00	≤1.0		l /	1653	

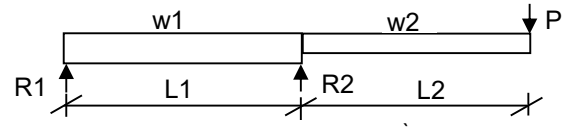


TJI Size	11.88	in		RE 1.75	11.875 TJI 110	
EI =	267	in^4		Ma=	3160	lb-ft
Δ =	0.081	in		Va=	1560	lbs
l /	1521			Ra=	910	lbs

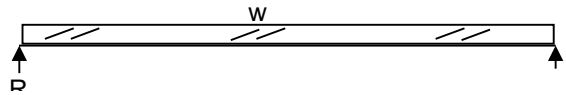
Beam		B14		HF	6	x 12
w=	320	plf		R=	1,760	lbs
L=	11.00	ft		M=	4,840	ft-lbs
b=	5.50	in		Fb=	479	psi
d=	11.50	in		Fv=	34	psi
E=	1200	ksi		Δ=	0.13	in
Cv=	1.00	≤1.0		l /	1047	



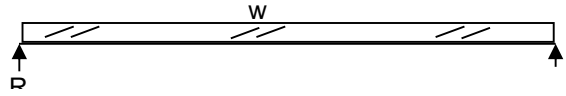
Beam		B15		HF	6	x 12
w1=	490	plf		R1=	1014	lbs
w2=	490	plf		R2=	4,866	lbs
L1=	7.25	ft		M+=	1,049	lb-ft
L2=	4.75	ft		M-=	5,528	lb-ft
X=	3.63	ft		Fb=	547	psi
P=	-	lbs		Fv=	49	psi
b=	5.50	in		Δspan=	(0.001)	in
d=	11.50	in		l span/	(65,921)	
E=	1,000	ksi		Δcant=	0.14	in
Cv=	1.00			l cant/	797	



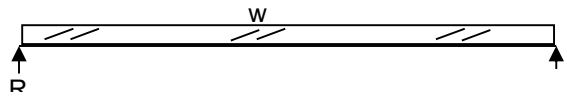
Beam		B9A		DF-L	4	x 10
w=	834	plf		R=	2,501	lbs
L=	6.00	ft		M=	3,751	ft-lbs
b=	3.50	in		Fb=	902	psi
d=	9.25	in		Fv=	86	psi
E=	1600	ksi		Δ=	0.07	in
Cv=	1.00	≤1.0		l /	1094	



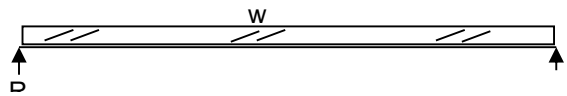
Beam		B9B		DF-L	3	x 8
w=	834	plf		R=	1,771	lbs
L=	4.25	ft		M=	1,882	ft-lbs
b=	3.00	in		Fb=	859	psi
d=	7.25	in		Fv=	87	psi
E=	1600	ksi		Δ=	0.04	in
Cv=	1.00	≤1.0		l /	1271	



Beam		B18		DF-L	4	x 6
w=	551	plf		R=	965	lbs
L=	3.50	ft		M=	844	ft-lbs
b=	3.50	in		Fb=	574	psi
d=	5.50	in		Fv=	55	psi
E=	1600	ksi		Δ=	0.02	in
Cv=	1.00	≤1.0		l /	1752	



Beam		J3B		HF	2	x 12
w=	107	plf		R=	653	lbs
L=	12.25	ft		M=	2,001	ft-lbs
b=	1.50	in		Fb=	759	psi
d=	11.25	in		Fv=	49	psi
E=	1300	ksi		Δ=	0.23	in
Cv=	1.00	≤1.0		l /	629	



STRUCTURAL ENGINEERING

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

Project: Eckels Anderson

Date: 05/07/24

Project #: 10213-2023-02

Design: LAN

Sheet: 29

Beam Analysis

Beam:		B16 gravity					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.450**	**0.952**			1.402	**0**
	w_2	**-0.266**	**-0.379**			-0.645	**0.67**
	w_3	**0.235**	**0.379**			0.614	**8.67**
	w_4	**-0.123**	**-0.368**			-0.490	**11.75**
	w_5	**-0.235**	**-0.379**			-0.614	**12.33**
	w_6	**0.223**	**0.379**			0.602	**17.42**
	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	**0.200**	**0.522**			0.722	**0.67**
	P_2	**0.470**	**1.332**			1.802	**3.42**
	P_3	**0.270**	**0.810**			1.080	**8.67**
	P_4	**0.270**	**0.810**			1.080	**12.33**
	P_5	**0.270**	**0.810**			1.080	**17.42**
	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		**18.00**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	10.732	**0.00**
R_2	8.618	**18.00**
R_3	0.000	**18.00**
R_4	0.000	**18.00**
R_5	0.000	**18.00**
R_6	0.000	**18.00**
R_7	0.000	**18.00**
R_8	0.000	**18.00**
R_9	0.000	**18.00**
R_{10}	0.000	**18.00**

Demand Output		
Location, ft		**10.00**
Shear, k	V	-1.68
Moment, k-ft	M =	44.76
Deflection, in	D =	-0.69
Δ/Span		L/315

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

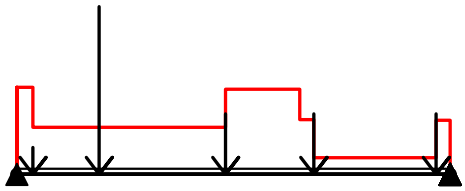
Stresses @ Input Location	
f_v (psi)	-28
f_b (psi)	2152

Max/Min Stresses	
f_{v_MAX} (psi)	177
f_{v_MIN} (psi)	-142
f_{b_MAX} (psi)	2202
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**5.5**
d (in)	**16.5**
I (in^4)	2058.9
S (in^3)	249.56
A (in^2)	90.75
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	10.7	-8.62	-	45.8	-0.699 (↓)	8.9	L/309	-0.51 (↓)	8.9	L/424

SWENSON SAY FAGÉT
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
ssfengineers.com

STRUCTURAL ENGINEERING

PROJECT Eckels Anderson

DATE 5/7/2024
PROJ. # 10213-2023-02
DESIGN LAN
SHEET 30

Beam Analysis

Beam:		B16 EQ					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.450**	**0.952**			1.402	**0**
	w_2	**-0.266**	**-0.379**			-0.645	**0.67**
	w_3	**0.235**	**0.379**			0.614	**8.67**
	w_4	**-0.123**	**-0.368**			-0.490	**11.75**
	w_5	**-0.235**	**-0.379**			-0.614	**12.33**
	w_6	**0.223**	**0.379**			0.602	**17.42**
	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	**0.200**	**0.522**			0.722	**0.67**
	P_2	**0.470**	**1.332**			1.802	**3.42**
	P_3	**0.270**	**0.810**		**-3.173**	-2.093	**8.67**
	P_4	**0.270**	**0.810**		**3.173**	4.253	**12.33**
	P_5	**0.270**	**0.810**			1.080	**17.42**
	P_6					0.000	
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Steel Beam Section	NONE

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**18.00**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	10.086	**0.00**
R_2	9.264	**18.00**
R_3	0.000	**18.00**
R_4	0.000	**18.00**
R_5	0.000	**18.00**
R_6	0.000	**18.00**
R_7	0.000	**18.00**
R_8	0.000	**18.00**
R_9	0.000	**18.00**
R_{10}	0.000	**18.00**

Demand Output		
Location, ft		**10.00**
Shear, k	V	0.84
Moment, k-ft	M =	42.52
Deflection, in	D =	-0.66
Δ/Span		L/327

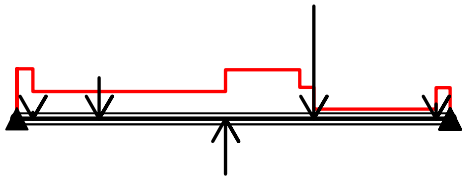
Load Factors	
Dead	**1.00**
Live	**1.00**
Roof Live	**1.00**
Seismic	**1.00**

Stresses @ Input Location	
f_v (psi)	14
f_b (psi)	2045

Max/Min Stresses	
f_{v_MAX} (psi)	167
f_{v_MIN} (psi)	-153
f_{b_MAX} (psi)	2058
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1800**
b (in)	**5.5**
d (in)	**16.5**
I (in^4)	2058.9
S (in^3)	249.56
A (in^2)	90.75
I (Override)	
S (Override)	
A (Override)	

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	10.1	-9.26	0	42.8	-0.667 (↓)	9.1	L/324	-0.51 (↓)	8.9	L/424

SWENSON SAY FAGÉT
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
ssfengineers.com

STRUCTURAL ENGINEERING

PROJECT	Eckels Anderson
DATE	*5/7/2024*
PROJ. #	10213-2023-02
DESIGN	LAN
SHEET	31

Beam Analysis

Beam:	B17 gravity					
Load	Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft) w_1	**0.118**	**0.067**			0.185	**0.00**
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					0.000	
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		2
Total Beam Length		**10.25**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	0.946	**0.00**
R_2	0.946	**10.25**
R_3	0.000	**10.25**
R_4	0.000	**10.25**
R_5	0.000	**10.25**
R_6	0.000	**10.25**
R_7	0.000	**10.25**
R_8	0.000	**10.25**
R_9	0.000	**10.25**
R_{10}	0.000	**10.25**

Demand Output		
Location, ft		**10.00**
Shear, k		-0.90
Moment, k-ft	M =	0.23
Deflection, in	D =	0.00
Δ/Span		L/26044

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

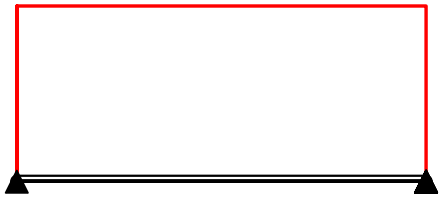
Stresses @ Input Location	
f_v (psi)	-32
f_b (psi)	34

Max/Min Stresses	
f_{v_MAX} (psi)	34
f_{v_MIN} (psi)	-34
f_{b_MAX} (psi)	354
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1550**
b (in)	**3.5**
d (in)	**11.875**
I (in^4)	488.41
S (in^3)	82.259
A (in^2)	41.563
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	0.946	-0.946	-	2.43	-0.061 (↓)	5.1	L/2016	-0.022 (↓)	5.1	L/5591

SWENSON SAY FAGÉT
ssfengineers.com
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 Analysis

Beam:		B17 EQ					
Load		Dead	Live	Roof Live	Seismic	Factored	Location
Distributed (k/ft)	w_1	**0.118**	**0.067**			0.168	**0.00**
	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				**3.192**	3.192	**7.67**
	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		2
Total Beam Length		**10.25**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	1.666	**0.00**
R_2	3.249	**10.25**
R_3	0.000	**10.25**
R_4	0.000	**10.25**
R_5	0.000	**10.25**
R_6	0.000	**10.25**
R_7	0.000	**10.25**
R_8	0.000	**10.25**
R_9	0.000	**10.25**
R_{10}	0.000	**10.25**

Demand Output		
Location, ft		**10.00**
Shear, k		-3.21
Moment, k-ft	M =	0.81
Deflection, in	D =	-0.01
Δ/Span		L/8315

Load Factors	
Dead	**1.00**
Live	**0.75**
Roof Live	**0.75**
Seismic	**1.00**

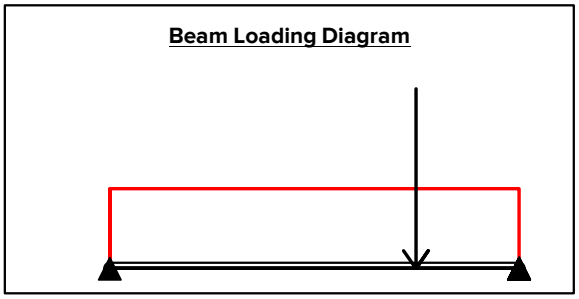
Stresses @ Input Location	
f_v (psi)	-116
f_b (psi)	118

Max/Min Stresses	
f_{v_MAX} (psi)	60
f_{v_MIN} (psi)	-117
f_{b_MAX} (psi)	1142
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**1550**
b (in)	**3.5**
d (in)	**11.875**
I (in^4)	488.41
S (in^3)	82.259
A (in^2)	41.563
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	1.67	-3.25	0	7.83	-0.175 (↓)	5.5	L/703	-0.022 (↓)	5.1	L/5591

SWENSON SAY FAGÉT
ssfengineers.com
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