CK Engineering LLC.

19229 38th PL NE
Lake Forest Park, WA 98155

Phone: (206) 417-0670

STRUCTURAL CALCULATIONS

Lateral & Gravity Design
25-010

10/13/2025

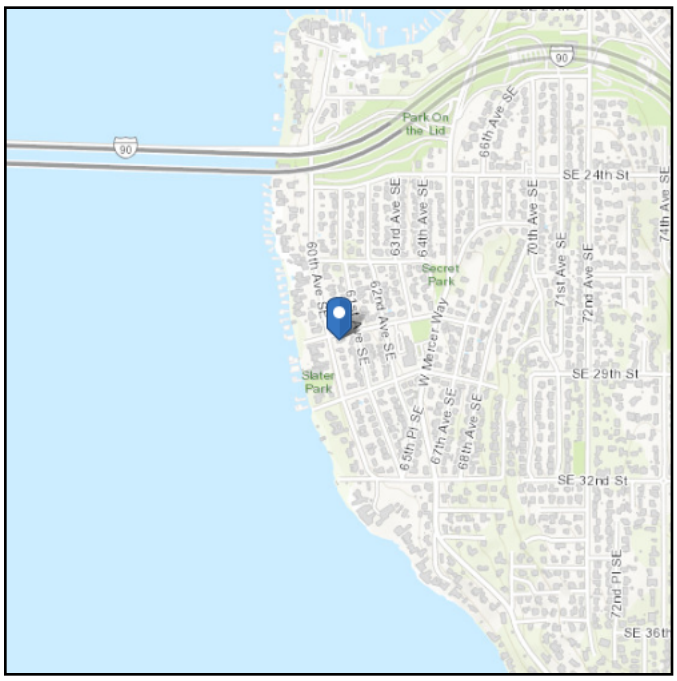
DICKINSON RESIDENCE
2800 60TH AVE SE
Mercer Island, WA 98040
October 13, 2025

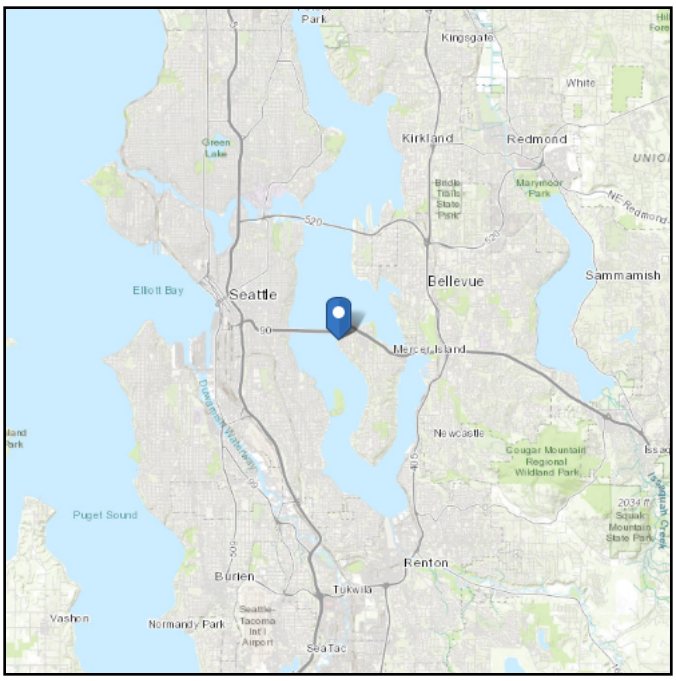
ASCE Hazards Report

Address:
2800 60th Ave SE
Mercer Island, Washington
98040

Standard: ASCE/SEI 7-16
Risk Category: I
Soil Class: D - Default (see Section 11.4.3)

Latitude: 47.585185
Longitude: -122.252025
Elevation: 58.921749520010366 ft (NAVD 88)





Wind

Results:

Wind Speed	92 Vmph
10-year MRI	67 Vmph
25-year MRI	74 Vmph
50-year MRI	78 Vmph
100-year MRI	83 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1A and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Sun May 11 2025

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (annual exceedance probability = 0.00333, MRI = 300 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	1.404	S_{D1} :	N/A
S_1 :	0.489	T_L :	6
F_a :	1.2	PGA :	0.601
F_v :	N/A	PGA_M :	0.721
S_{MS} :	1.685	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.124	C_v :	1.381

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Sun May 11 2025

Date Source: USGS Seismic Design Maps

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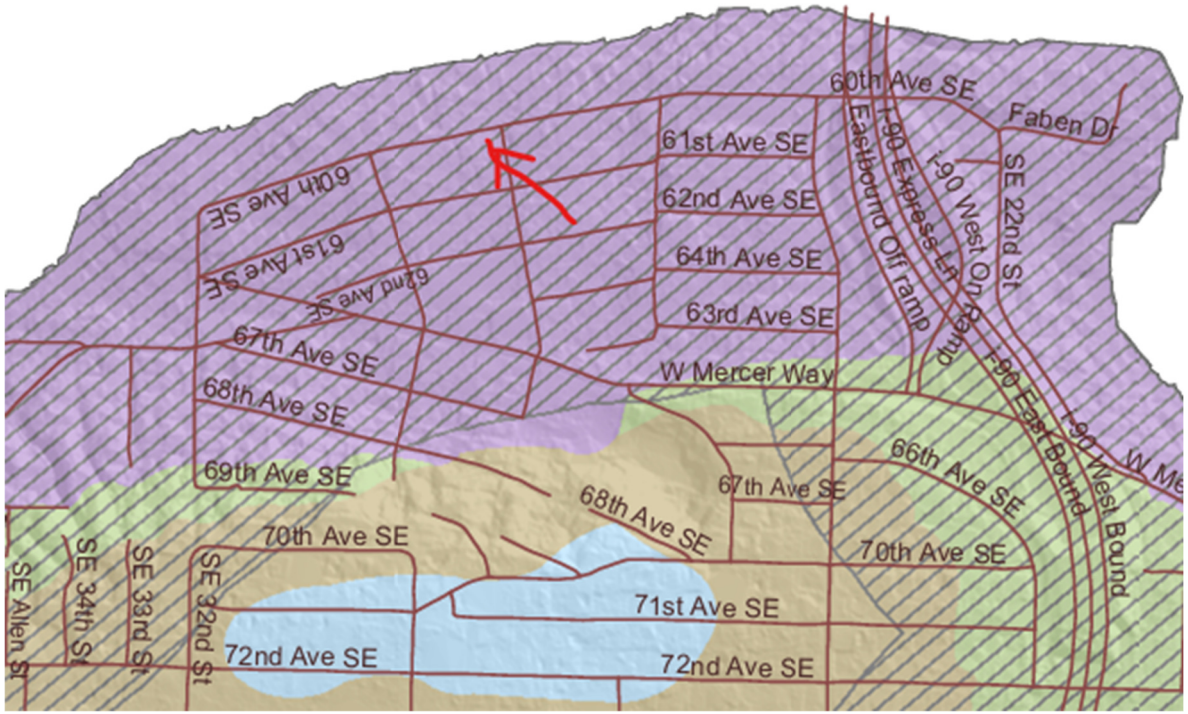

60th Ave SE
Faben Dr
61st Ave SE
62nd Ave SE
64th Ave SE
63rd Ave SE
W Mercer Way
67th Ave SE
68th Ave SE
69th Ave SE
70th Ave SE
71st Ave SE
72nd Ave SE
I-90 Eastbound Off ramp
I-90 Express Ln
I-90 West On ramp
SE 22nd St
I-90 East Bound
I-90 West Bound
66th Ave SE
SE Allen St
SE 34th St
SE 33rd St
SE 32nd St

Design Criteria

Scope of Work:	Lateral & Gravity Design		
Site Address:	2800 60TH AVE SE Mercer Island, WA 98040		
Number of Stories:	2	Engineer:	PK

Roof Loading

Roofing	Composition	3.0
Sheathing	15/32" Plywood	1.5
Insulation	Roll/Batt	3.0
Ceiling	5/8" GWB	2.8
Framing	Rafters & Beams	3.0
Miscellaneous	fixtures, mechanical, electrical, etc.	1.7
	TOTAL DEAD LOAD:	15.0 psf
	ROOF SNOW LOAD:	25.0 psf

Upper Floor Loading

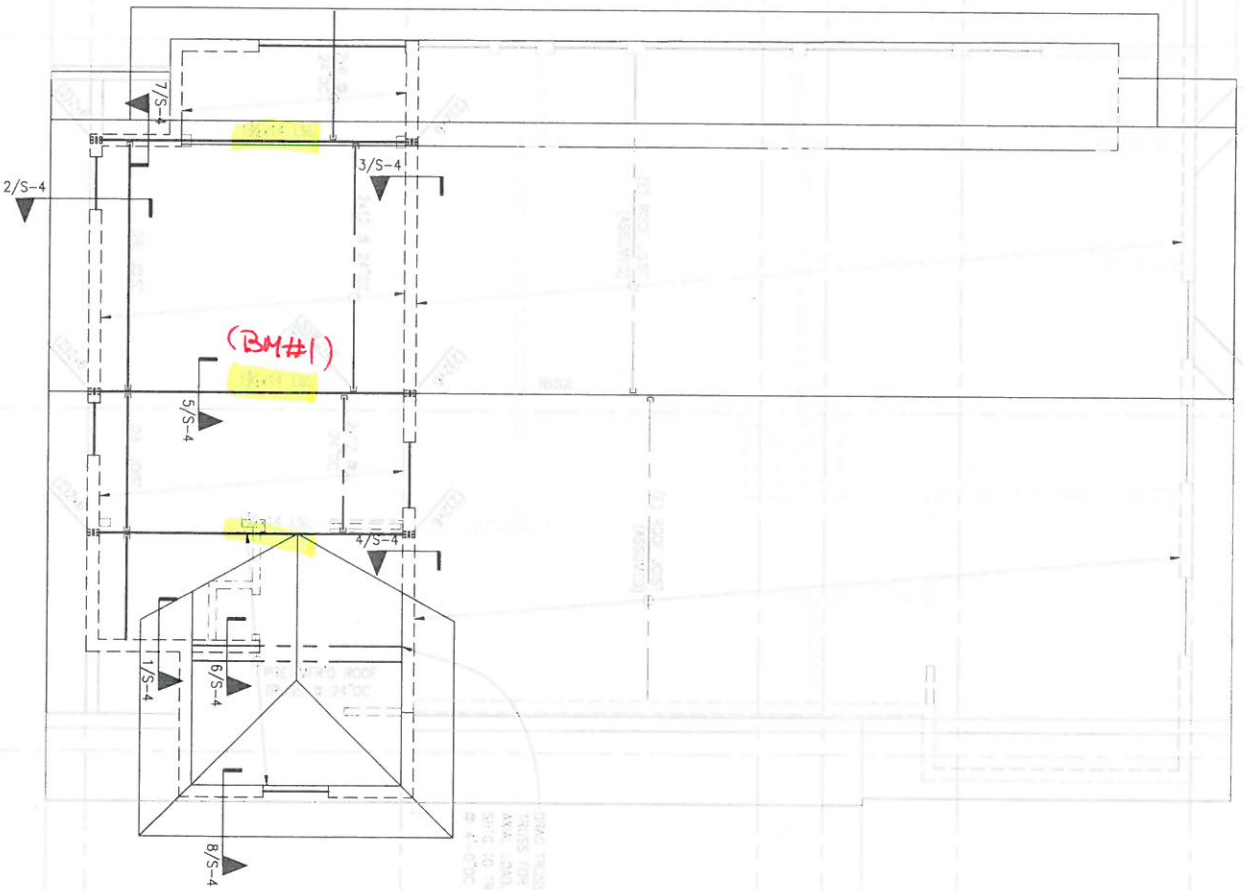
Floor Covering	Carpet/Hardwood/Tile	3.0
Sheathing	3/4" T&G	2.3
Ceiling	1/2" GWB	2.2
Joists	I-Joists	2.1
Beams		4.0
Miscellaneous	fixtures, mechanical, electrical, etc.	1.4
	TOTAL DEAD LOAD:	15.0 psf
	FLOOR LIVE LOAD:	40.0 psf

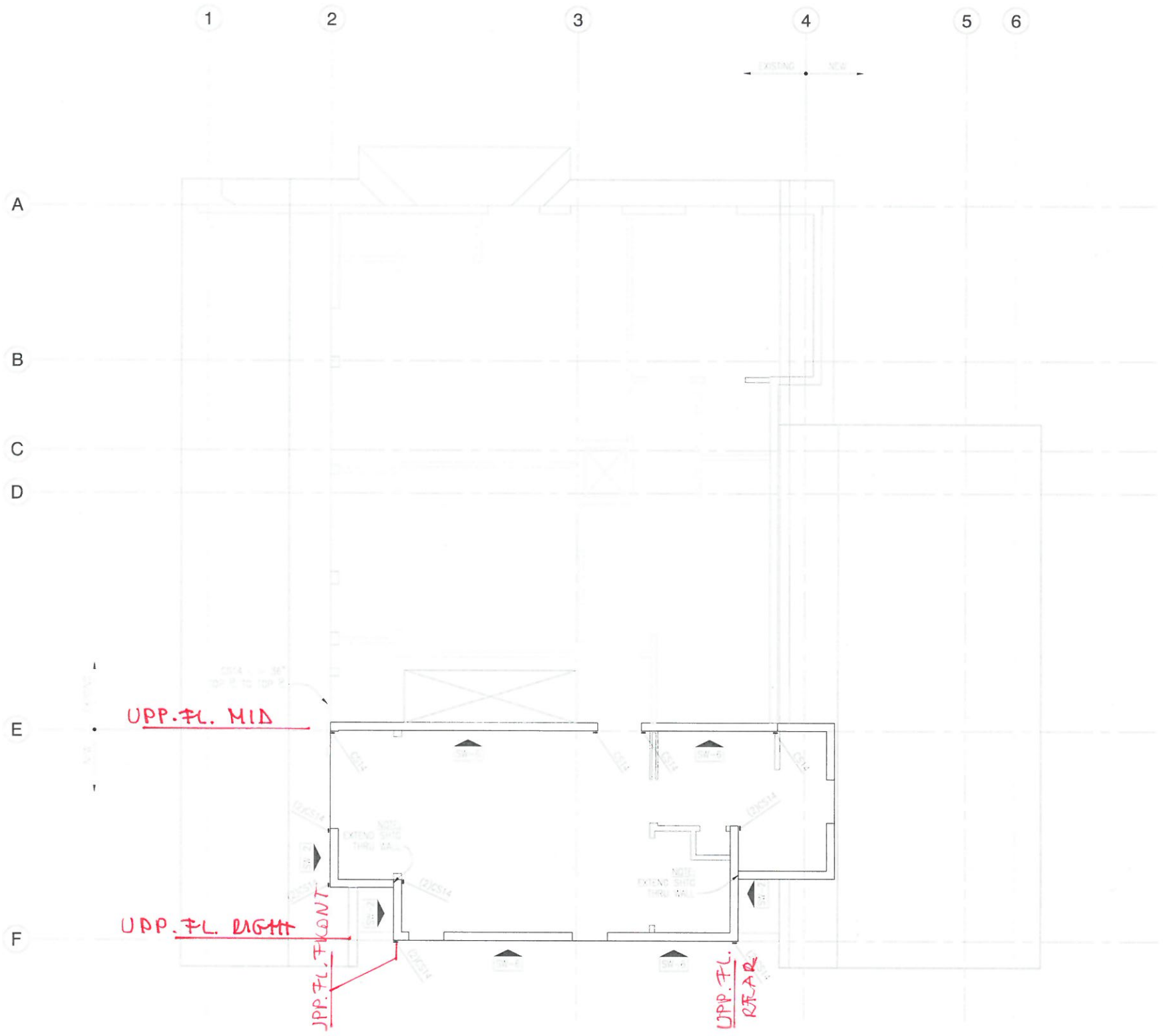
Main Floor Loading

Floor Covering	Carpet/Hardwood/Tile	3.0
Sheathing	3/4" T&G	2.3
Ceiling	5/8" GWB	2.8
Joists	I-Joists	2.1
Beams		4.2
Miscellaneous	fixtures, mechanical, electrical, etc.	0.6
	TOTAL DEAD LOAD:	15.0 psf
	FLOOR LIVE LOAD:	40.0 psf

Soil Bearing Capacity:	1500 psf
Frost Depth:	18 in

LATERAL & GRAVITY DESIGN

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UPP. FL. MID
UPP. FL. RIGHT
UPP. FL. FRONT
UPP. FL. REAR


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EXISTING
NEW
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3/S-3
1/S-4
4/S-3
2/S-3
9/S-4
5/S-3
5/S-3
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(BM#1)
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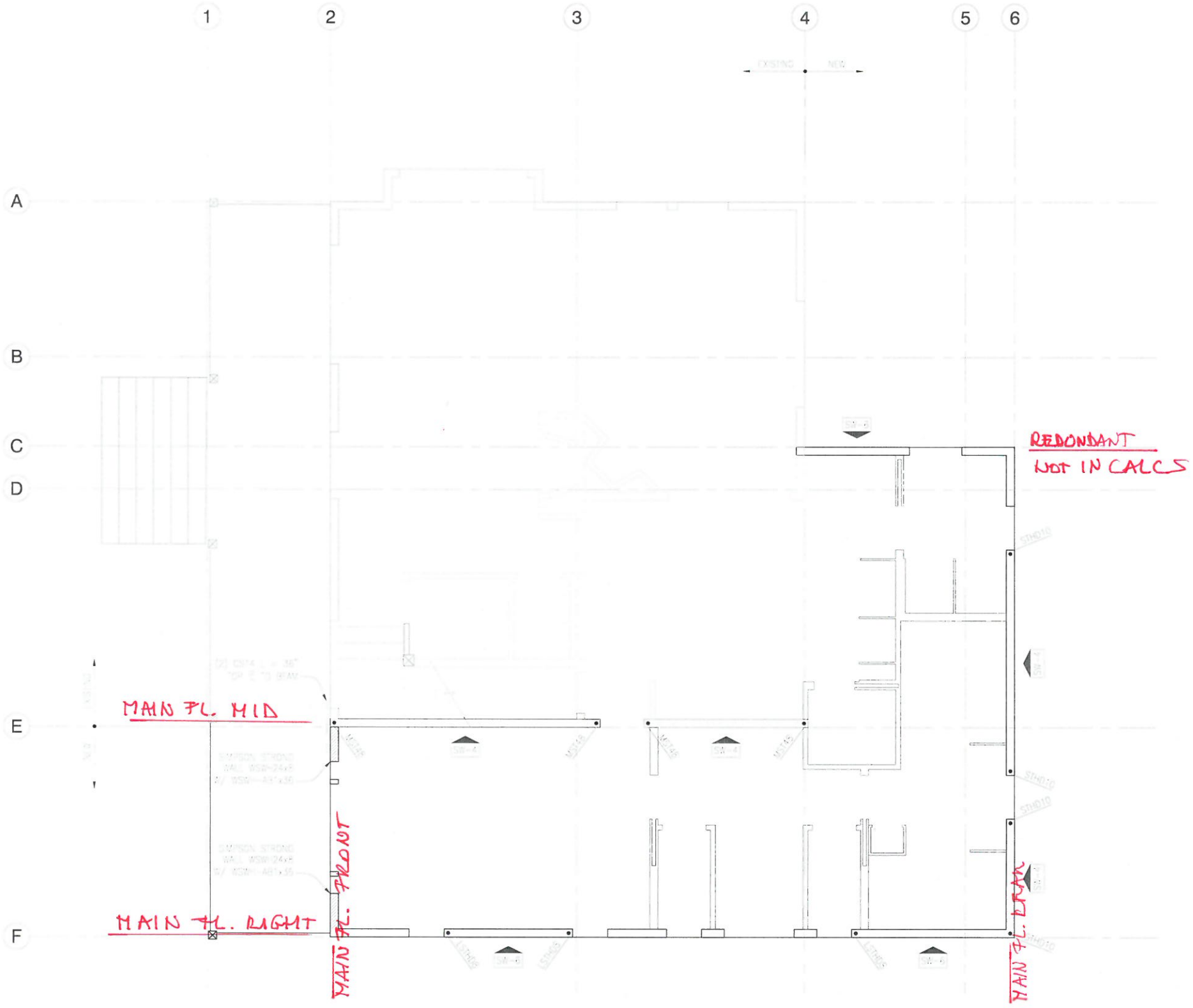
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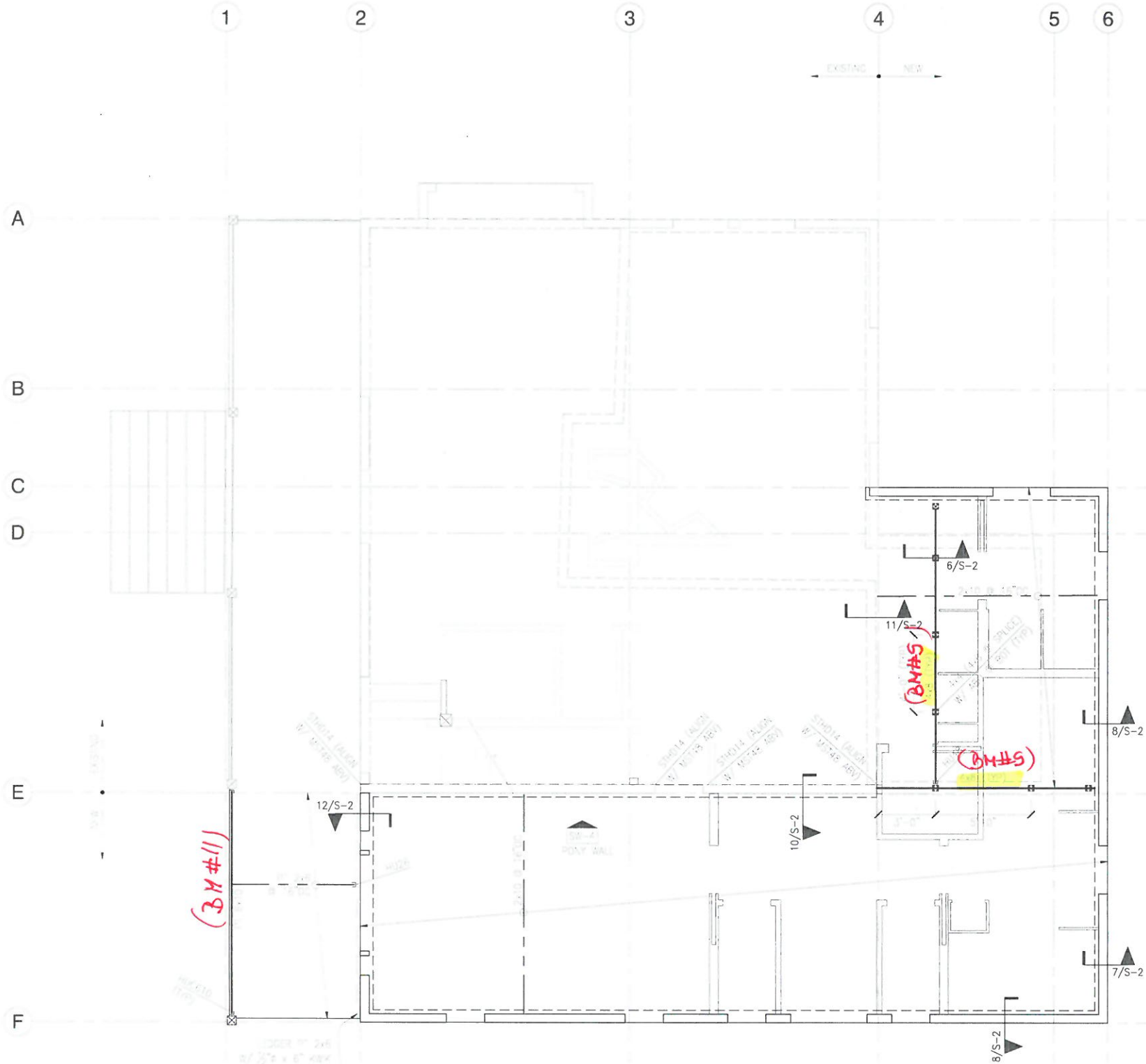
MAIN FL. FRONT
MAIN FL. REAR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6/S-2
11/S-2
8/S-2
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7/S-2
8/S-2
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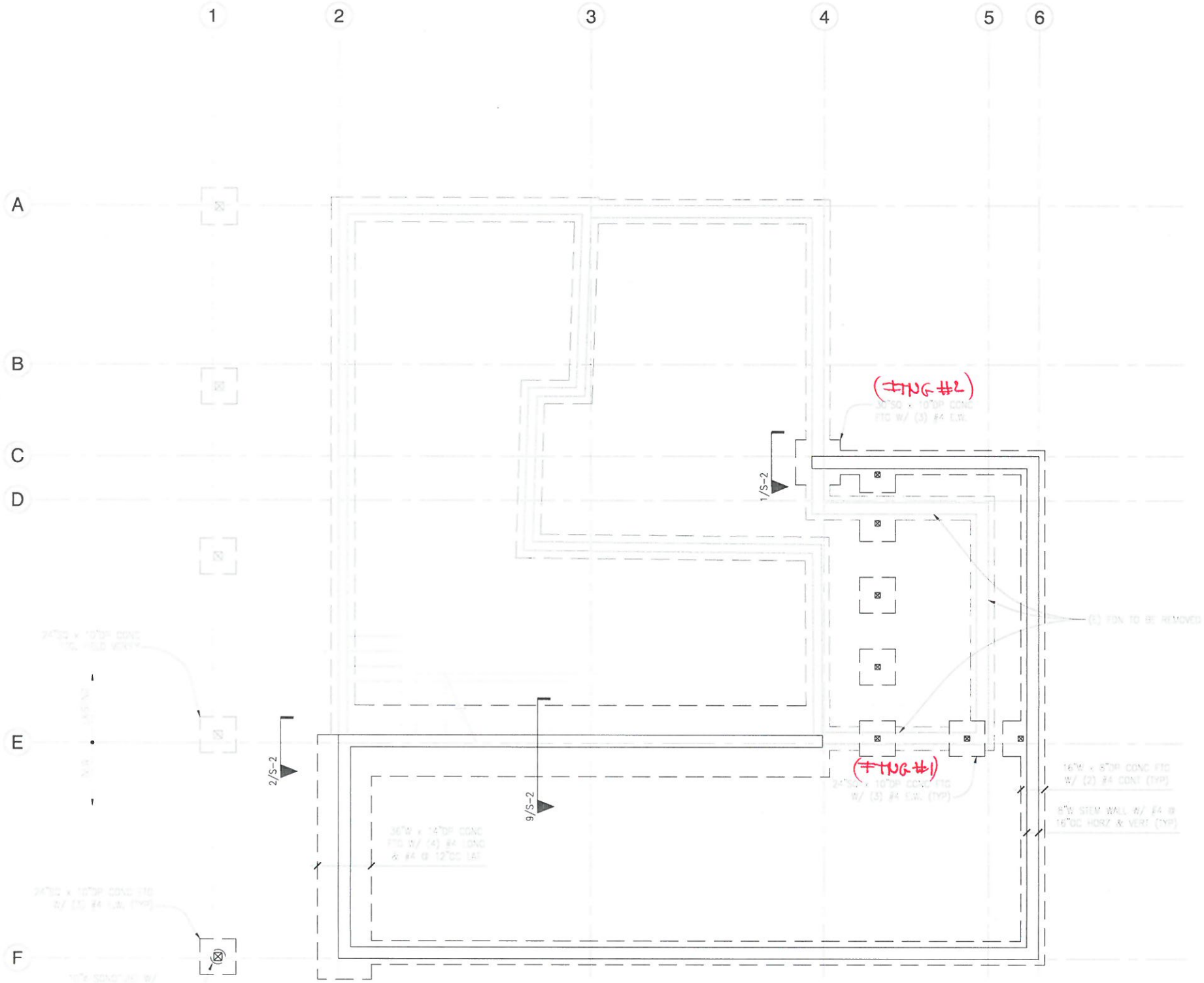
(BM#5)
(BM#11)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(FTNG #2)
1/S-2
2/S-2
9/S-2
(FTNG #1)

Type of construction:	NEW	Location:	2800 60TH AVE SE
Applicable Building Codes:	IBC 2021, ASCE 7/SEI 7-16		Mercer Island, WA 98040

Work performed :

Lateral & Gravity Design

WIND DESIGN:

$P_s = \lambda I_w P_{s30} K_{zt}$

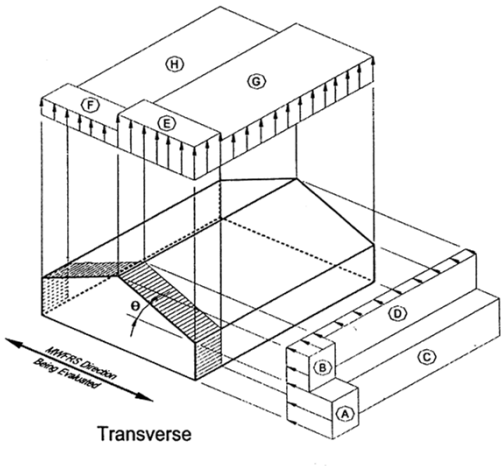
Exposure :	C	Wind Exposure Category as set forth in Section 26.7 of ASCE 7-16
Wind Speed =	85 MPH	Basic Wind Speed (LRFD) as used in Figure 28.5 of ASCE 7-16 and converted to (ASD)
P_{s30} =		Simplified design wind pressure for Exposure B, at h = 30 feet and for I = 1.0, from Figure 28.5-1
I_w =	1	Importance factor as defined in Table 1.5-2 of ASCE 7-16
λ =	1.29	Adjustment factor for building height and exposure from Figure 28.5-1 of ASCE 7-16
K_{ZT} =	1.00	Adjustment factor for increased wind speed due to a hill or escarpment from Section 26.8 of ASCE 7-16

Roof slope :

		rise		run			
Front/Rear	$\tan^{-1}$ (	6	/	12	)	= 26.6 degrees	Number of floors: 2
Left/Right	$\tan^{-1}$ (	6	/	12	)	= 26.6 degrees	
		20 ft	Mean Elevation				

0

Average uplift (F/R)=	-5.6 psf	Based on wind zones 'G' and 'H'
Average uplift (R/L)=	-5.6 psf	Based on wind zones 'G' and 'H'



	End zone of wall		End zone of roof	
		Front/Rear Left/Right	Front/Rear	Left/Right
P_{s30} =	A =	13.9 psf 13.9 psf	B = 4.3 psf	4.3 psf
P_s =		17.9 psf 17.9 psf	5.6 psf	5.6 psf

	Interior zone of wall		Interior zone of roof	
	Front/Rear	Left/Right	Front/Rear	Left/Right
P_{s30} =	C = 10.3 psf	10.3 psf	D = 3.8 psf	3.8 psf
P_s =	13.3 psf	13.3 psf	4.9 psf	4.9 psf

WIND LOAD CALCULATIONS

FRONT ⟶ REAR

ΣV 2ND FLOOR =

WIND ZONE	B	D										
AVE. HEIGHT	9	9										
AVE. WIDTH	7	37										
Ps	5.58	4.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	352	1646	0	0	0	0	0	0	0	0	0	0
TOTAL	3,960 lbs		Minimum net pressure controls. The calc. pressure is less than the min. net pressure, equal to 16psf(A-C), and 8psf(B-D) applied over the entire area. (ASCE 7-16 28.5.3)									

ΣV 1ST FLOOR =

WIND ZONE	A	C										
AVE. HEIGHT	9	9										
AVE. WIDTH	7	37										
Ps	17.94	13.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	1130	4432	0	0	0	0	0	0	0	0	0	0
TOTAL	5,562 lbs											

NOT USED

WIND ZONE												
AVE. HEIGHT												
AVE. WIDTH												
Ps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0 lbs											

WIND LOAD CALCULATIONS

LEFT ⟶ RIGHT

ΣV 2ND FLOOR =

WIND ZONE	B	D										
AVE. HEIGHT	9	9										
AVE. WIDTH	5	24										
Ps	5.58	4.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	251	1068	0	0	0	0	0	0	0	0	0	0

TOTAL 2,610 lbs

Minimum net pressure controls. The calc. pressure is less than the min. net pressure, equal to 16psf(A-C), and 8psf(B-D) applied over the entire area. (ASCE 7-16 28.5.3)

ΣV 1ST FLOOR =

WIND ZONE	A	C	A	C								
AVE. HEIGHT	9	9	10	10								
AVE. WIDTH	5	24	3	9								
Ps	17.94	13.31	17.94	13.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	807	2875	538	1198	0	0	0	0	0	0	0	0

TOTAL 5,418 lbs

NOT USED

WIND ZONE												
AVE. HEIGHT												
AVE. WIDTH												
Ps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0

TOTAL 0 lbs

ρ CALCS:

2ND FLOOR CALCULATIONS:

Plate Height:	8.00 ft
Total length of Shearwall in Shortest Line:	8.00 ft
Length of Shortest Segment within Shear Line:	3.00 ft
Length of Longest Segment in Shear Line:	5.00 ft

Tributary Area: 1.0
Total Area: 2.0

ρ = 1.00

ASCE 7-16 12.3.4.2 b

MAIN FLOOR CALCULATIONS:

Plate Height:	8.00 ft
Total length of Shearwall in Shortest Line:	8.50 ft
Length of Shortest Shearwall within Shear Line:	3.50 ft
Length of Longest Wall in Shear Line:	5.00 ft

Tributary Area: 1.0
Total Area: 2.0

ρ = 1.00

ASCE 7-16 12.3.4.2 b

NOT USED:

Plate Height:	9.00 ft
Total length of Shearwall in Shortest Line:	10.00 ft
Length of Shortest Shearwall within Shear Line:	4.50 ft
Length of Longest Wall in Shear Line:	5.50 ft

Tributary Area: 1.0
Total Area: 2.0

ρ = NA

All loads in pounds per square foot

WALL DEAD LOAD =	10 psf	ROOF DEAD LOAD =	15.0 psf
FLAT ROOF SNOW LOAD =	25 psf	UPPER FLOOR D.L. =	15.0 psf
RED. S.L. (20%*S.L.) =	0	LOWER FLOOR D.L. =	15.0 psf
		FLOOR LIVE LOAD =	40.0 psf

SEISMIC DESIGN:

$E = E_h + E_v$

$E = \rho Q_{E+.2S_{DS}D}$ $\quad Q_E = V = C_sW$

ρ =	1.00				
Site Class =	D	Geotech Report	No	20% Seismic Load Increase	
I_E =	1	Importance factor as defined in Table 11.5-1			
R =	6.5				
h_n =	25	Total height of structure			

$V = 0.7S_{DS}I_EW / R$ $\quad S_{DS} = 2/3\ S_{MS}$ $\quad Ss =$ 140.4% $\quad S_{MS} = 168.5\%$ $\quad V =$ 0.121 W

$V_{max} = S_{D1}I_EW / T_aR$ $\quad S_{MS} = (Fa)(Ss)$ $\quad Fa =$ 1.20 $\quad S_{DS} = 112.3\%$ $\quad E =$ 0.121 W

$T_a = 0.02h_n^{0.75}$ $\quad S_{D1} = 2/3\ S_{M1}$ $\quad S_1 =$ 48.9% $\quad S_{M1} = 73.4\%$

$T_a =$ 0.22 s $\quad S_{M1} = (Fv)(S_1)$ $\quad Fv =$ 1.50 $\quad S_{D1} = 48.9\%$ $\quad Cs =$ 0.121

2ND FLOOR DIAPHRAGM LOADING:

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
45	31	15.0	20925
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 1395 Sub-Total= 20925

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
		15.0	0
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 0 Sub-Total= 0

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
150	4	10.0	6000
90	4	10.0	3600
		10.0	0
		10.0	0
		10.0	0

Area = 960 Sub-Total= 9600

TOTAL = 30525 lb

1ST FLOOR DIAPHRAGM LOADING:

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
31	16	15.0	7440
45	11	15.0	7425
		15.0	0
		15.0	0
		15.0	0

Area = 991 Sub-Total= 14865

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
28	42	15.0	17640
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 1176 Sub-Total= 17640

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
150	8	10.0	12000
150	8	10.0	12000
		10.0	0
		10.0	0
		10.0	0

Area = 2400 Sub-Total= 24000

TOTAL = 56505 lb

NOT APPLICABLE

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
		15.0	0
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 0 Sub-Total= 0

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
		15.0	0
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 0 Sub-Total= 0

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
		10.0	0
		10.0	0
		10.0	0
		10.0	0
		10.0	0

Area = 0 Sub-Total= 0

TOTAL = lb

V (2ND FLOOR) = .121 x 30525 lb = 3692 lbs

V (1ST FLOOR) = .121 x 56505 lb = 6835 lbs

V ( ) = .121 x lb = lbs

REDISTRIBUTE:

ΣV x ρ	height	ΣV x height
3692 lb	17	62769
6835 lb	8	54679
lb		0
TOTAL = 10527 lb		TOTAL = 117448

$$E\ (2ND) = \frac{\Sigma V \times height \times \Sigma V\ TOTAL}{\Sigma V \times height\ TOTAL} = 5626\ lbs$$

$$E\ (1ST) = \frac{\Sigma V \times height \times \Sigma V\ TOTAL}{\Sigma V \times height\ TOTAL} = 4901\ lbs$$

$$E\ () = \frac{NOT\ USED}{} = 0\ lbs$$

SUMMARY:

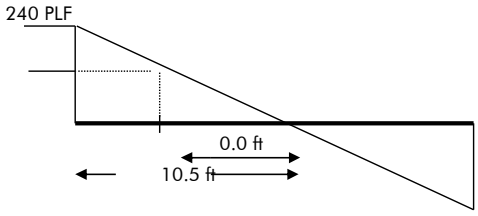
	WIND (front-rear)	WIND (left-right)	SEISMIC
ΣV (2ND) =	3960 lbs	2610 lbs	6751 lbs
ΣV (MAIN) =	5562 lbs	5418 lbs	5881 lbs
NOT APPLICABLE	0 lbs	0 lbs	0 lbs
TOTAL =	9522 lbs	8028 lbs	12633 lbs

DIAPHRAGM SHEAR:

Total diaphragm length = 45.0 ft Sub-diaphragm length = 45.0 ft
Diaphragm width = 21.0 ft ΣV (2ND) = 6,751 lbs

$$v = \frac{\Sigma V(roof)}{(2)(width)} = \frac{6751\ lb}{42\ ft} = 161\ PLF$$

IBC Table 2306.3.1 → 240 PLF



USE 15/32 CDX ROOF SHEATHING OR 3/4 T&G CDX SUBFLOORING w/8d AT 6 in o/c(PANEL EDGE), END 8d AT 12in o/c(PANEL FIELD)

CHORD:

Sub-diaphragm length = 45.0 ft Total-diaphragm length = 45.0 ft
Sub-diaphragm width = 21.0 ft

$$T = \frac{M}{B} = \frac{\Sigma V \times (\text{diaphragm length})}{8 \times (\text{diaphragm width})} = \frac{6751 \times 45\ ft}{8 \times 21\ ft} = 1808\ lbs$$

Top Plate Size: 2x6 Species/Grade: HF #2

Area = 8.25 in^2 F_t = 525 psi
Load duration (C_D) = 1.33 $T_{allowable}$ = Area x C_D x F_t = 5,761 lbs

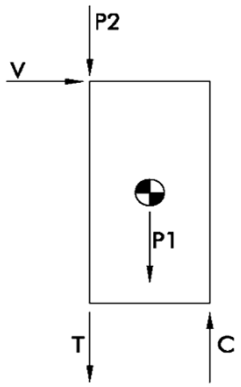
Since T allowable is greater than T applied, OK.

SHEAR CAPACITY OF 10d COMMON NAIL = 102 lbs 102 x Cd x p = 136 lbs 2018 NDS

$$\#\ OF\ NAILS\ PER\ 4\ FT\ SPLICE = \frac{1808\ lbs}{136\ lbs} = 13$$

USE 2x6 HF #2 TOP PLATE W/ (2) 10d NAILS @ 7 in O/C.

Lateral Calculation Key



V = Shear, plf
H = Height of shearwall
L = Length of shearwall
P1 = Weight of shearwall and connected framing
P2 = Weight of adjacent wall

T = V x H - 0.5P1 - P2 = Tension reaction to be resisted by holdown
C = V x H + 0.5P1 = Compression reaction

ASD Basic Load Combinations

For calculation of tension and compression forces in compliance with ASCE 7-16 2.4.1

Tension Equations (Uplift)

7. 0.6D + W
8. $(0.6 - 0.14S_{DS})D + E$ → 0.44 D + E

*8. $(0.6 - 0.14S_{DS})D + 2.5\ E$ → 0.44 D + 2.5 E

Compression Equations

5. D + W
5. $(1 + 0.14S_{DS})D + E$ → 1.16 D + E
6. D + 0.75W + 0.75L + 0.75S
6. $(1.0 + 0.105S_{DS})D + 0.75E + 0.75L + 0.75S$ → 1.12 D + 0.75 E + 0.75 L + 0.75 S

*5. $(1 + 0.14S_{DS})D + 2.5E$ → 1.16 D + 2.5 E
*6. $(1.0 + 0.105S_{DS})D + 1.875E + 0.75L + 0.75S$ → 1.12 D +1.875 E + 0.75 L + 0.75 S

** Equations include overstrength factor.*

Note: The 0.7 factor for Earthquake loading has already been incorporated into the calculation of the lateral design force E_h, but not E_v. Therefore this factor has been omitted from equations 5, 6 and 8 where appropriate.

UPPER FL. REAR (NEW CL.)

SHEARWALL | WIND | SEISMIC

Floor Info

		WIND	SEISMIC
Upper	Floor Level, e.g. Upper, Main, Lower	Tributary Width (Upper Floor): 1.0 tributary width, 2.0 total width	Tributary Area (Upper Floor): 1.0 tributary area, 2.0 total area
Lt-Rt	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)	Tributary Width (Main Floor): 1.0 tributary width, 2.0 total width	Tributary Area (Main Floor): 1.0 tributary area, 2.0 total area
CDX	Sheathing type Values in accordance with AF&PA SDPWS-2015	Not Used: 1.0 tributary width, 2.0 total width	Not Used: 1.0 tributary area, 2.0 total area
Roof	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)		
7.00 ft	Total Length of Shearwalls		

V(from upper) =	2610 lb		6751 lb
V(from main) =	0 lb		0 lb
V(from lower) =	0 lb		0 lb
Σ (Wind) =	2,610 lb	Σ (Smc) =	6,751 lb
v =	186 PLF	v =	482 PLF

Height of Shearwall = 8.0 ft
Length of Shearwall = 7.0 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 1.0 ft
Length of adjoining wall = 1.0 ft

3x framing required per IBC

SDPWS, Table 4.3A → 0.93 x 595 = 553 PLF → USE SW2

Seismic controls shearwall design

C_{TOTAL} =	(floor above) + (this floor) =		+	2701 lbs	=	2701 lbs Seismic controls
T_{TOTAL} =	(floor above) + (this floor) =		+	3669 lbs	=	3669 lbs Load case 8 controls - Seismic

Seismic controls holdown design

(2)CS14

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 3858 lbs

USE SIMPSON DESIGNED HOLDOWN: MST60
OR AT FOUNDATION / INTERIOR WALLS USE: STHD14/RJ thus OK

UPPER FL. FRONT (NEW GUEST BR.)

SHEARWALL | WIND | SEISMIC

Floor Info

		WIND	SEISMIC
Upper	Floor Level, e.g. Upper, Main, Lower	Tributary Width (Upper Floor): 1.0 tributary width, 2.0 total width	Tributary Area (Upper Floor): 1.0 tributary area, 2.0 total area
Lt-Rt	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)	Tributary Width (Main Floor): 1.0 tributary width, 2.0 total width	Tributary Area (Main Floor): 1.0 tributary area, 2.0 total area
CDX	Sheathing type Values in accordance with AF&PA SDPWS-2015	Not Used: 1.0 tributary width, 2.0 total width	Not Used: 1.0 tributary area, 2.0 total area
Roof	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)		
7.00 ft	Total Length of Shearwalls		

V(from upper) =	2610 lb		6751 lb
V(from main) =	0 lb		0 lb
V(from lower) =	0 lb		0 lb
Σ (Wind) =	2,610 lb	Σ (Smc) =	6,751 lb
v =	186 PLF	v =	482 PLF

Height of Shearwall = 8.0 ft
Length of Shearwall = 3.5 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 1.0 ft
Length of adjoining wall = 1.0 ft

3x framing required per IBC

SDPWS, Table 4.3A → (2w/h) x 0.93 x 595 = 484 PLF → USE SW2

Seismic controls shearwall design

C_{TOTAL} =	(floor above) + (this floor) =		+	2701 lbs	=	2701 lbs Seismic controls
T_{TOTAL} =	(floor above) + (this floor) =		+	3742 lbs	=	3742 lbs Load case 8 controls - Seismic

Seismic controls holdown design

(2)CS14

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 3858 lbs

USE SIMPSON DESIGNED HOLDOWN: MST60
OR AT FOUNDATION / INTERIOR WALLS USE: HDU8-SDS2.5

UPPER FL. MID (NEW GUEST BR.)

SHEARWALL | WIND | SEISMIC

Floor Info

		WIND	SEISMIC
Upper	Floor Level, e.g. Upper, Main, Lower	Tributary Width (Upper Floor): 1.0 tributary width, 2.0 total width	Tributary Area (Upper Floor): 1.0 tributary area, 2.0 total area
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)	Tributary Width (Main Floor): 1.0 tributary width, 2.0 total width	Tributary Area (Main Floor): 1.0 tributary area, 2.0 total area
CDX	Sheathing type Values in accordance with AF&PA SDPWS-2015	Not Used: 1.0 tributary width, 2.0 total width	Not Used: 1.0 tributary area, 2.0 total area
Roof	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)		
22.00 ft	Total Length of Shearwalls		

V(from upper) =	3960 lb		6751 lb
V(from main) =	0 lb		0 lb
V(from lower) =	0 lb		0 lb
Σ (Wind) =	3,960 lb	Σ (Smc) =	6,751 lb
v =	90 PLF	v =	153 PLF

Height of Shearwall = 8.0 ft
Length of Shearwall = 7.0 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 1.0 ft
Length of adjoining wall = 1.0 ft

SDPWS, Table 4.3A → 0.93 x 242 = 225 PLF → USE SW6

Seismic controls shearwall design

C_{TOTAL} =	(floor above) + (this floor) =		+	859 lbs	=	859 lbs Seismic controls
T_{TOTAL} =	(floor above) + (this floor) =		+	1038 lbs	=	1038 lbs Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1228 lbs

USE SIMPSON DESIGNED HOLDOWN: CS14
OR AT FOUNDATION / INTERIOR WALLS USE: LSTHD8/RJ

UPPER FL. RIGHT (NEW GUEST BR.)

SHEARWALL

Floor Info

Upper	Floor Level, e.g. Upper, Main, Lower
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear
	(For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type
	Values in accordance with AF&PA SDPWS-2015
Roof	Resisting Dead Load
	(e.g. Roof, Upper Floor, Main Floor)
14.00 ft	Total Length of Shearwalls

V(from upper)=	3960 lb	6751 lb
V(from main)=	0 lb	0 lb
V(from lower)=	0 lb	0 lb
Σ (Wind) =	3,960 lb	Σ (Smc) = 6,751 lb
v =	40 PLF	v = 69 PLF

WIND

Tributary Width (Upper Floor)

6.0	tributary width
42.0	total width

Tributary Width (Main Floor)

1.0	tributary width
2.0	total width

Not Used

1.0	tributary width
2.0	total width

SEISMIC

Tributary Area (Upper Floor)

6.0	tributary area
42.0	total area

Tributary Area (Main Floor)

1.0	tributary area
2.0	total area

Not Used

1.0	tributary area
2.0	total area

Height of Shearwall = 8.0 ft
Length of Shearwall = 7.0 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 1.0 ft
Length of adjoining wall = 1.0 ft

SDPWS, Table 4.3A → 0.93 x 242 = 225 PLF → USE SW6

Seismic controls shearwall design

C_{TOTAL} = (floor above) + (this floor) = + 386 lbs = 386 lbs Seismic controls

T_{TOTAL} = (floor above) + (this floor) = + 362 lbs = 362 lbs Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E= 551 lbs

NO HOLDOWNS REQUIRED → OK

MAIN FL. REAR (NEW WIC)

SHEARWALL

Floor Info

Main	Floor Level, e.g. Upper, Main, Lower
Lt-Rt	Load Direction, e.g. Left-Right, Front-Rear
	(For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type
	Values in accordance with AF&PA SDPWS-2015
Roof	Resisting Dead Load
	(e.g. Roof, Upper Floor, Main Floor)
20.00 ft	Total Length of Shearwalls

V(from upper)=	2610 lb	6751 lb
V(from main)=	5418 lb	5881 lb
V(from lower)=	0 lb	0 lb
Σ (Wind) =	8,028 lb	Σ (Smc) = 12,633 lb
v =	201 PLF	v = 316 PLF

WIND

Tributary Width (Upper Floor)

1.0	tributary width
2.0	total width

Tributary Width (Main Floor)

1.0	tributary width
2.0	total width

Not Used

1.0	tributary width
2.0	total width

SEISMIC

Tributary Area (Upper Floor)

1.0	tributary area
2.0	total area

Tributary Area (Main Floor)

1.0	tributary area
2.0	total area

Not Used

1.0	tributary area
2.0	total area

Height of Shearwall = 8.0 ft
Length of Shearwall = 7.0 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 1.0 ft
Length of adjoining wall = 2.0 ft

SDPWS, Table 4.3A → 0.93 x 353 = 328 PLF → USE SW4

Seismic controls shearwall design

C_{TOTAL} = (floor above) + (this floor) = + 1769 lbs = 1769 lbs Seismic controls

T_{TOTAL} = (floor above) + (this floor) = + 2295 lbs = 2295 lbs Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E= 2527 lbs

USE SIMPSON DESIGNED HOLDOWN: CS14
OR AT FOUNDATION / INTERIOR WALLS USE: STHD10/RJ

MAIN FL. FRONT (NEW MAIN BDRM.)

SHEARWALL

Floor Info

Main	Floor Level, e.g. Upper, Main, Lower
Lt-Rt	Load Direction, e.g. Left-Right, Front-Rear
	(For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type
	Values in accordance with AF&PA SDPWS-2015
U/FL	Resisting Dead Load
	(e.g. Roof, Upper Floor, Main Floor)
4.00 ft	Total Length of Shearwalls

V(from upper)=	2610 lb	6751 lb
V(from main)=	5418 lb	5881 lb
V(from lower)=	0 lb	0 lb
Σ (Wind) =	8,028 lb	Σ (Smc) = 12,633 lb
v =	1004 PLF	v = 1579 PLF

WIND

Tributary Width (Upper Floor)

1.0	tributary width
2.0	total width

Tributary Width (Main Floor)

1.0	tributary width
2.0	total width

Not Used

1.0	tributary width
2.0	total width

SEISMIC

Tributary Area (Upper Floor)

1.0	tributary area
2.0	total area

Tributary Area (Main Floor)

1.0	tributary area
2.0	total area

Not Used

1.0	tributary area
2.0	total area

Height of Shearwall = 8.0 ft
Length of Shearwall = 2.0 ft
Warning! Height to Width Ratio!
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 5.0 ft
Length of adjoining wall = 2.0 ft

3x framing required per IBC

SDPWS, Table 4.3A → (2w/h) x 0.93 x 1432 = 666 PLF → USE SIMSON'S WSWH24x8 10d@2"o/c

Sucka'! You'd better bust out your Simpson Catalog!

Seismic controls shearwall design

C_{TOTAL} = (floor above) + (this floor) = + 8843 lbs = 8843 lbs Seismic controls

T_{TOTAL} = (floor above) + (this floor) = + 12427 lbs = 12427 lbs Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E= 12633 lbs

USE SIMPSON DESIGNED HOLDOWN: WSWH-AB1x36 (2)CMST14
OR AT FOUNDATION / INTERIOR WALLS USE: HHDQ14-SDS2.5

MAIN FL. MID (NEW MAIN BDRM./BATH)

SHEARWALL

Floor Info

Main	Floor Level, e.g. Upper, Main, Lower	
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear	
	(For Left Wall, Use Front-Rear Load Direction)	
CDX	Sheathing type	
	Values in accordance with AF&PA SDPWS-2015	
U/FL	Resisting Dead Load	
	(e.g. Roof, Upper Floor, Main Floor)	
24.00 ft	Total Length of Shearwalls	

WIND

Tributary Width (Upper Floor)

1.0	tributary width
2.0	total width

Tributary Width (Main Floor)

1.0	tributary width
2.0	total width

Not Used

1.0	tributary width
2.0	total width

SEISMIC

Tributary Area (Upper Floor)

1.0	tributary area
2.0	total area

Tributary Area (Main Floor)

1.0	tributary area
2.0	total area

Not Used

1.0	tributary area
2.0	total area

V(from upper)=	3960 lb	6751 lb
V(from main)=	5562 lb	5881 lb
V(from lower)=	0 lb	0 lb
Σ (Wind) =	9,522 lb	Σ (Smc) = 12,633 lb
v =	198 PLF	**v =** 263 PLF

Height of Shearwall = 8.0 ft
Length of Shearwall = 9.0 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 1.0 ft
Length of adjoining wall = 1.0 ft

SDPWS, Table 4.3A → 0.93 x 353 = 328 PLF → USE SW4

Seismic controls shearwall design

C_{TOTAL} = (floor above) + (this floor) = 859 + 1587 lbs = 2446 lbs Wind controls

T_{TOTAL} = (floor above) + (this floor) = 1038 + 1874 lbs = 2912 lbs Load case 8 controls - Seismic

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E= 2105 lbs

USE SIMPSON DESIGNED HOLDOWN: MST48

OR AT FOUNDATION / INTERIOR WALLS USE: STHD14/RJ

MAIN FL. RIGHT (NEW MAIN BDRM., WIC)

SHEARWALL

Floor Info

Main	Floor Level, e.g. Upper, Main, Lower	
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear	
	(For Left Wall, Use Front-Rear Load Direction)	
CDX	Sheathing type	
	Values in accordance with AF&PA SDPWS-2015	
U/FL	Resisting Dead Load	
	(e.g. Roof, Upper Floor, Main Floor)	
16.50 ft	Total Length of Shearwalls	

WIND

Tributary Width (Upper Floor)

6.0	tributary width
42.0	total width

Tributary Width (Main Floor)

6.0	tributary width
42.0	total width

Not Used

1.0	tributary width
2.0	total width

SEISMIC

Tributary Area (Upper Floor)

6.0	tributary area
42.0	total area

Tributary Area (Main Floor)

6.0	tributary area
42.0	total area

Not Used

1.0	tributary area
2.0	total area

V(from upper)=	3960 lb	6751 lb
V(from main)=	5562 lb	5881 lb
V(from lower)=	0 lb	0 lb
Σ (Wind) =	9,522 lb	Σ (Smc) = 12,633 lb
v =	82 PLF	**v =** 109 PLF

Height of Shearwall = 8.0 ft
Length of Shearwall = 7.5 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 1.0 ft
Length of adjoining wall = 1.0 ft

SDPWS, Table 4.3A → 0.93 x 242 = 225 PLF → USE SW6

Seismic controls shearwall design

C_{TOTAL} = (floor above) + (this floor) = 386 + 660 lbs = 1046 lbs Wind controls

T_{TOTAL} = (floor above) + (this floor) = 362 + 675 lbs = 1037 lbs Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E= 875 lbs

USE SIMPSON DESIGNED HOLDOWN: CS14

OR AT FOUNDATION / INTERIOR WALLS USE: LSTHD8/RJ

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 | CK Engineering LLC | (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#1

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

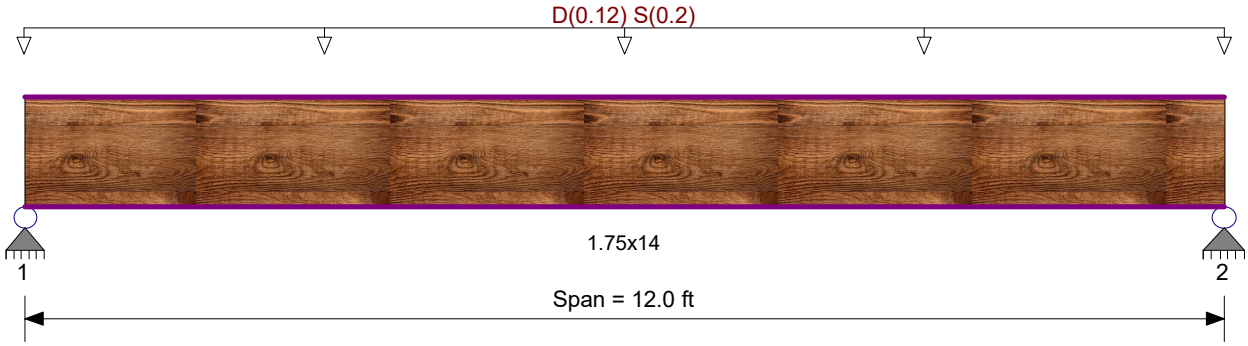
Wood Species : iLevel Truss Joist
Wood Grade : TimberStrand LSL 1.3E - Plank

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	1900 psi
Fb -	1900 psi
Fc - Prll	1400 psi
Fc - Perp	435 psi
Fv	150 psi
Ft	1075 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	660.75 ksi
Density	45.01 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 8.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.575** : 1	Maximum Shear Stress Ratio	=	**0.565** : 1
Section used for this span		**1.75x14** NDS2018	Section used for this span		**1.75x14** NDS2018
fb: Actual	=	1,238.03 psi	fv: Actual	=	97.52 psi
F'b	=	2,154.23 psi	F'v	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.180 in	Ratio =	798	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.296 in	Ratio =	487	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.286	0.281	0.90	1.00	1.00	1.00	0.986	1.00	1.00	1.00	2.30	482.3	1,685.9	0.62	38.0	135.0
+D+S					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.575	0.565	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	5.90	1,238.0	2,154.2	1.59	97.5	172.5
+D+0.750S					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.487	0.479	1.15	1.00	1.00	1.00	0.986	1.00	1.00	1.00	5.00	1,049.1	2,154.2	1.35	82.6	172.5
+0.60D					1.00	1.00	1.00	0.986	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#1

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 12.0 ft	1	0.097	0.095	1.60	1.00	1.00	1.00	0.986	1.00	1.00	1.00	1.38	289.4	2,997.2	0.37	22.8	240.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	0.2956	6.044		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.1152	in	6.044 ft	0.0000	in	0.000	ft
+D+S	1	0.2956	in	6.044 ft	0.0000	in	0.000	ft
+D+0.750S	1	0.2505	in	6.044 ft	0.0000	in	0.000	ft
+0.60D	1	0.0691	in	6.044 ft	0.0000	in	0.000	ft
S Only	1	0.1804	in	6.044 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.966	1.966
Max Upward from Load Combinations	1.966	1.966
Max Upward from Load Cases	1.200	1.200
D Only	0.766	0.766
+D+S	1.966	1.966
+D+0.750S	1.666	1.666
+0.60D	0.460	0.460
S Only	1.200	1.200

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#2

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

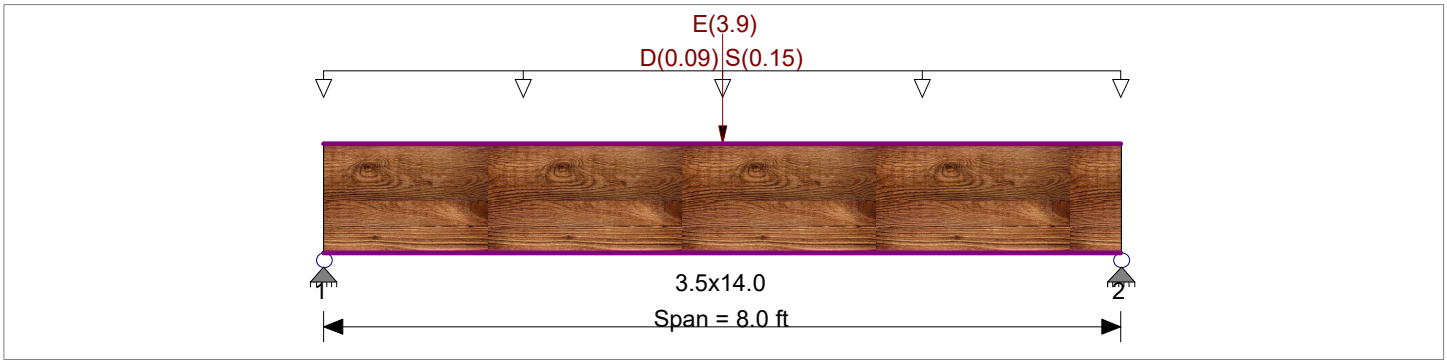
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	525.0 psi
Fv	290.0 psi
Ft	2,300.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	45.070 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 6.0 ft, (ROOF)
Point Load : E = 3.90 k @ 4.0 ft, (SW2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.839** : 1	Maximum Shear Stress Ratio	=	**0.608** : 1
Section used for this span		**3.5x14.0** NDS2018	Section used for this span		**3.5x14.0** NDS2018
fb: Actual	=	3,827.25 psi	fv: Actual	=	282.28 psi
F'b	=	4,561.28 psi	F'v	=	464.00 psi
Load Combination		+1.157D+4.550E	Load Combination		+1.157D+4.550E
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.045 in	Ratio =	2126	>=360	Span: 1 : E Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.038 in	Ratio =	2545	>=240	Span: 1 : +D+0.70E
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.034	0.035	0.90	1.00	1.00	1.00	0.983	1.00	1.00	1.00	0.84	88.4	2,565.7	0.30	9.2	261.0
+D+S					1.00	1.00	1.00	0.983	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.065	0.067	1.15	1.00	1.00	1.00	0.983	1.00	1.00	1.00	2.04	214.4	3,278.4	0.73	22.4	333.5
+D+0.750S					1.00	1.00	1.00	0.983	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.056	0.057	1.15	1.00	1.00	1.00	0.983	1.00	1.00	1.00	1.74	182.9	3,278.4	0.62	19.1	333.5

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#2

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.157D+4.550E					1.00	1.00	1.00	0.983	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.839	0.608	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	36.47	3,827.2	4,561.3	9.22	282.3	464.0
+1.118D+0.750S+3.413E					1.00	1.00	1.00	0.983	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.655	0.482	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	28.46	2,987.0	4,561.3	7.31	223.9	464.0
+0.60D					1.00	1.00	1.00	0.983	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.012	0.012	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	0.51	53.1	4,561.3	0.18	5.5	464.0
+0.4428D+4.550E					1.00	1.00	1.00	0.983	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.825	0.594	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	35.86	3,764.1	4,561.3	9.01	275.7	464.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	E Only	0.0452	4.000		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span		Max. Upward Defl		Location in Span	
D Only	1	0.0061	in	4.029	ft	0.0000	in	0.000	ft
+D+S	1	0.0148	in	4.029	ft	0.0000	in	0.000	ft
+D+0.750S	1	0.0126	in	4.029	ft	0.0000	in	0.000	ft
+D+0.70E	1	0.0377	in	4.029	ft	0.0000	in	0.000	ft
+D+0.750S+0.5250E	1	0.0363	in	4.029	ft	0.0000	in	0.000	ft
+0.60D	1	0.0037	in	4.029	ft	0.0000	in	0.000	ft
+0.60D+0.70E	1	0.0353	in	4.029	ft	0.0000	in	0.000	ft
S Only	1	0.0087	in	4.029	ft	0.0000	in	0.000	ft
E Only	1	0.0452	in	4.000	ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.950	1.950
Max Upward from Load Combinations	1.895	1.895
Max Upward from Load Cases	1.950	1.950
D Only	0.421	0.421
+D+S	1.021	1.021
+D+0.750S	0.871	0.871
+D+0.70E	1.786	1.786
+D+0.750S+0.5250E	1.895	1.895
+0.60D	0.253	0.253
+0.60D+0.70E	1.618	1.618
S Only	0.600	0.600
E Only	1.950	1.950

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#3

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

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

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	525.0 psi
Fv	290.0 psi
Ft	2,300.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	45.070 pcf

Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLOOR)
Point Load : E = 3.90 k @ 2.750 ft, (SW2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.947** : 1	Maximum Shear Stress Ratio	=	**0.686** : 1
Section used for this span		**7x9.25** NDS2018	Section used for this span		**7x9.25** NDS2018
fb: Actual	=	4,520.85 psi	fv: Actual	=	318.16 psi
F'b	=	4,776.01 psi	F'v	=	464.00 psi
Load Combination		+1.157D+4.550E	Load Combination		+1.157D+4.550E
Location of maximum on span	=	2.770 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.157 in	Ratio =	879	>=360	Span: 1 : E Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.127 in	Ratio =	1087	>=240	Span: 1 : +D+0.70E
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 11.50 ft	1	0.030	0.018	0.90	1.00	1.00	1.00	1.029	1.00	1.00	1.00	0.66	79.9	2,686.5	0.20	4.7	261.0
+D+L					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.50 ft	1	0.062	0.037	1.00	1.00	1.00	1.00	1.029	1.00	1.00	1.00	1.54	185.6	2,985.0	0.47	10.8	290.0
+D+0.750L					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.50 ft	1	0.043	0.026	1.25	1.00	1.00	1.00	1.029	1.00	1.00	1.00	1.32	159.2	3,731.3	0.40	9.3	362.5

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#3

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.157D+4.550E					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.50 ft	1	0.947	0.686	1.60	1.00	1.00	1.00	1.029	1.00	1.00	1.00	37.61	4,520.8	4,776.0	13.73	318.2	464.0
+1.118D+0.750L+3.413E					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.50 ft	1	0.725	0.527	1.60	1.00	1.00	1.00	1.029	1.00	1.00	1.00	28.81	3,463.2	4,776.0	10.55	244.4	464.0
+0.60D					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.50 ft	1	0.010	0.006	1.60	1.00	1.00	1.00	1.029	1.00	1.00	1.00	0.40	48.0	4,776.0	0.12	2.8	464.0
+0.4428D+4.550E					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 11.50 ft	1	0.938	0.679	1.60	1.00	1.00	1.00	1.029	1.00	1.00	1.00	37.26	4,479.1	4,776.0	13.59	314.8	464.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	E Only	0.1570	5.078		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span		Max. Upward Defl		Location in Span	
D Only	1	0.0172	in	5.792	ft	0.0000	in	0.000	ft
+D+L	1	0.0400	in	5.792	ft	0.0000	in	0.000	ft
+D+0.750L	1	0.0343	in	5.792	ft	0.0000	in	0.000	ft
+D+0.70E	1	0.1269	in	5.162	ft	0.0000	in	0.000	ft
+D+0.750L+0.5250E	1	0.1163	in	5.288	ft	0.0000	in	0.000	ft
+0.60D	1	0.0103	in	5.792	ft	0.0000	in	0.000	ft
+0.60D+0.70E	1	0.1201	in	5.120	ft	0.0000	in	0.000	ft
L Only	1	0.0228	in	5.792	ft	0.0000	in	0.000	ft
E Only	1	0.1570	in	5.078	ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.967	0.950
Max Upward from Load Combinations	2.308	0.950
Max Upward from Load Cases	2.967	0.933
D Only	0.231	0.231
+D+L	0.537	0.537
+D+0.750L	0.461	0.461
+D+0.70E	2.308	0.884
+D+0.750L+0.5250E	2.019	0.950
+0.60D	0.139	0.139
+0.60D+0.70E	2.216	0.792
L Only	0.306	0.306
E Only	2.967	0.933

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#4

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

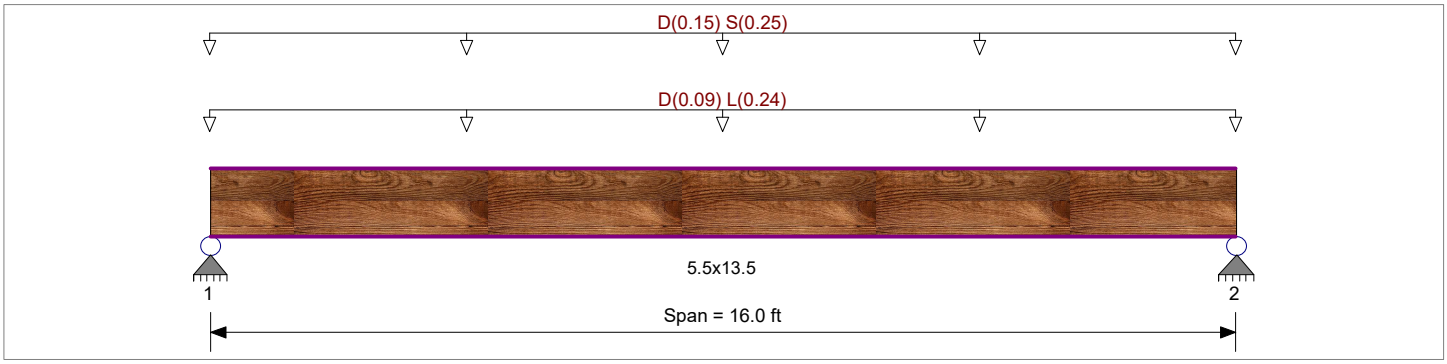
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 6.0 ft, (FLOOR)
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 10.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.519** : 1	Maximum Shear Stress Ratio	=	**0.285** : 1
Section used for this span		**5.5x13.5** NDS2018	Section used for this span		**5.5x13.5** NDS2018
fb: Actual	=	1,433.35 psi	fv: Actual	=	86.81 psi
F'b	=	2,760.00 psi	F'v	=	304.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	8.000 ft	Location of maximum on span	=	14.891 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.183 in	Ratio =	1051	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.456 in	Ratio =	421	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.273	0.149	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.19	588.6	2,160.0	1.76	35.6	238.5
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.475	0.261	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	15.87	1,140.3	2,400.0	3.42	69.1	265.0
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.421	0.231	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	16.19	1,163.3	2,760.0	3.49	70.4	304.8

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#4

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.334	0.183	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.95	1,002.4	3,000.0	3.00	60.7	331.3
+D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.519	0.285	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	19.95	1,433.4	2,760.0	4.30	86.8	304.8
+1.157D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.177	0.097	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.48	681.2	3,840.0	2.04	41.3	424.0
+1.118D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.391	0.215	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	20.92	1,502.8	3,840.0	4.50	91.0	424.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.092	0.050	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.92	353.2	3,840.0	1.06	21.4	424.0
+0.4428D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.0 ft	1	0.068	0.037	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.63	260.6	3,840.0	0.78	15.8	424.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+0.750L+0.750S	0.4557	8.058		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.1871	in	8.058 ft	0.0000	in	0.000	ft
+D+L	1	0.3625	in	8.058 ft	0.0000	in	0.000	ft
+D+S	1	0.3698	in	8.058 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.3187	in	8.058 ft	0.0000	in	0.000	ft
+D+0.750L+0.750S	1	0.4557	in	8.058 ft	0.0000	in	0.000	ft
+0.60D	1	0.1123	in	8.058 ft	0.0000	in	0.000	ft
L Only	1	0.1754	in	8.058 ft	0.0000	in	0.000	ft
S Only	1	0.1827	in	8.058 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.989	4.989
Max Upward from Load Combinations	4.989	4.989
Max Upward from Load Cases	2.049	2.049
D Only	2.049	2.049
+D+L	3.969	3.969
+D+S	4.049	4.049
+D+0.750L	3.489	3.489
+D+0.750L+0.750S	4.989	4.989
+0.60D	1.229	1.229
L Only	1.920	1.920
S Only	2.000	2.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#5

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

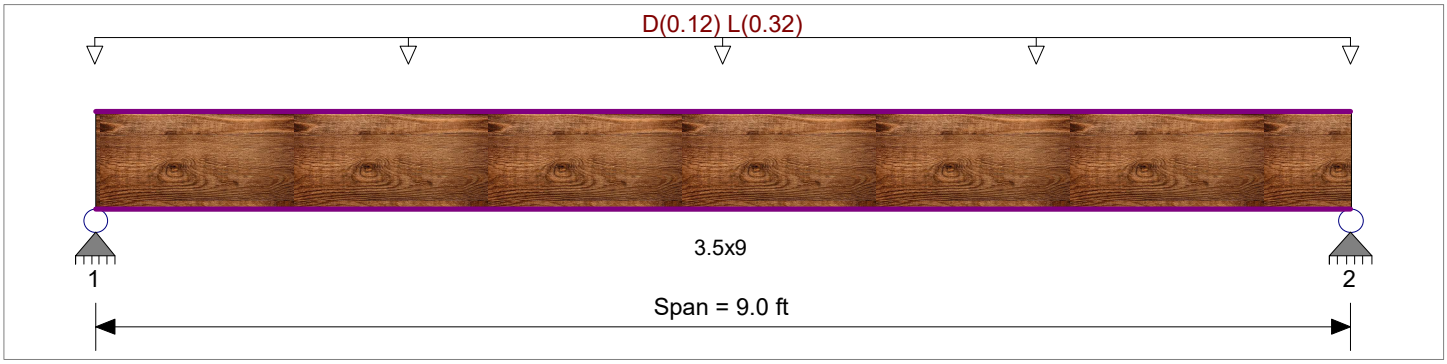
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.479** : 1	Maximum Shear Stress Ratio	=	**0.303** : 1
Section used for this span		**3.5x9** NDS2018	Section used for this span		**3.5x9** NDS2018
fb: Actual	=	1,148.98 psi	fv: Actual	=	80.37 psi
F'b	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.500 ft	Location of maximum on span	=	8.277 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.124 in	Ratio =	869	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.173 in	Ratio =	623	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.151	0.096	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	326.1	2,160.0	0.48	22.8	238.5
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.479	0.303	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.52	1,149.0	2,400.0	1.69	80.4	265.0
+D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.314	0.199	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.71	943.3	3,000.0	1.39	66.0	331.3
+1.157D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#5

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 9.0 ft	1	0.098	0.062	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.49	377.4	3,840.0	0.55	26.4	424.0
+1.118D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.256	0.162	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.87	981.7	3,840.0	1.44	68.7	424.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.051	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.77	195.7	3,840.0	0.29	13.7	424.0
+0.4428D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.038	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.57	144.4	3,840.0	0.21	10.1	424.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.1734	4.533		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.0492	in	4.533 ft	0.0000	in	0.000	ft
+D+L	1	0.1734	in	4.533 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.1423	in	4.533 ft	0.0000	in	0.000	ft
+0.60D	1	0.0295	in	4.533 ft	0.0000	in	0.000	ft
L Only	1	0.1241	in	4.533 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.011	2.011
Max Upward from Load Combinations	2.011	2.011
Max Upward from Load Cases	1.440	1.440
D Only	0.571	0.571
+D+L	2.011	2.011
+D+0.750L	1.651	1.651
+0.60D	0.342	0.342
L Only	1.440	1.440

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#6

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

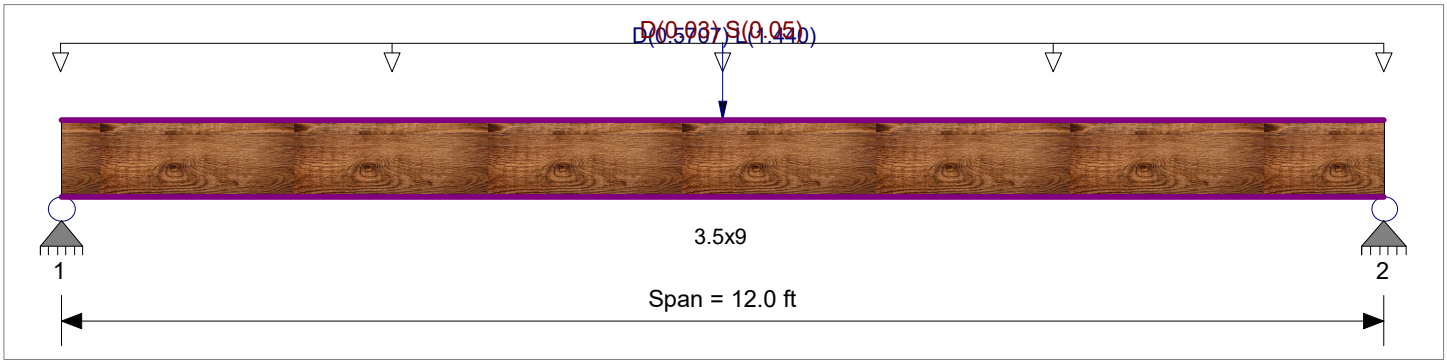
Wood Species : DF/DF
Wood Grade : 24F-V4

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,400.0 psi
Fb -	1,850.0 psi
Fc - Prll	1,650.0 psi
Fc - Perp	650.0 psi
Fv	265.0 psi
Ft	1,100.0 psi

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.0 ft, (ROOF)
Linked Load(s)
Beam BM#5, Support 1: D = 0.5707, L = 1.440 k @ 6 ft from left end of beam

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.708** : 1	Maximum Shear Stress Ratio	=	**0.215** : 1
Section used for this span		**3.5x9** NDS2018	Section used for this span		**3.5x9** NDS2018
fb: Actual	=	1,700.33 psi	fv: Actual	=	57.09 psi
F'b	=	2,400.00 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.235 in	Ratio =	611	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.374 in	Ratio =	385	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.279	0.096	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.38	603.2	2,160.0	0.48	22.8	238.5
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.708	0.215	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.70	1,700.3	2,400.0	1.20	57.1	265.0
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#6

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 12.0 ft	1	0.301	0.116	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.28	831.8	2,760.0	0.74	35.3	304.8
+D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.475	0.146	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.62	1,426.0	3,000.0	1.02	48.5	331.3
+D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.579	0.190	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.29	1,597.5	2,760.0	1.22	57.9	304.8
+1.157D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.182	0.062	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.75	698.0	3,840.0	0.55	26.4	424.0
+1.118D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.435	0.143	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.57	1,668.6	3,840.0	1.27	60.6	424.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.094	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.43	361.9	3,840.0	0.29	13.7	424.0
+0.4428D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.070	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.05	267.1	3,840.0	0.21	10.1	424.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.3738	6.044		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.1384	in	6.044 ft	0.0000	in	0.000	ft
+D+L	1	0.3738	in	6.044 ft	0.0000	in	0.000	ft
+D+S	1	0.1997	in	6.044 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.3149	in	6.044 ft	0.0000	in	0.000	ft
+D+0.750L+0.750S	1	0.3609	in	6.044 ft	0.0000	in	0.000	ft
+0.60D	1	0.0831	in	6.044 ft	0.0000	in	0.000	ft
L Only	1	0.2353	in	6.000 ft	0.0000	in	0.000	ft
S Only	1	0.0613	in	6.044 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.271	1.271
Max Upward from Load Combinations	1.271	1.271
Max Upward from Load Cases	0.720	0.720
D Only	0.506	0.506
+D+L	1.226	1.226
+D+S	0.806	0.806
+D+0.750L	1.046	1.046
+D+0.750L+0.750S	1.271	1.271
+0.60D	0.304	0.304
L Only	0.720	0.720
S Only	0.300	0.300

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 | CK Engineering LLC | (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#7

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

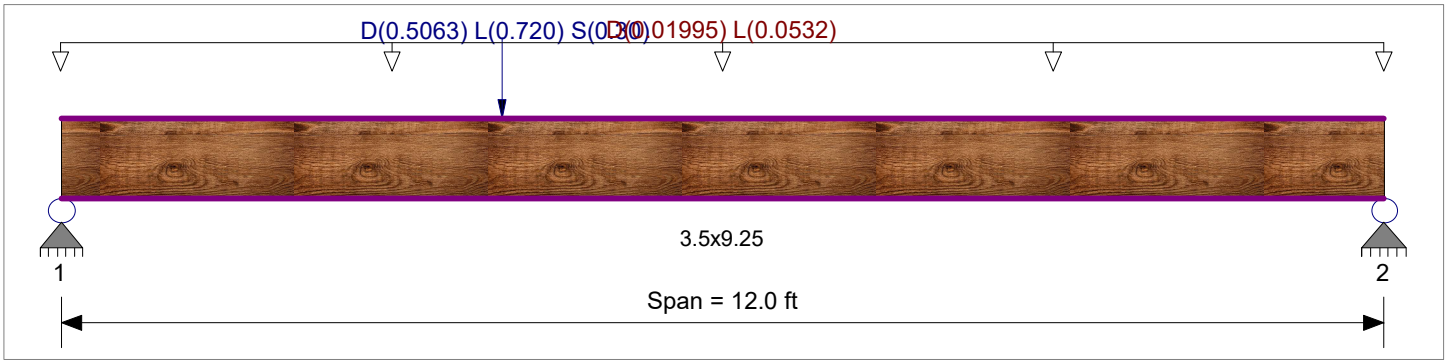
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	525.0 psi
Fv	290.0 psi
Ft	2,300.0 psi

E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,016.54 ksi
Density	45.070 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLOOR)
Linked Load(s)
Beam BM#6, Support 1: D = 0.5063, L = 0.720, S = 0.30 k @ 4 ft from left end of beam

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.370** : 1	Maximum Shear Stress Ratio	=	**0.201** : 1
Section used for this span		**3.5x9.25** NDS2018	Section used for this span		**3.5x9.25** NDS2018
fb: Actual	=	1,104.90 psi	fv: Actual	=	58.16 psi
F'b	=	2,985.01 psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.029 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.138 in	Ratio =	1045	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.227 in	Ratio =	633	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.164	0.088	0.90	1.00	1.00	1.00	1.029	1.00	1.00	1.00	1.83	439.6	2,686.5	0.50	23.0	261.0
+D+L					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.370	0.201	1.00	1.00	1.00	1.00	1.029	1.00	1.00	1.00	4.60	1,104.9	2,985.0	1.26	58.2	290.0
+D+S					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#7

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 12.0 ft	1	0.184	0.097	1.15	1.00	1.00	1.00	1.029	1.00	1.00	1.00	2.63	631.2	3,432.8	0.70	32.2	333.5
+D+0.750L					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.252	0.136	1.25	1.00	1.00	1.00	1.029	1.00	1.00	1.00	3.90	938.6	3,731.3	1.07	49.4	362.5
+D+0.750L+0.750S					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.315	0.169	1.15	1.00	1.00	1.00	1.029	1.00	1.00	1.00	4.50	1,082.3	3,432.8	1.22	56.3	333.5
+1.157D					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.107	0.057	1.60	1.00	1.00	1.00	1.029	1.00	1.00	1.00	2.12	508.7	4,776.0	0.57	26.6	464.0
+1.118D+0.750L+0.750S					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.237	0.127	1.60	1.00	1.00	1.00	1.029	1.00	1.00	1.00	4.72	1,134.1	4,776.0	1.27	59.0	464.0
+0.60D					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.055	0.030	1.60	1.00	1.00	1.00	1.029	1.00	1.00	1.00	1.10	263.7	4,776.0	0.30	13.8	464.0
+0.4428D					1.00	1.00	1.00	1.029	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.041	0.022	1.60	1.00	1.00	1.00	1.029	1.00	1.00	1.00	0.81	194.6	4,776.0	0.22	10.2	464.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.2272	5.693		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.0894	in	5.650 ft	0.0000	in	0.000	ft
+D+L	1	0.2272	in	5.693 ft	0.0000	in	0.000	ft
+D+S	1	0.1244	in	5.606 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.1927	in	5.693 ft	0.0000	in	0.000	ft
+D+0.750L+0.750S	1	0.2190	in	5.650 ft	0.0000	in	0.000	ft
+0.60D	1	0.0537	in	5.650 ft	0.0000	in	0.000	ft
L Only	1	0.1377	in	5.693 ft	0.0000	in	0.000	ft
S Only	1	0.0350	in	5.474 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.317	0.908
Max Upward from Load Combinations	1.317	0.908
Max Upward from Load Cases	0.799	0.559
D Only	0.518	0.349
+D+L	1.317	0.908
+D+S	0.718	0.449
+D+0.750L	1.117	0.769
+D+0.750L+0.750S	1.267	0.844
+0.60D	0.311	0.210
L Only	0.799	0.559
S Only	0.200	0.100

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 | CK Engineering LLC | (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#8

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

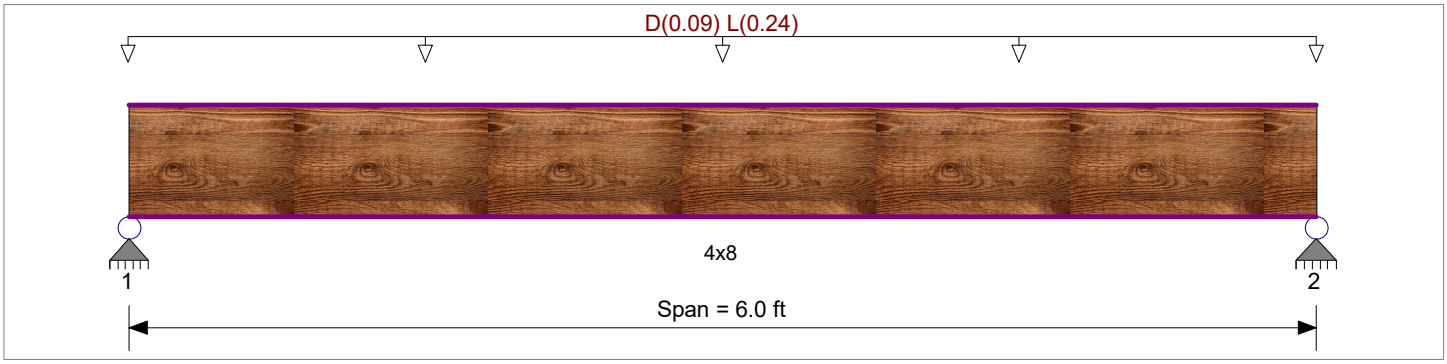
Wood Species : Douglas Fir-Larch (North)
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	875 psi
Fb -	875 psi
Fc - Prll	600 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	425 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	30.59 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 6.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.519 : 1	Maximum Shear Stress Ratio	=	0.281 : 1
Section used for this span		4x8 NDS2018	Section used for this span		4x8 NDS2018
fb: Actual	=	590.68 psi	fv: Actual	=	47.76 psi
F'b	=	1,137.50 psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.049 in	Ratio =	1477	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.068 in	Ratio =	1057	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.164	0.089	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.43	168.0	1,023.8	0.23	13.6	153.0
+D+L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.519	0.281	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.51	590.7	1,137.5	0.81	47.8	170.0
+D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.341	0.185	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.24	485.0	1,421.9	0.66	39.2	212.5
+1.157D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#8

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 6.0 ft	1	0.107	0.058	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.50	194.4	1,820.0	0.27	15.7	272.0
+1.118D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.277	0.150	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.29	504.8	1,820.0	0.69	40.8	272.0
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.055	0.030	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.26	100.8	1,820.0	0.14	8.1	272.0
+0.4428D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.041	0.022	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.19	74.4	1,820.0	0.10	6.0	272.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.0681	3.022		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.0194	in	3.022 ft	0.0000	in	0.000	ft
+D+L	1	0.0681	in	3.022 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.0559	in	3.022 ft	0.0000	in	0.000	ft
+0.60D	1	0.0116	in	3.022 ft	0.0000	in	0.000	ft
L Only	1	0.0487	in	3.022 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.006	1.006
Max Upward from Load Combinations	1.006	1.006
Max Upward from Load Cases	0.720	0.720
D Only	0.286	0.286
+D+L	1.006	1.006
+D+0.750L	0.826	0.826
+0.60D	0.172	0.172
L Only	0.720	0.720

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#9

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

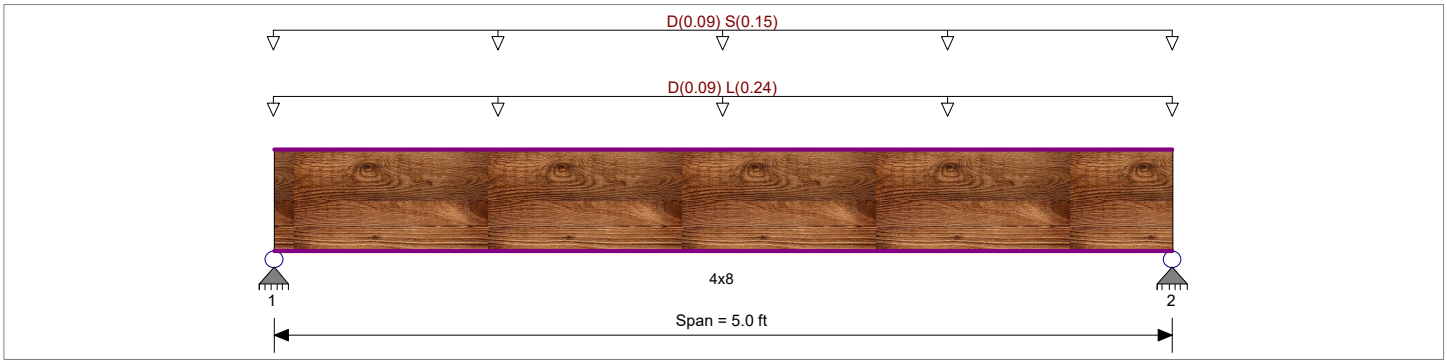
Wood Species : Douglas Fir-Larch (North)
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	875.0 psi
Fb -	875.0 psi
Fc - Prll	600.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	425.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	30.590 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 6.0 ft, (FLOOR)
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 6.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.457** : 1	Maximum Shear Stress Ratio	=	**0.281** : 1
Section used for this span		**4x8** NDS2018	Section used for this span		**4x8** NDS2018
fb: Actual	=	520.27 psi	fv: Actual	=	47.72 psi
F'b	=	1,137.50 psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.023 in	Ratio =	2553	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.047 in	Ratio =	1282	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.221	0.136	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.58	226.7	1,023.8	0.35	20.8	153.0
+D+L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.457	0.281	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.33	520.3	1,137.5	0.81	47.7	170.0
+D+S					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.314	0.192	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.05	410.2	1,308.1	0.64	37.6	195.5

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: BM#9

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.314	0.193	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.14	446.9	1,421.9	0.69	41.0	212.5
+D+0.750L+0.750S					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.447	0.274	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.49	584.5	1,308.1	0.91	53.6	195.5
+1.157D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.144	0.088	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.67	262.4	1,820.0	0.41	24.1	272.0
+1.118D+0.750L+0.750S					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.336	0.206	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.56	611.2	1,820.0	0.95	56.1	272.0
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.075	0.046	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.35	136.0	1,820.0	0.21	12.5	272.0
+0.4428D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 5.0 ft	1	0.055	0.034	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.26	100.4	1,820.0	0.16	9.2	272.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+0.750L+0.750S	0.0468	2.518		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.0181	in	2.518 ft	0.0000	in	0.000	ft
+D+L	1	0.0416	in	2.518 ft	0.0000	in	0.000	ft
+D+S	1	0.0328	in	2.518 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.0358	in	2.518 ft	0.0000	in	0.000	ft
+D+0.750L+0.750S	1	0.0468	in	2.518 ft	0.0000	in	0.000	ft
+0.60D	1	0.0109	in	2.518 ft	0.0000	in	0.000	ft
L Only	1	0.0235	in	2.518 ft	0.0000	in	0.000	ft
S Only	1	0.0147	in	2.518 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.195	1.195
Max Upward from Load Combinations	1.195	1.195
Max Upward from Load Cases	0.600	0.600
D Only	0.463	0.463
+D+L	1.063	1.063
+D+S	0.838	0.838
+D+0.750L	0.913	0.913
+D+0.750L+0.750S	1.195	1.195
+0.60D	0.278	0.278
L Only	0.600	0.600
S Only	0.375	0.375

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 | CK Engineering LLC | (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#10

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

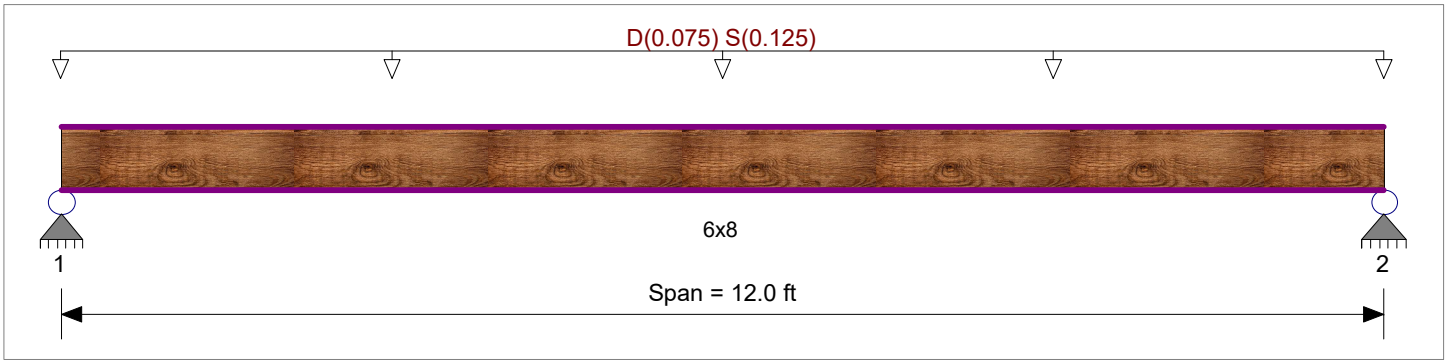
Wood Species : Douglas Fir-Larch (North)
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	875.0 psi
Fb -	875.0 psi
Fc - Prll	600.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	425.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	30.590 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 5.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.869 : 1	Maximum Shear Stress Ratio	=	0.209 : 1
Section used for this span		6x8 NDS2018	Section used for this span		6x8 NDS2018
fb: Actual	=	874.53 psi	fv: Actual	=	40.89 psi
F'b	=	1,006.25 psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.233 in	Ratio =	617	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.390 in	Ratio =	369	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.446	0.107	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.51	350.9	787.5	0.45	16.4	153.0
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.869	0.209	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.76	874.5	1,006.3	1.12	40.9	195.5
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.739	0.178	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.20	743.6	1,006.3	0.96	34.8	195.5
+1.157D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#10

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 12.0 ft	1	0.290	0.070	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.74	406.1	1,400.0	0.52	19.0	272.0
+1.118D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.561	0.135	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.37	785.0	1,400.0	1.01	36.7	272.0
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.150	0.036	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.90	210.5	1,400.0	0.27	9.8	272.0
+0.4428D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 12.0 ft	1	0.111	0.027	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.67	155.4	1,400.0	0.20	7.3	272.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+S	0.3897	6.044		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.1564	in	6.044 ft	0.0000	in	0.000	ft
+D+S	1	0.3897	in	6.044 ft	0.0000	in	0.000	ft
+D+0.750S	1	0.3314	in	6.044 ft	0.0000	in	0.000	ft
+0.60D	1	0.0938	in	6.044 ft	0.0000	in	0.000	ft
S Only	1	0.2334	in	6.044 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.253	1.253
Max Upward from Load Combinations	1.253	1.253
Max Upward from Load Cases	0.750	0.750
D Only	0.503	0.503
+D+S	1.253	1.253
+D+0.750S	1.065	1.065
+0.60D	0.302	0.302
S Only	0.750	0.750

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 | CK Engineering LLC | (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#11

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

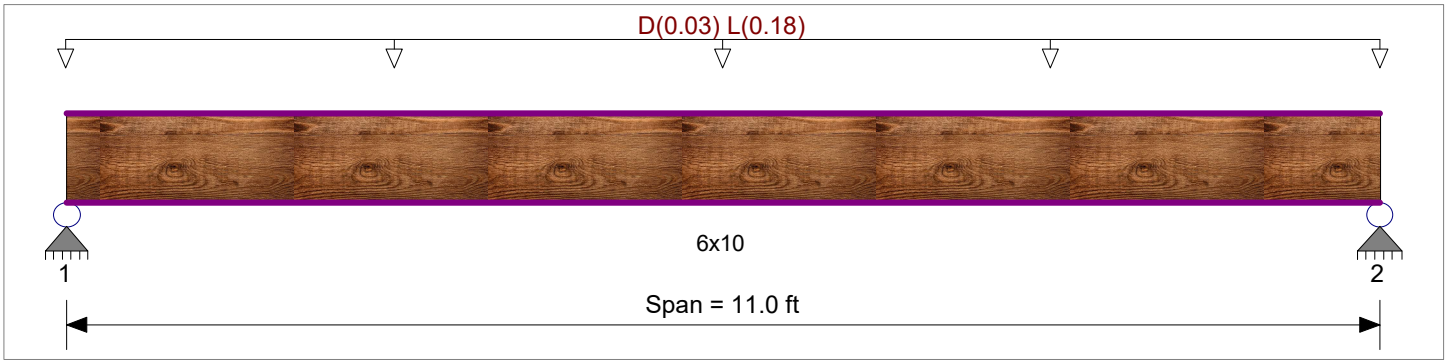
Wood Species : Douglas Fir-Larch (North)
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	875.0 psi
Fb -	875.0 psi
Fc - Prll	600.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	425.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	30.590 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 3.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.693** : 1	Maximum Shear Stress Ratio	=	**0.221** : 1
Section used for this span		**6x10** NDS2018	Section used for this span		**6x10** NDS2018
fb: Actual	=	485.07 psi	fv: Actual	=	30.07 psi
F'b	=	700.00 psi	F'v	=	136.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.500 ft	Location of maximum on span	=	10.237 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.123 in	Ratio =	1074	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.151 in	Ratio =	874	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.143	0.046	0.90	1.00	1.00	1.00	1.000	1.00	0.80	1.00	0.62	90.2	630.0	0.19	5.6	122.4
+D+L					1.00	1.00	1.00	1.000	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.693	0.221	1.00	1.00	1.00	1.00	1.000	1.00	0.80	1.00	3.34	485.1	700.0	1.05	30.1	136.0
+D+0.750L					1.00	1.00	1.00	1.000	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.442	0.141	1.25	1.00	1.00	1.00	1.000	1.00	0.80	1.00	2.66	386.3	875.0	0.83	23.9	170.0
+1.157D					1.00	1.00	1.00	1.000	1.00	0.80	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: BM#11

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 11.0 ft	1	0.093	0.030	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.00	0.72	104.3	1,120.0	0.23	6.5	217.6
+1.118D+0.750L					1.00	1.00	1.00	1.000	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.354	0.113	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.00	2.74	397.0	1,120.0	0.86	24.6	217.6
+0.60D					1.00	1.00	1.00	1.000	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.048	0.015	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.00	0.37	54.1	1,120.0	0.12	3.4	217.6
+0.4428D					1.00	1.00	1.00	1.000	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 11.0 ft	1	0.036	0.011	1.60	1.00	1.00	1.00	1.000	1.00	0.80	1.00	0.28	39.9	1,120.0	0.09	2.5	217.6

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.1510	5.540		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.0281	in	5.540 ft	0.0000	in	0.000	ft
+D+L	1	0.1510	in	5.540 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.1202	in	5.540 ft	0.0000	in	0.000	ft
+0.60D	1	0.0168	in	5.540 ft	0.0000	in	0.000	ft
L Only	1	0.1229	in	5.540 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.216	1.216
Max Upward from Load Combinations	1.216	1.216
Max Upward from Load Cases	0.990	0.990
D Only	0.226	0.226
+D+L	1.216	1.216
+D+0.750L	0.969	0.969
+0.60D	0.136	0.136
L Only	0.990	0.990

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: HDR#1

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

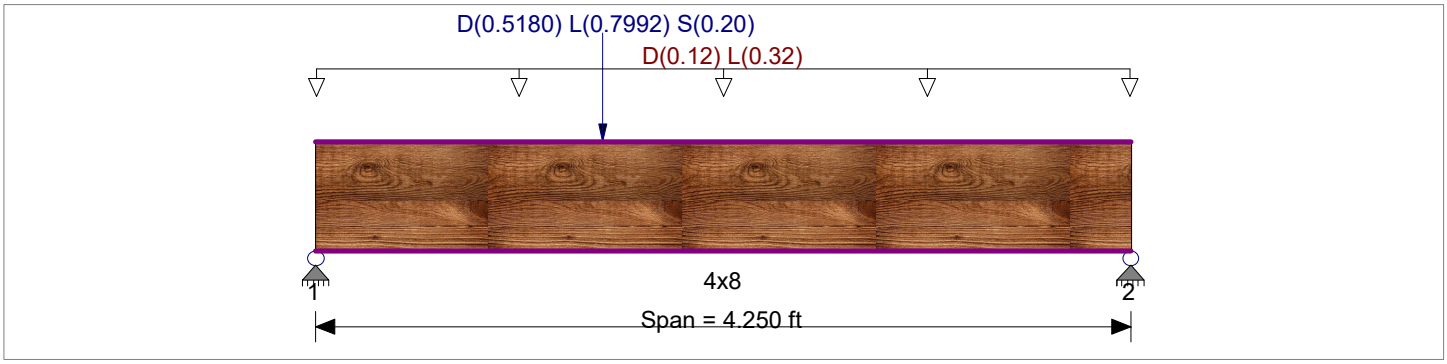
Wood Species : Douglas Fir-Larch (North)
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	875 psi
Fb -	875 psi
Fc - Prll	600 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	425 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	30.59 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLOOR)
Linked Load(s)
Beam BM#7, Support 1: D = 0.5180, L = 0.7992, S = 0.20 k @ 1.5 ft from left end of beam

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.756** : 1	Maximum Shear Stress Ratio	=	**0.534** : 1
Section used for this span		**4x8** NDS2018	Section used for this span		**4x8** NDS2018
fb: Actual	=	859.55 psi	fv: Actual	=	90.81 psi
F'b	=	1,137.50 psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	1.505 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.030 in	Ratio =	1700	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.045 in	Ratio =	1127	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 4.250 ft	1	0.291	0.204	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.76	297.8	1,023.8	0.53	31.2	153.0
+D+L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.250 ft	1	0.756	0.534	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.20	859.6	1,137.5	1.54	90.8	170.0
+D+S					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: HDR#1

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 4.250 ft	1	0.286	0.199	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.95	373.7	1,308.1	0.66	38.8	195.5
+D+0.750L					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.250 ft	1	0.506	0.357	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.84	719.1	1,421.9	1.28	75.9	212.5
+D+0.750L+0.750S					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.250 ft	1	0.593	0.418	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.98	776.0	1,308.1	1.38	81.6	195.5
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 4.250 ft	1	0.098	0.069	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.46	178.7	1,820.0	0.32	18.7	272.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.0452	2.047		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span		Max. Upward Defl		Location in Span	
D Only	1	0.0153	in	2.032	ft	0.0000	in	0.000	ft
+D+L	1	0.0452	in	2.047	ft	0.0000	in	0.000	ft
+D+S	1	0.0187	in	2.016	ft	0.0000	in	0.000	ft
+D+0.750L	1	0.0377	in	2.047	ft	0.0000	in	0.000	ft
+D+0.750L+0.750S	1	0.0403	in	2.032	ft	0.0000	in	0.000	ft
+0.60D	1	0.0092	in	2.032	ft	0.0000	in	0.000	ft
L Only	1	0.0300	in	2.047	ft	0.0000	in	0.000	ft
S Only	1	0.0034	in	1.954	ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.799	1.411
Max Upward from Load Combinations	1.799	1.411
Max Upward from Load Cases	1.197	0.962
D Only	0.602	0.449
+D+L	1.799	1.411
+D+S	0.731	0.520
+D+0.750L	1.500	1.171
+D+0.750L+0.750S	1.597	1.224
+0.60D	0.361	0.270
L Only	1.197	0.962
S Only	0.129	0.071

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: DECK JOIST

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

Wood Species : Hem-Fir
Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	850 psi
Fb -	850 psi
Fc - Prll	1300 psi
Fc - Perp	405 psi
Fv	150 psi
Ft	525 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	26.84 pcf

Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 1.330 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.702** : 1	Maximum Shear Stress Ratio	=	**0.349** : 1
Section used for this span		**2x6** NDS2018	Section used for this span		**2x6** NDS2018
fb: Actual	=	620.62 psi	fv: Actual	=	41.89 psi
F'b	=	884.00 psi	F'v	=	120.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.875 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.077 in	Ratio =	897	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.091 in	Ratio =	756	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 5.750 ft	1	0.122	0.061	0.90	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.06	97.3	795.6	0.04	6.6	108.0
+D+L					1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 5.750 ft	1	0.702	0.349	1.00	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.39	620.6	884.0	0.23	41.9	120.0
+D+0.750L					1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 5.750 ft	1	0.443	0.220	1.25	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.31	489.8	1,105.0	0.18	33.1	150.0
+1.157D					1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: DECK JOIST

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 5.750 ft	1	0.080	0.040	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.07	112.6	1,414.4	0.04	7.6	192.0
+1.118D+0.750L					1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 5.750 ft	1	0.354	0.176	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.32	501.3	1,414.4	0.19	33.8	192.0
+0.60D					1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 5.750 ft	1	0.041	0.021	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.04	58.4	1,414.4	0.02	3.9	192.0
+0.4428D					1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 5.750 ft	1	0.030	0.015	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.03	43.1	1,414.4	0.02	2.9	192.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.0912	2.896		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.0143	in	2.896 ft	0.0000	in	0.000	ft
+D+L	1	0.0912	in	2.896 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.0719	in	2.896 ft	0.0000	in	0.000	ft
+0.60D	1	0.0086	in	2.896 ft	0.0000	in	0.000	ft
L Only	1	0.0769	in	2.896 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.272	0.272
Max Upward from Load Combinations	0.272	0.272
Max Upward from Load Cases	0.229	0.229
D Only	0.043	0.043
+D+L	0.272	0.272
+D+0.750L	0.215	0.215
+0.60D	0.026	0.026
L Only	0.229	0.229

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

DESCRIPTION: MAIN FLOOR JOIST w/ ROOF LOAD

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : NDS 2018
Load Combination Set : IBC 2021 (1)

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021 (1)

Wood Species : Hem-Fir (North)
Wood Grade : No.2

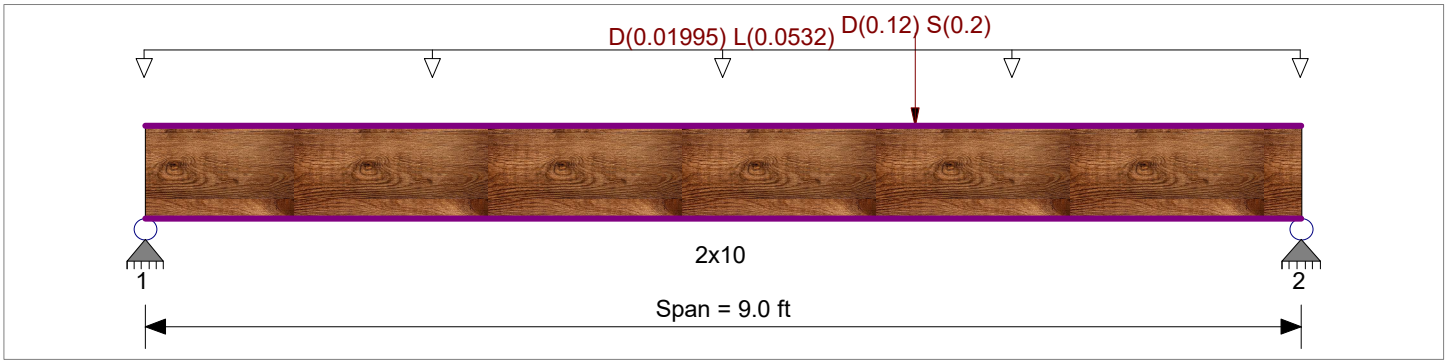
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	675.0 psi
Fb -	675.0 psi
Fc - Prll	475.0 psi
Fc - Perp	405.0 psi
Fv	135.0 psi
Ft	325.0 psi

E : Modulus of Elasticity

Ebend- xx	1,100.0 ksi
Eminbend - xx	400.0 ksi
Density	28.720 pcf

Repetitive Member Stress Increase



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLOOR)
Point Load : D = 0.120, S = 0.20 k @ 6.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.631** : 1	Maximum Shear Stress Ratio	=	**0.292** : 1
Section used for this span		**2x10** NDS2018	Section used for this span		**2x10** NDS2018
fb: Actual	=	619.16 psi	fv: Actual	=	39.38 psi
F'b	=	981.96 psi	F'v	=	135.00 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+L
Location of maximum on span	=	5.945 ft	Location of maximum on span	=	8.245 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.073 in	Ratio =	1487	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	>=360	n/a
Max Downward Total Deflection	0.141 in	Ratio =	763	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	>=240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.324	0.147	0.90	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.44	249.3	768.5	0.17	17.8	121.5
+D+L					1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.630	0.292	1.00	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.96	538.1	853.9	0.36	39.4	135.0
+D+S					1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.482	0.208	1.15	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.84	472.8	982.0	0.30	32.3	155.3

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: MAIN FLOOR JOIST w/ ROOF LOAD

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750L					1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.435	0.201	1.25	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.83	463.8	1,067.3	0.31	34.0	168.8
+D+0.750L+0.750S					1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.631	0.289	1.15	1.00	1.00	1.00	1.100	1.00	1.00	1.15	1.10	619.2	982.0	0.41	44.8	155.3
+0.60D					1.00	1.00	1.00	1.100	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.109	0.050	1.60	1.00	1.00	1.00	1.100	1.00	1.00	1.15	0.27	149.6	1,366.2	0.10	10.7	216.0

Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+0.750L+0.750S	0.1414	4.664		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl		Location in Span	Max. Upward Defl		Location in Span	
D Only	1	0.0559	in	4.697 ft	0.0000	in	0.000	ft
+D+L	1	0.1284	in	4.599 ft	0.0000	in	0.000	ft
+D+S	1	0.0975	in	4.796 ft	0.0000	in	0.000	ft
+D+0.750L	1	0.1103	in	4.599 ft	0.0000	in	0.000	ft
+D+0.750L+0.750S	1	0.1414	in	4.664 ft	0.0000	in	0.000	ft
+0.60D	1	0.0335	in	4.697 ft	0.0000	in	0.000	ft
L Only	1	0.0726	in	4.533 ft	0.0000	in	0.000	ft
S Only	1	0.0417	in	4.927 ft	0.0000	in	0.000	ft

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.382	0.462
Max Upward from Load Combinations	0.382	0.462
Max Upward from Load Cases	0.239	0.239
D Only	0.142	0.182
+D+L	0.382	0.422
+D+S	0.209	0.316
+D+0.750L	0.322	0.362
+D+0.750L+0.750S	0.372	0.462
+0.60D	0.085	0.109
L Only	0.239	0.239
S Only	0.067	0.133

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: FTNG#1

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : ACI 318-19
Load Combinations Used : IBC 2021 (1)

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50	ksi
fy : Rebar Yield	=	40.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	150.0	pcf
Soil/Concrete Friction Coeff.	=	0.250	

Increases based on footing Depth

Footing base depth below soil surface	=	ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

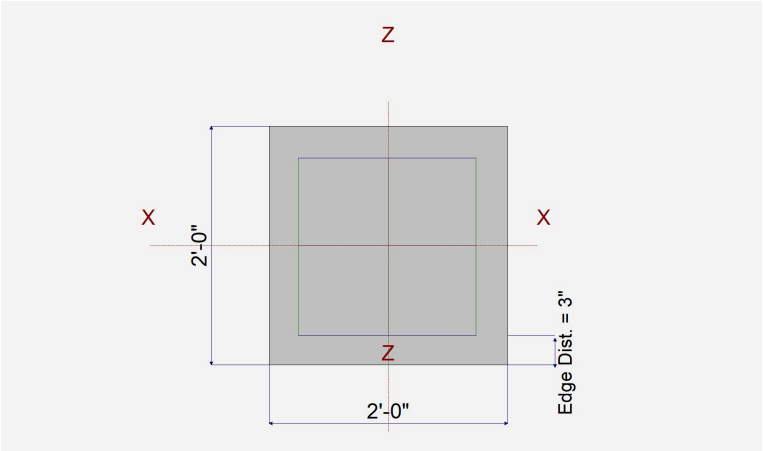
Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.0 ft
Footing Thickness	=	10.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)

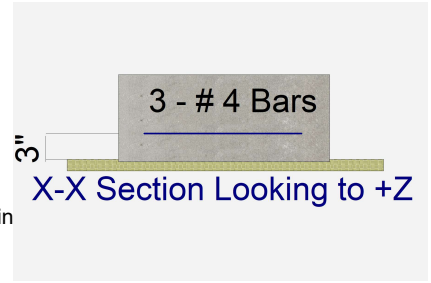
Number of Bars	=		3
Reinforcing Bar Size	=	#	4

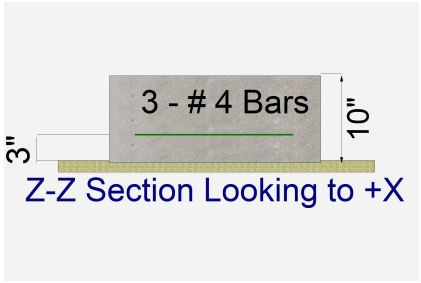
Bars parallel to Z-Z Axis (resisting X Flexure)

Number of Bars	=		3
Reinforcing Bar Size	=	#	4

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in





Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: FTNG#1

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.0		1.20	1.0				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.5222	Soil Bearing	0.7833 ksf	1.50 ksf	+D+0.750L+0.750S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.07432	Z Flexure (+X) Bot Tens	0.4525 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.07432	Z Flexure (-X) Bot Tens	0.4525 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.720	Min Steel X Flexure Bottom	0.216 in2/ft	0.300 in2/ft	n/a
PASS	0.07432	X Flexure (+Z) Bot Tens	0.4525 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.07432	X Flexure (-Z) Bot Tens	0.4525 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.720	Min Steel Z Flexure Bottom	0.216 in2/ft	0.300 in2/ft	n/a
PASS	0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS	0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS	0.09868	1-way Shear (+X)	4.525 psi	45.857 psi	+1.20D+1.60L+0.50S
PASS	0.09868	1-way Shear (-X)	4.525 psi	45.857 psi	+1.20D+1.60L+0.50S
PASS	0.09868	1-way Shear (+Z)	4.525 psi	45.857 psi	+1.20D+1.60L+0.50S
PASS	0.09868	1-way Shear (-Z)	4.525 psi	45.857 psi	+1.20D+1.60L+0.50S
PASS	0.1120	2-way Punching	16.807 psi	150.0 psi	+1.20D+1.60L+0.50S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.0	0.3708	0.3708	n/a	n/a	0.247
X-X, +D+L	1.50	n/a	0.0	0.6708	0.6708	n/a	n/a	0.447
X-X, +D+S	1.50	n/a	0.0	0.6208	0.6208	n/a	n/a	0.414
X-X, +D+0.750L	1.50	n/a	0.0	0.5958	0.5958	n/a	n/a	0.397
X-X, +D+0.750L+0.750S	1.50	n/a	0.0	0.7833	0.7833	n/a	n/a	0.522
X-X, +0.60D	1.50	n/a	0.0	0.2225	0.2225	n/a	n/a	0.148
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.3708	0.3708	0.247
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	0.6708	0.6708	0.447
Z-Z, +D+S	1.50	0.0	n/a	n/a	n/a	0.6208	0.6208	0.414
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	0.5958	0.5958	0.397
Z-Z, +D+0.750L+0.750S	1.50	0.0	n/a	n/a	n/a	0.7833	0.7833	0.522
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2225	0.2225	0.148

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

DESCRIPTION: FTNG#1

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1750	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.40D	0.1750	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60L	0.390	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60L	0.390	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	0.4525	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	0.4525	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L	0.2250	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L	0.2250	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D	0.150	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D	0.150	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	0.4250	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	0.4250	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60S	0.350	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60S	0.350	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	0.2875	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	0.2875	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	0.3125	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	0.3125	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +0.90D	0.1125	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +0.90D	0.1125	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.40D	0.1750	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.40D	0.1750	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60L	0.390	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60L	0.390	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	0.4525	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	0.4525	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.2250	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.2250	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D	0.150	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D	0.150	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	0.4250	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	0.4250	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.350	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.350	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	0.2875	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	0.2875	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	0.3125	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	0.3125	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +0.90D	0.1125	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +0.90D	0.1125	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.75 psi	1.75 psi	1.75 psi	45.86 psi	0.04	OK
+1.20D+1.60L	3.90 psi	3.90 psi	3.90 psi	45.86 psi	0.09	OK
+1.20D+1.60L+0.50S	4.53 psi	4.53 psi	4.53 psi	45.86 psi	0.10	OK
+1.20D+0.50L	2.25 psi	2.25 psi	2.25 psi	45.86 psi	0.05	OK
+1.20D	1.50 psi	1.50 psi	1.50 psi	45.86 psi	0.03	OK
+1.20D+0.50L+1.60S	4.25 psi	4.25 psi	4.25 psi	45.86 psi	0.09	OK
+1.20D+1.60S	3.50 psi	3.50 psi	3.50 psi	45.86 psi	0.08	OK
+1.20D+0.50L+0.50S	2.88 psi	2.88 psi	2.88 psi	45.86 psi	0.06	OK
+1.20D+0.50L+0.70S	3.13 psi	3.13 psi	3.13 psi	45.86 psi	0.07	OK
+0.90D	1.13 psi	1.13 psi	1.13 psi	45.86 psi	0.02	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.75 psi	1.75 psi	1.75 psi	45.86 psi	0.04	OK
+1.20D+1.60L	3.90 psi	3.90 psi	3.90 psi	45.86 psi	0.09	OK
+1.20D+1.60L+0.50S	4.53 psi	4.53 psi	4.53 psi	45.86 psi	0.10	OK
+1.20D+0.50L	2.25 psi	2.25 psi	2.25 psi	45.86 psi	0.05	OK
+1.20D	1.50 psi	1.50 psi	1.50 psi	45.86 psi	0.03	OK
+1.20D+0.50L+1.60S	4.25 psi	4.25 psi	4.25 psi	45.86 psi	0.09	OK
+1.20D+1.60S	3.50 psi	3.50 psi	3.50 psi	45.86 psi	0.08	OK
+1.20D+0.50L+0.50S	2.88 psi	2.88 psi	2.88 psi	45.86 psi	0.06	OK
+1.20D+0.50L+0.70S	3.13 psi	3.13 psi	3.13 psi	45.86 psi	0.07	OK
+0.90D	1.13 psi	1.13 psi	1.13 psi	45.86 psi	0.02	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

DESCRIPTION: FTNG#1

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	6.50 psi	150.00 psi	0.04	OK
+1.20D+1.60L	14.49 psi	150.00 psi	0.10	OK
+1.20D+1.60L+0.50S	16.81 psi	150.00 psi	0.11	OK
+1.20D+0.50L	8.36 psi	150.00 psi	0.06	OK
+1.20D	5.57 psi	150.00 psi	0.04	OK
+1.20D+0.50L+1.60S	15.79 psi	150.00 psi	0.11	OK
+1.20D+1.60S	13.00 psi	150.00 psi	0.09	OK
+1.20D+0.50L+0.50S	10.68 psi	150.00 psi	0.07	OK
+1.20D+0.50L+0.70S	11.61 psi	150.00 psi	0.08	OK
+0.90D	4.18 psi	150.00 psi	0.03	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: FTNG#2

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : ACI 318-19
Load Combinations Used : IBC 2021 (1)

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50	ksi
fy : Rebar Yield	=	40.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	150.0	pcf
Soil/Concrete Friction Coeff.	=	0.250	

Increases based on footing Depth

Footing base depth below soil surface	=	ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

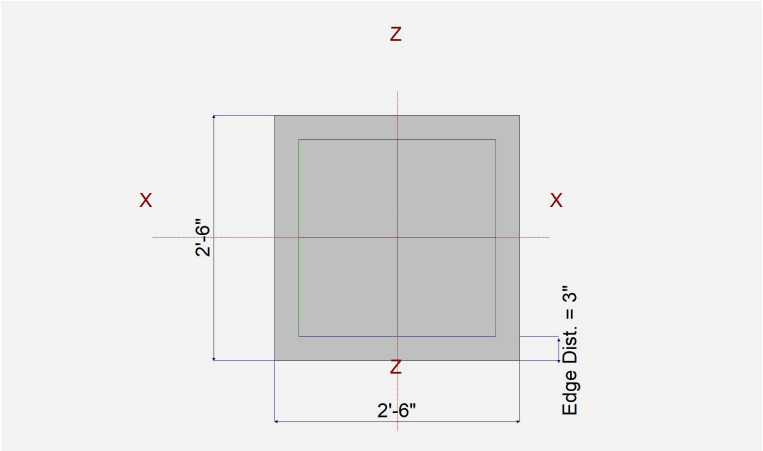
Width parallel to X-X Axis	=	2.50	ft
Length parallel to Z-Z Axis	=	2.50	ft
Footing Thickness	=	10.0	in

Pedestal dimensions...

px : parallel to X-X Axis	=		in
pz : parallel to Z-Z Axis	=		in
Height	=		in

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a



Bottom Reinforcing

Bars parallel to X-X Axis (resisting Z Flexure)

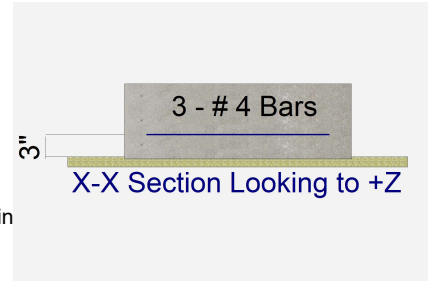
Number of Bars	=		3.0
Reinforcing Bar Size	=	#	4

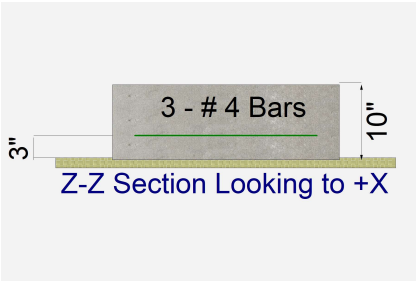
Bars parallel to Z-Z Axis (resisting X Flexure)

Number of Bars	=		3.0
Reinforcing Bar Size	=	#	4

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=		3.0 in





Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

DESCRIPTION: FTNG#2

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	2.030			5.120				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8433	Soil Bearing	1.265 ksf	1.50 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.2709	Z Flexure (+X) Bot Tens	1.329 k-ft/ft	4.904 k-ft/ft	+1.20D+1.60S
PASS	0.2709	Z Flexure (-X) Bot Tens	1.329 k-ft/ft	4.904 k-ft/ft	+1.20D+1.60S
PASS	0.900	Min Steel X Flexure Bottom	0.216 in2/ft	0.240 in2/ft	n/a
PASS	0.2709	X Flexure (+Z) Bot Tens	1.329 k-ft/ft	4.904 k-ft/ft	+1.20D+1.60S
PASS	0.2709	X Flexure (-Z) Bot Tens	1.329 k-ft/ft	4.904 k-ft/ft	+1.20D+1.60S
PASS	0.900	Min Steel Z Flexure Bottom	0.216 in2/ft	0.240 in2/ft	n/a
PASS	0.0	Z Flexure (+X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.0	Z Flexure (-X) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS	0.0	X Flexure (+Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.0	X Flexure (-Z) Top Tens	0 k-ft/ft	0.0 k-ft/ft	
PASS	0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS	0.3210	1-way Shear (+X)	13.665 psi	42.570 psi	+1.20D+1.60S
PASS	0.3210	1-way Shear (-X)	13.665 psi	42.570 psi	+1.20D+1.60S
PASS	0.3210	1-way Shear (+Z)	13.665 psi	42.570 psi	+1.20D+1.60S
PASS	0.3210	1-way Shear (-Z)	13.665 psi	42.570 psi	+1.20D+1.60S
PASS	0.3407	2-way Punching	51.101 psi	150.0 psi	+1.20D+1.60S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.0	0.4456	0.4456	n/a	n/a	0.297
X-X, +D+S	1.50	n/a	0.0	1.265	1.265	n/a	n/a	0.843
X-X, +D+0.750S	1.50	n/a	0.0	1.060	1.060	n/a	n/a	0.707
X-X, +0.60D	1.50	n/a	0.0	0.2674	0.2674	n/a	n/a	0.178
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.4456	0.4456	0.297
Z-Z, +D+S	1.50	0.0	n/a	n/a	n/a	1.265	1.265	0.843
Z-Z, +D+0.750S	1.50	0.0	n/a	n/a	n/a	1.060	1.060	0.707
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2674	0.2674	0.178

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.3553	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

DESCRIPTION: FTNG#2

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.3553	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D	0.3045	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D	0.3045	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+0.50S	0.6245	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+0.50S	0.6245	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+1.60S	1.329	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+1.60S	1.329	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+0.70S	0.7525	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+0.70S	0.7525	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +0.90D	0.2284	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +0.90D	0.2284	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.40D	0.3553	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.40D	0.3553	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D	0.3045	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D	0.3045	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+0.50S	0.6245	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+0.50S	0.6245	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+1.60S	1.329	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+1.60S	1.329	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+0.70S	0.7525	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+0.70S	0.7525	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +0.90D	0.2284	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +0.90D	0.2284	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.65 psi	3.65 psi	3.65 psi	42.57 psi	0.09	OK
+1.20D	3.13 psi	3.13 psi	3.13 psi	42.57 psi	0.07	OK
+1.20D+0.50S	6.42 psi	6.42 psi	6.42 psi	42.57 psi	0.15	OK
+1.20D+1.60S	13.67 psi	13.67 psi	13.67 psi	42.57 psi	0.32	OK
+1.20D+0.70S	7.74 psi	7.74 psi	7.74 psi	42.57 psi	0.18	OK
+0.90D	2.35 psi	2.35 psi	2.35 psi	42.57 psi	0.06	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.65 psi	3.65 psi	3.65 psi	42.57 psi	0.09	OK
+1.20D	3.13 psi	3.13 psi	3.13 psi	42.57 psi	0.07	OK
+1.20D+0.50S	6.42 psi	6.42 psi	6.42 psi	42.57 psi	0.15	OK
+1.20D+1.60S	13.67 psi	13.67 psi	13.67 psi	42.57 psi	0.32	OK
+1.20D+0.70S	7.74 psi	7.74 psi	7.74 psi	42.57 psi	0.18	OK
+0.90D	2.35 psi	2.35 psi	2.35 psi	42.57 psi	0.06	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	13.67 psi	150.00 psi	0.09	OK
+1.20D	11.71 psi	150.00 psi	0.08	OK
+1.20D+0.50S	24.02 psi	150.00 psi	0.16	OK
+1.20D+1.60S	51.10 psi	150.00 psi	0.34	OK
+1.20D+0.70S	28.95 psi	150.00 psi	0.19	OK
+0.90D	8.79 psi	150.00 psi	0.06	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: FTNG#3

Code References

Governing Code : IBC 2021
Referenced Design Standard(s) : ACI 318-19
Load Combinations Used : IBC 2021 (1)

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50	ksi
fy : Rebar Yield	=	40.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	150.0	pcf
Soil/Concrete Friction Coeff.	=	0.250	

Increases based on footing Depth

Footing base depth below soil surface	=	ft
Allow press. increase per foot of depth	=	ksf
when footing base is below	=	ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

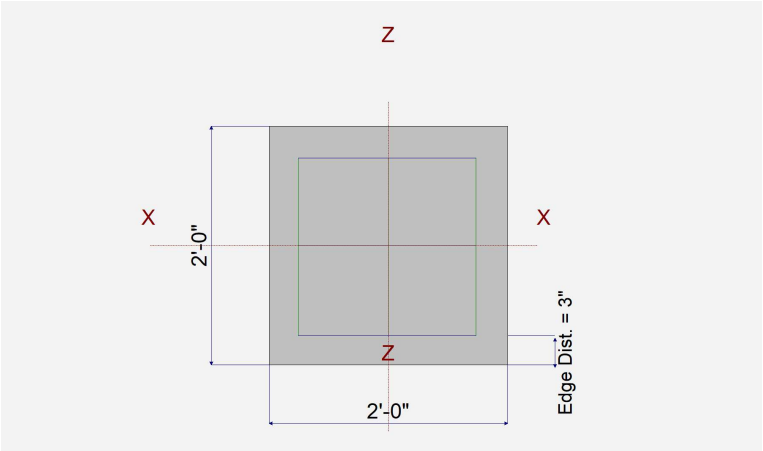
Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.0 ft
Footing Thickness	=	10.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation
Bars required within zone
Bars required on each side of zone



Bottom Reinforcing

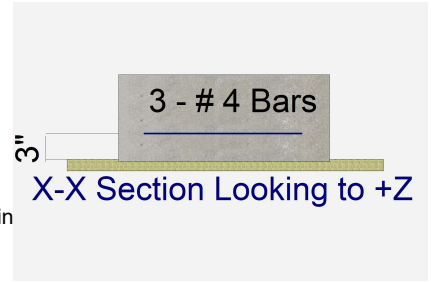
Bars parallel to X-X Axis (resisting Z Flexure)

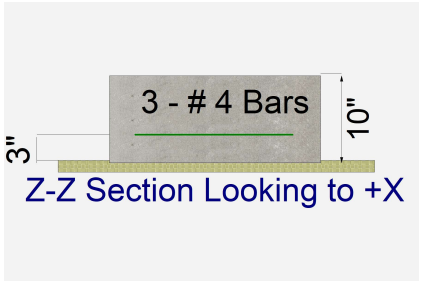
Number of Bars	=		3
Reinforcing Bar Size	=	#	4

Bars parallel to Z-Z Axis (resisting X Flexure)

Number of Bars	=		3.0
Reinforcing Bar Size	=	#	4

Rebar Centerline to Edge of Concrete...
at Bottom of footing = 3.0 in





Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

LIC# : KW-06016495, Build:20.25.09.16 CK Engineering LLC (c) ENERCALC, LLC 1982-2025

DESCRIPTION: FTNG#3

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.50		2.0	1.50				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

DESIGN SUMMARY

Design N.G.

Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	Soil Bearing	ksf	ksf	
FAIL	Overturning - X-X	k-ft	k-ft	
FAIL	Overturning - Z-Z	k-ft	k-ft	
FAIL	Sliding - X-X	k	k	
FAIL	Sliding - Z-Z	k	k	
FAIL	Uplift	k	k	
PASS	Z Flexure (+X) Bot Tens	k-ft/ft	k-ft/ft	
PASS	Z Flexure (-X) Bot Tens	k-ft/ft	k-ft/ft	
PASS 0.720	Min Steel X Flexure Bottom	0.000 in2/ft	0.000 in2/ft	n/a
PASS	X Flexure (+Z) Bot Tens	k-ft/ft	k-ft/ft	
PASS	X Flexure (-Z) Bot Tens	k-ft/ft	k-ft/ft	
PASS 0.720	Min Steel Z Flexure Bottom	0.000 in2/ft	0.000 in2/ft	n/a
PASS	Z Flexure (+X) Top Tens	k-ft/ft	k-ft/ft	
PASS	Z Flexure (-X) Top Tens	k-ft/ft	k-ft/ft	
PASS 0.000	Min Steel X Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS	X Flexure (+Z) Top Tens	k-ft/ft	k-ft/ft	
PASS	X Flexure (-Z) Top Tens	k-ft/ft	k-ft/ft	
PASS 0.000	Min Steel Z Flexure Top	0.000 in2/ft	0.000 in2/ft	n/a
PASS	1-way Shear (+X)	psi	psi	
PASS	1-way Shear (-X)	psi	psi	
PASS	1-way Shear (+Z)	psi	psi	
PASS	1-way Shear (-Z)	psi	psi	
PASS	2-way Punching	psi	psi	

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.0	0.4958	0.4958	n/a	n/a	0.331
X-X, +D+L	1.50	n/a	0.0	0.9958	0.9958	n/a	n/a	0.664
X-X, +D+S	1.50	n/a	0.0	0.8708	0.8708	n/a	n/a	0.581
X-X, +D+0.750L	1.50	n/a	0.0	0.8708	0.8708	n/a	n/a	0.581
X-X, +D+0.750L+0.750S	1.50	n/a	0.0	1.152	1.152	n/a	n/a	0.768
X-X, +0.60D	1.50	n/a	0.0	0.2975	0.2975	n/a	n/a	0.198
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.4958	0.4958	0.331
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	0.9958	0.9958	0.664
Z-Z, +D+S	1.50	0.0	n/a	n/a	n/a	0.8708	0.8708	0.581
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	0.8708	0.8708	0.581
Z-Z, +D+0.750L+0.750S	1.50	0.0	n/a	n/a	n/a	1.152	1.152	0.768
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2975	0.2975	0.198

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

All units k

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

DESCRIPTION: FTNG#3

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.2625	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.40D	0.2625	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60L	0.6250	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60L	0.6250	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	0.7188	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	0.7188	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L	0.350	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L	0.350	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D	0.2250	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D	0.2250	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	0.650	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	0.650	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60S	0.5250	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+1.60S	0.5250	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	0.4438	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	0.4438	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	0.4813	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	0.4813	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +0.90D	0.1688	+Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
X-X, +0.90D	0.1688	-Z	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.40D	0.2625	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.40D	0.2625	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60L	0.6250	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60L	0.6250	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	0.7188	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	0.7188	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.350	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.350	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D	0.2250	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D	0.2250	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	0.650	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	0.650	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.5250	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.5250	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	0.4438	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	0.4438	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	0.4813	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	0.4813	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +0.90D	0.1688	-X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK
Z-Z, +0.90D	0.1688	+X	Bottom	0.2160	ACI 7.6.1.1	0.30	6.088	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.63 psi	2.63 psi	2.63 psi	45.86 psi	0.06	OK
+1.20D+1.60L	6.25 psi	6.25 psi	6.25 psi	45.86 psi	0.14	OK
+1.20D+1.60L+0.50S	7.19 psi	7.19 psi	7.19 psi	45.86 psi	0.16	OK
+1.20D+0.50L	3.50 psi	3.50 psi	3.50 psi	45.86 psi	0.08	OK
+1.20D	2.25 psi	2.25 psi	2.25 psi	45.86 psi	0.05	OK
+1.20D+0.50L+1.60S	6.50 psi	6.50 psi	6.50 psi	45.86 psi	0.14	OK
+1.20D+1.60S	5.25 psi	5.25 psi	5.25 psi	45.86 psi	0.11	OK
+1.20D+0.50L+0.50S	4.44 psi	4.44 psi	4.44 psi	45.86 psi	0.10	OK
+1.20D+0.50L+0.70S	4.81 psi	4.81 psi	4.81 psi	45.86 psi	0.10	OK
+0.90D	1.69 psi	1.69 psi	1.69 psi	45.86 psi	0.04	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.63 psi	2.63 psi	2.63 psi	45.86 psi	0.06	OK
+1.20D+1.60L	6.25 psi	6.25 psi	6.25 psi	45.86 psi	0.14	OK
+1.20D+1.60L+0.50S	7.19 psi	7.19 psi	7.19 psi	45.86 psi	0.16	OK
+1.20D+0.50L	3.50 psi	3.50 psi	3.50 psi	45.86 psi	0.08	OK
+1.20D	2.25 psi	2.25 psi	2.25 psi	45.86 psi	0.05	OK
+1.20D+0.50L+1.60S	6.50 psi	6.50 psi	6.50 psi	45.86 psi	0.14	OK
+1.20D+1.60S	5.25 psi	5.25 psi	5.25 psi	45.86 psi	0.11	OK
+1.20D+0.50L+0.50S	4.44 psi	4.44 psi	4.44 psi	45.86 psi	0.10	OK
+1.20D+0.50L+0.70S	4.81 psi	4.81 psi	4.81 psi	45.86 psi	0.10	OK
+0.90D	1.69 psi	1.69 psi	1.69 psi	45.86 psi	0.04	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 25-010.ec6

DESCRIPTION: FTNG#3

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	9.75 psi	150.00 psi	0.07	OK
+1.20D+1.60L	23.21 psi	150.00 psi	0.15	OK
+1.20D+1.60L+0.50S	26.70 psi	150.00 psi	0.18	OK
+1.20D+0.50L	13.00 psi	150.00 psi	0.09	OK
+1.20D	8.36 psi	150.00 psi	0.06	OK
+1.20D+0.50L+1.60S	24.14 psi	150.00 psi	0.16	OK
+1.20D+1.60S	19.50 psi	150.00 psi	0.13	OK
+1.20D+0.50L+0.50S	16.48 psi	150.00 psi	0.11	OK
+1.20D+0.50L+0.70S	17.88 psi	150.00 psi	0.12	OK
+0.90D	6.27 psi	150.00 psi	0.04	OK

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 4FT WALL

Code References

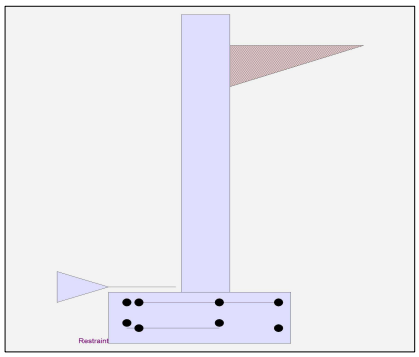
Governing Code : IBC 2021
Referenced Design Standard(s) : ACI 318-19

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	0.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Earth Pressure Seismic Load

Method : Uniform

Multiplier Used	=	7.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	33.833
Total Seismic Force	=	163.528

Stem Weight Seismic Load

F_p / W_p Weight Multiplier = 0.200 g

Added seismic base force 63.0 lbs

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 4FT WALL

Design Summary

Wall Stability Ratios

Overturning	=	1.55	OK
Slab Resists All Sliding !			
Global Stability	=	1.97	
Total Bearing Load	=	1,310 lbs	
...resultant ecc.	=	8.36 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,360 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,904 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	8.8 psi	OK
Footing Shear @ Heel	=	6.3 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	586.3 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 4		
Rebar Spacing	=	12.00		
Rebar Placed at	=	Edge		
Design Data				
fb/FB + fa/Fa	=	**0.292**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	673.3		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	1,070.5		
Moment.....Allowable	=	3,655.6		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	9.0		
Shear.....Allowable	psi =	41.6		
Anet (Masonry)	in2 =			
Wall Weight	psf =	100.0		
Rebar Depth 'd'	in =	6.25		

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	40,000.0

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 4FT WALL

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0602 in2/ft		
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.2 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	1.27 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	1.00 ft
Heel Width	=	1.50
Total Footing Width	=	2.50
Footing Thickness	=	10.00 in

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,904	0	psf
Mu' : Upward	=	761	0	ft-#
Mu' : Downward	=	75	235	ft-#
Mu: Design	=	686	235	ft-#
φ Mn	=	4,264	4,912	ft-#
Actual 1-Way Shear	=	8.76	6.28	psi
Allow 1-Way Shear	=	41.60	39.73	psi

Toe Reinforcing = # 4 @ 11.11 in
Heel Reinforcing = # 4 @ 11.11 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, φ Tn = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 11.11 in, #5@ 17.22 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 11.11 in, #5@ 17.22 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 0.54 in2
Min footing T&S reinf Area per foot 0.22 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 11.11 in	#4@ 22.22 in
#5@ 17.22 in	#5@ 34.44 in
#6@ 24.44 in	#6@ 48.89 in

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 4FT WALL

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		408.8	1.61	658.7	Soil Over HL (ab. water tbl)	366.7	2.08	763.9
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		2.08	763.9
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
Seismic Earth Load	=	114.5	2.42	276.6	Surcharge Over Toe	=		
Seismic Stem Self Wt	=	63.0	3.08	194.3	Stem Weight(s)	=	450.0	1.33	600.0
					Earth @ Stem Transitions	=		
					Footing Weight	=	312.5	1.25	390.6
					Key Weight	=			
					Vert. Component	=			
Total	=	586.3	**O.T.M.** =	1,129.5	**Total =**		1,129.2 lbs	**R.M.=**	1,754.5

Resisting/Overturning Ratio = **1.55**

Vertical Loads used for Soil Pressure = 1,309.6 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.068	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

DESCRIPTION: 4FT WALL

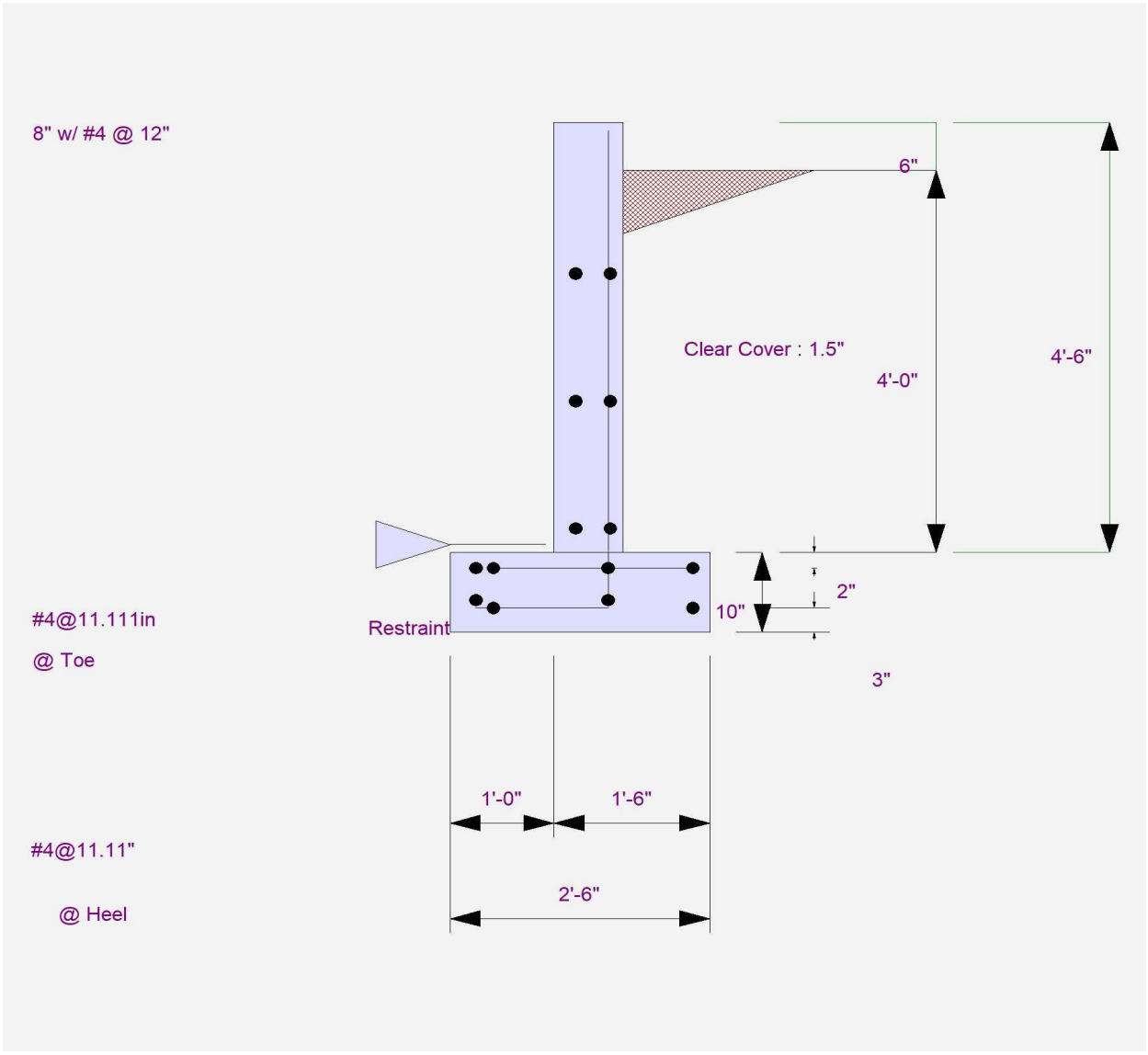
Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =	15.60 in
Development length for #4 bar specified in this stem design segment =	12.00 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.00 in
As Provided =	0.2000 in2/ft
As Required =	0.1728 in2/ft

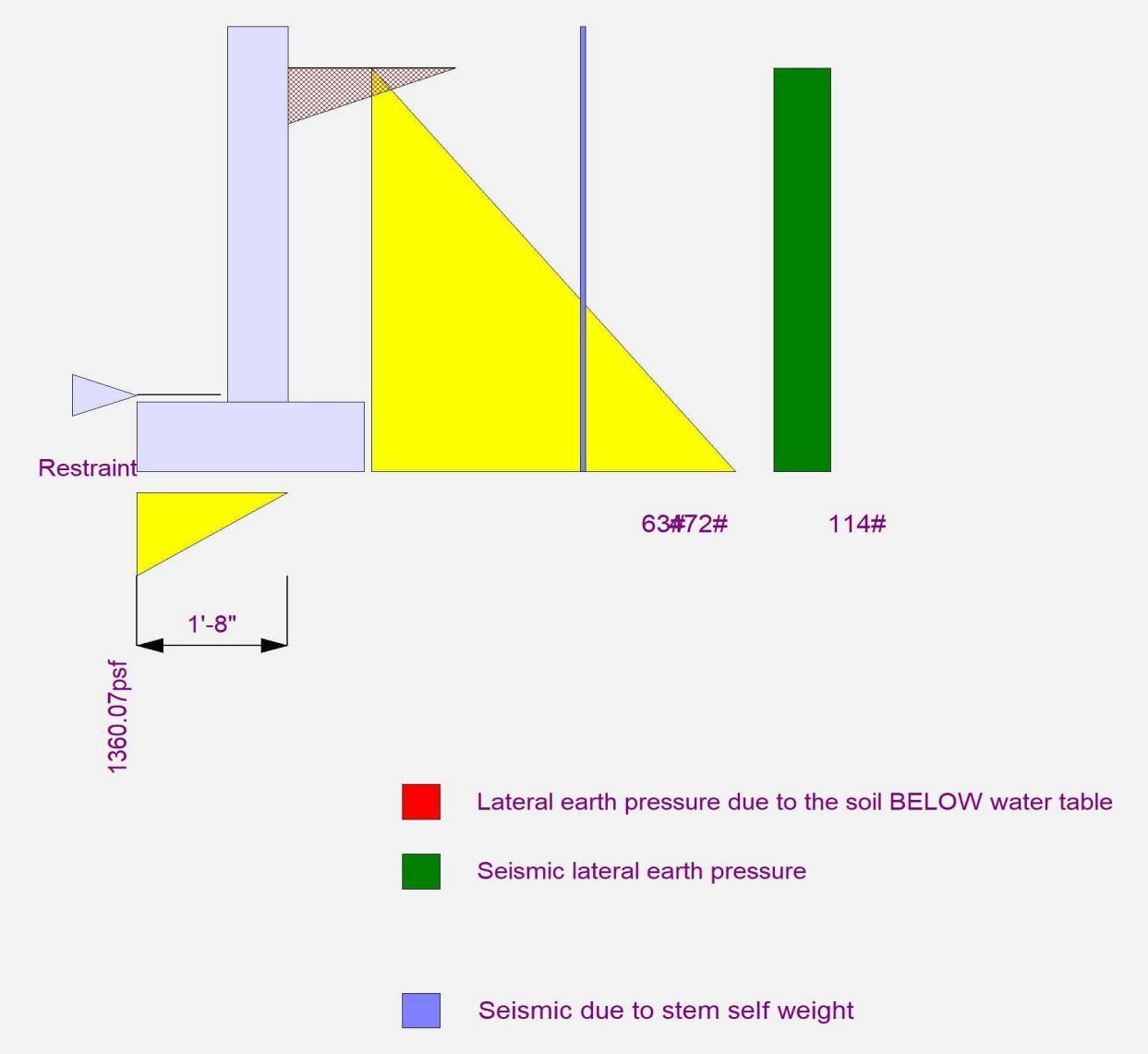
Cantilevered Retaining Wall

DESCRIPTION: 4FT WALL



Cantilevered Retaining Wall

DESCRIPTION: 4FT WALL



Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 6FT WALL

Code References

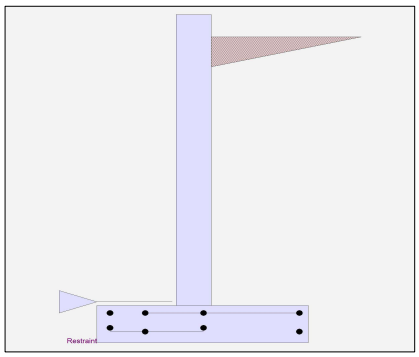
Governing Code : IBC 2021
Referenced Design Standard(s) : ACI 318-19

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	0.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform

Multiplier Used	=	7.000
(Multiplier used on soil density)		

Stem Weight Seismic Load

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Uniform Seismic Force	=	47.833
Total Seismic Force	=	326.861

F_p / W_p Weight Multiplier = 0.200 g

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Added seismic base force 91.0 lbs

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 6FT WALL

Design Summary

Wall Stability Ratios

Overturning	=	1.96	OK
Slab Resists All Sliding !			
Global Stability	=	1.82	
Total Bearing Load	=	2,721 lbs	
...resultant ecc.	=	9.21 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,277 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,788 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	17.3 psi	OK
Footing Shear @ Heel	=	12.9 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,137.0 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 4		
Rebar Spacing	=	8.00		
Rebar Placed at	=	Edge		
Design Data				
fb/FB + fa/Fa	=	**0.609**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	1,425.0		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	3,299.5		
Moment.....Allowable	=	5,412.6		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	19.0		
Shear.....Allowable	psi =	47.6		
Anet (Masonry)	in2 =			
Wall Weight	psf =	100.0		
Rebar Depth 'd'	in =	6.25		

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	40,000.0

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 6FT WALL

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1854 in2/ft		
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1854 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.3 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	1.27 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.50
Total Footing Width	=	4.00
Footing Thickness	=	10.00 in

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,788	0	psf
Mu' : Upward	=	1,739	289	ft-#
Mu' : Downward	=	169	1,583	ft-#
Mu: Design	=	1,570	1,295	ft-#
φ Mn	=	4,264	4,912	ft-#
Actual 1-Way Shear	=	17.27	12.90	psi
Allow 1-Way Shear	=	41.60	39.73	psi

Toe Reinforcing = # 4 @ 11.11 in
Heel Reinforcing = # 4 @ 11.11 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, φ Tn = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 11.11 in, #5@ 17.22 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 11.11 in, #5@ 17.22 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 0.86 in2
Min footing T&S reinf Area per foot 0.22 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 11.11 in	#4@ 22.22 in
#5@ 17.22 in	#5@ 34.44 in
#6@ 24.44 in	#6@ 48.89 in

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 6FT WALL

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		817.2	2.28	1,861.3	Soil Over HL (ab. water tbl)	1,210.0	3.08	3,730.8
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		3.08	3,730.8
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
Seismic Earth Load	=	228.8	3.42	781.7	Surcharge Over Toe	=		
Seismic Stem Self Wt	=	91.0	4.08	371.6	Stem Weight(s)	=	650.0	1.83	1,191.7
					Earth @ Stem Transitions	=		
Total	=	1,137.0	**O.T.M.** =	3,014.6	Footing Weight	=	500.0	2.00	1,000.0
					Key Weight	=		
					Vert. Component	=		
					Total =		2,360.0 lbs	**R.M.=**	5,922.5

Resisting/Overturning Ratio = **1.96**

Vertical Loads used for Soil Pressure = 2,720.7 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.058	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

DESCRIPTION: 6FT WALL

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

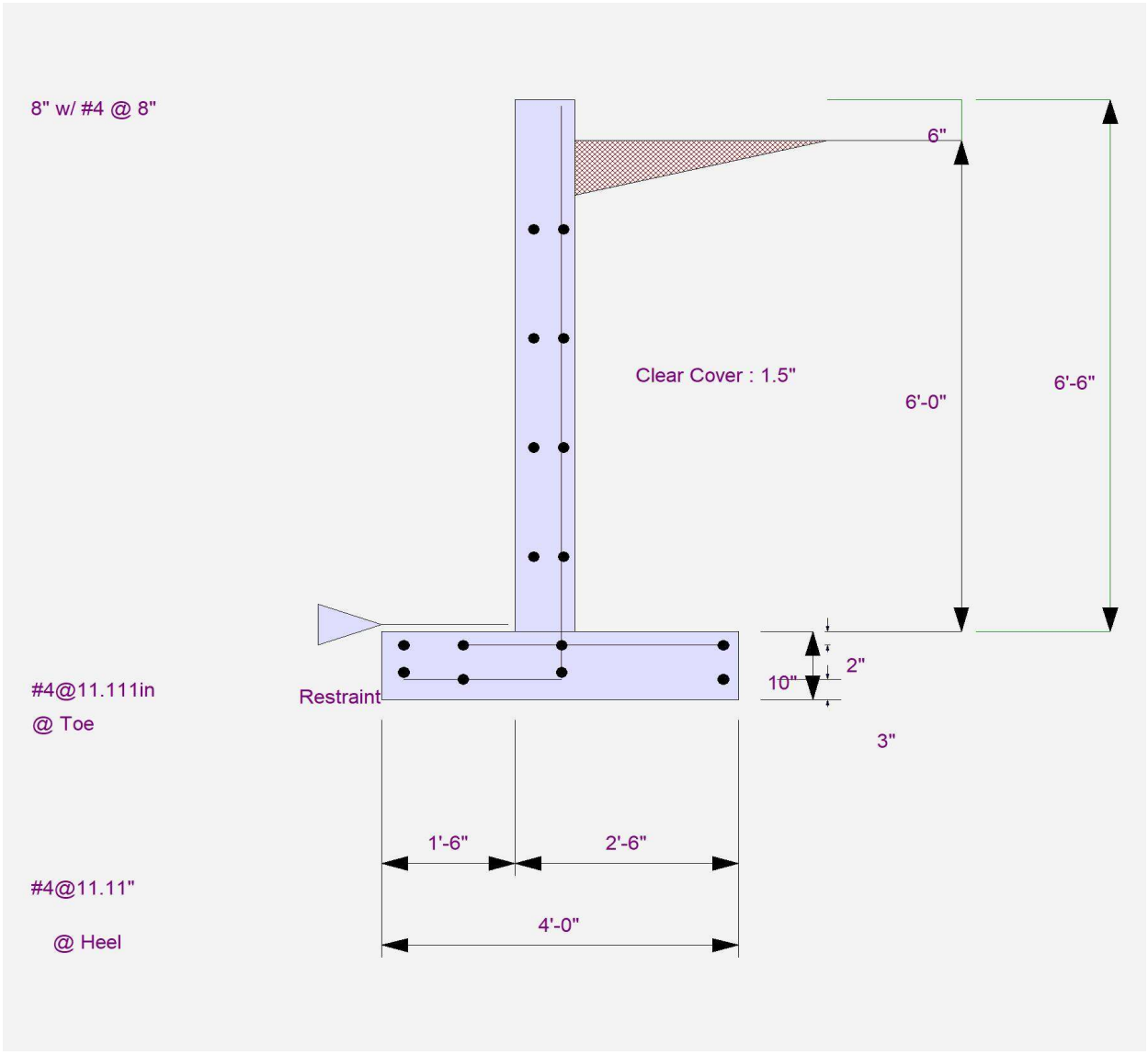
Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =	15.60 in
Development length for #4 bar specified in this stem design segment =	12.00 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.00 in
As Provided =	0.3000 in2/ft
As Required =	0.2472 in2/ft

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 6FT WALL

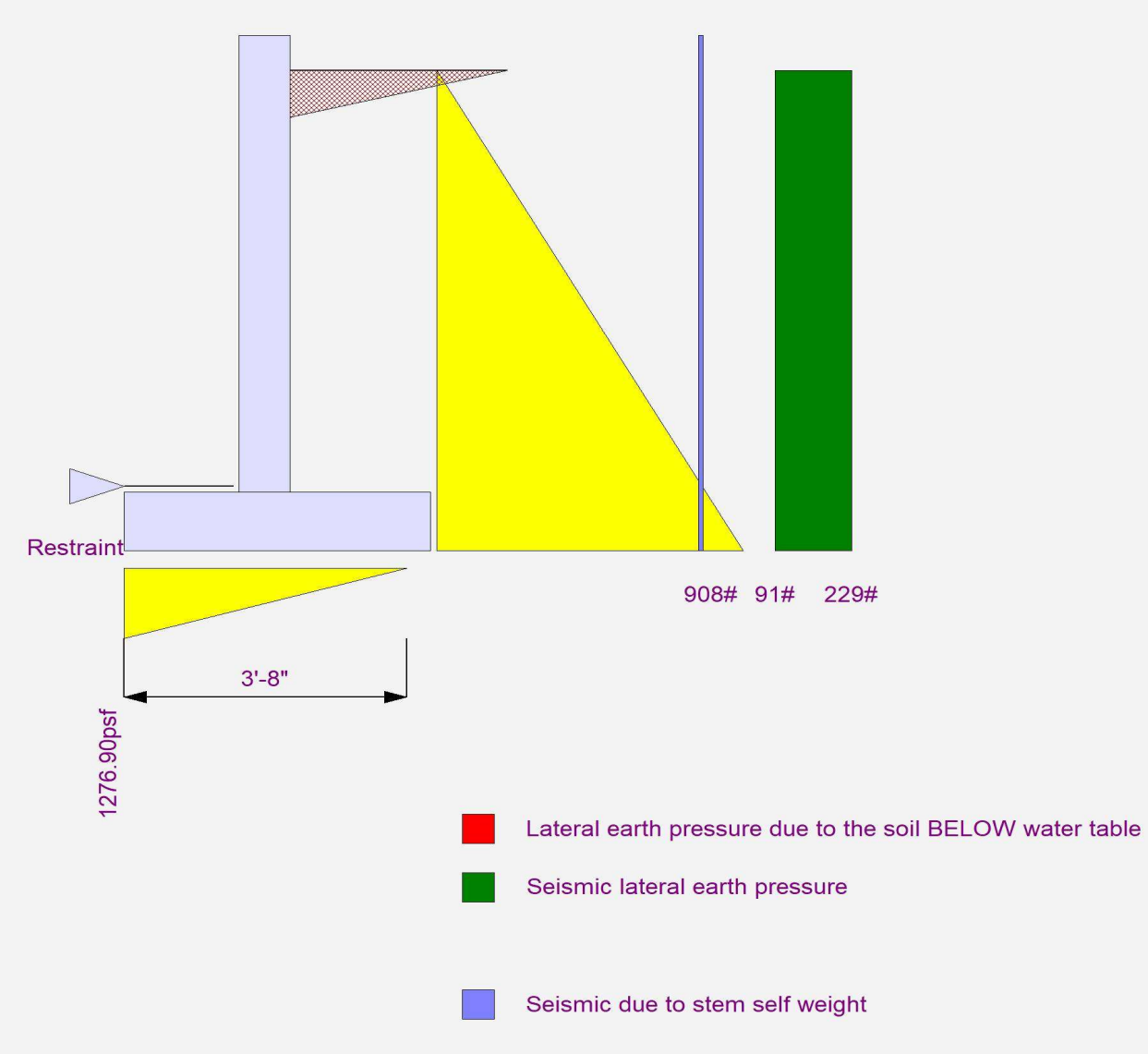


Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 6FT WALL



Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 8FT WALL

Code References

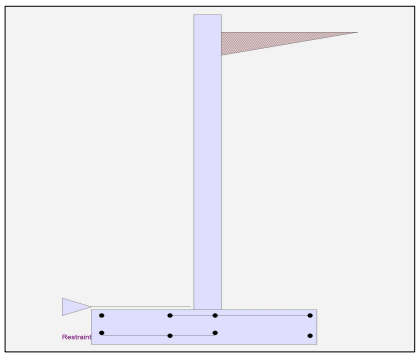
Governing Code : IBC 2021
Referenced Design Standard(s) : ACI 318-19

Criteria

Retained Height	=	8.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	0.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform

Multiplier Used	=	7.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	63.000
Total Seismic Force	=	567.000

Stem Weight Seismic Load

F_p / W_p Weight Multiplier = 0.200 g

Added seismic base force 119.0 lbs

Project Title:
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Project Descr:

Cantilevered Retaining Wall

Project File: 25-010.ec6

DESCRIPTION: 8FT WALL

Design Summary

Wall Stability Ratios

Overturning	=	2.04	OK
Slab Resists All Sliding !			
Global Stability	=	1.69	
Total Bearing Load	=	4,354 lbs	
...resultant ecc.	=	10.75 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,341 psf	OK
Soil Pressure @ Heel	=	15 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,877 psf	
ACI Factored @ Heel	=	21 psf	
Footing Shear @ Toe	=	24.5 psi	OK
Footing Shear @ Heel	=	16.8 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,933.4 lbs	

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing pressures.

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 5		
Rebar Spacing	=	12.00		
Rebar Placed at	=	Edge		
Design Data				
fb/FB + fa/Fa	=	**0.925**		
Total Force @ Section				
Service Level	lbs =			
Strength Level	lbs =	2,466.0		
Moment....Actual				
Service Level	ft-# =			
Strength Level	ft-# =	7,517.2		
Moment.....Allowable	=	8,121.3		
Shear.....Actual				
Service Level	psi =			
Strength Level	psi =	33.2		
Shear.....Allowable	psi =	48.3		
Anet (Masonry)	in2 =			
Wall Weight	psf =	100.0		
Rebar Depth 'd'	in =	6.19		

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0

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DESCRIPTION: 8FT WALL

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2846 in2/ft		
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.2846 in2/ft	#4@ 13.89 in	#4@ 27.78 in
Provided Area :	0.31 in2/ft	#5@ 21.53 in	#5@ 43.06 in
Maximum Area :	0.8382 in2/ft	#6@ 30.56 in	#6@ 61.11 in

Footing Data

Toe Width	=	2.50 ft
Heel Width	=	3.00
Total Footing Width	=	5.50
Footing Thickness	=	12.00 in

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,877	21	psf
Mu' : Upward	=	4,987	772	ft-#
Mu' : Downward	=	563	3,365	ft-#
Mu: Design	=	4,424	2,593	ft-#
φ Mn	=	9,777	10,944	ft-#
Actual 1-Way Shear	=	24.50	16.81	psi
Allow 1-Way Shear	=	40.64	39.19	psi

Toe Reinforcing = # 5 @ 14.35 in
Heel Reinforcing = # 5 @ 14.35 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, φ Tn = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 18 in, #7@ 18 in, #8@ 18 in, #9@ 18 in, #10@ 18 in

Key: No key defined

Min footing T&S reinf Area 1.43 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

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DESCRIPTION: 8FT WALL

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		1,417.5	3.00	4,252.5	Soil Over HL (ab. water tbl)	2,053.3	4.33	8,897.8
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		4.33	8,897.8
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
Seismic Earth Load	=	396.9	4.50	1,786.1	Surcharge Over Toe	=		
Seismic Stem Self Wt	=	119.0	5.25	624.8	Stem Weight(s)	=	850.0	2.83	2,408.3
					Earth @ Stem Transitions	=		
Total	=	1,933.4	**O.T.M.** =	6,663.3	Footing Weight	=	825.0	2.75	2,268.8
					Key Weight	=		
					Vert. Component	=		
					Total =		3,728.3 lbs	**R.M.=**	13,574.9

Resisting/Overturning Ratio = **2.04**

Vertical Loads used for Soil Pressure = 4,354.0 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.058	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

DESCRIPTION: 8FT WALL

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	8.27 in
As Provided =	0.3100 in2/ft
As Required =	0.2846 in2/ft

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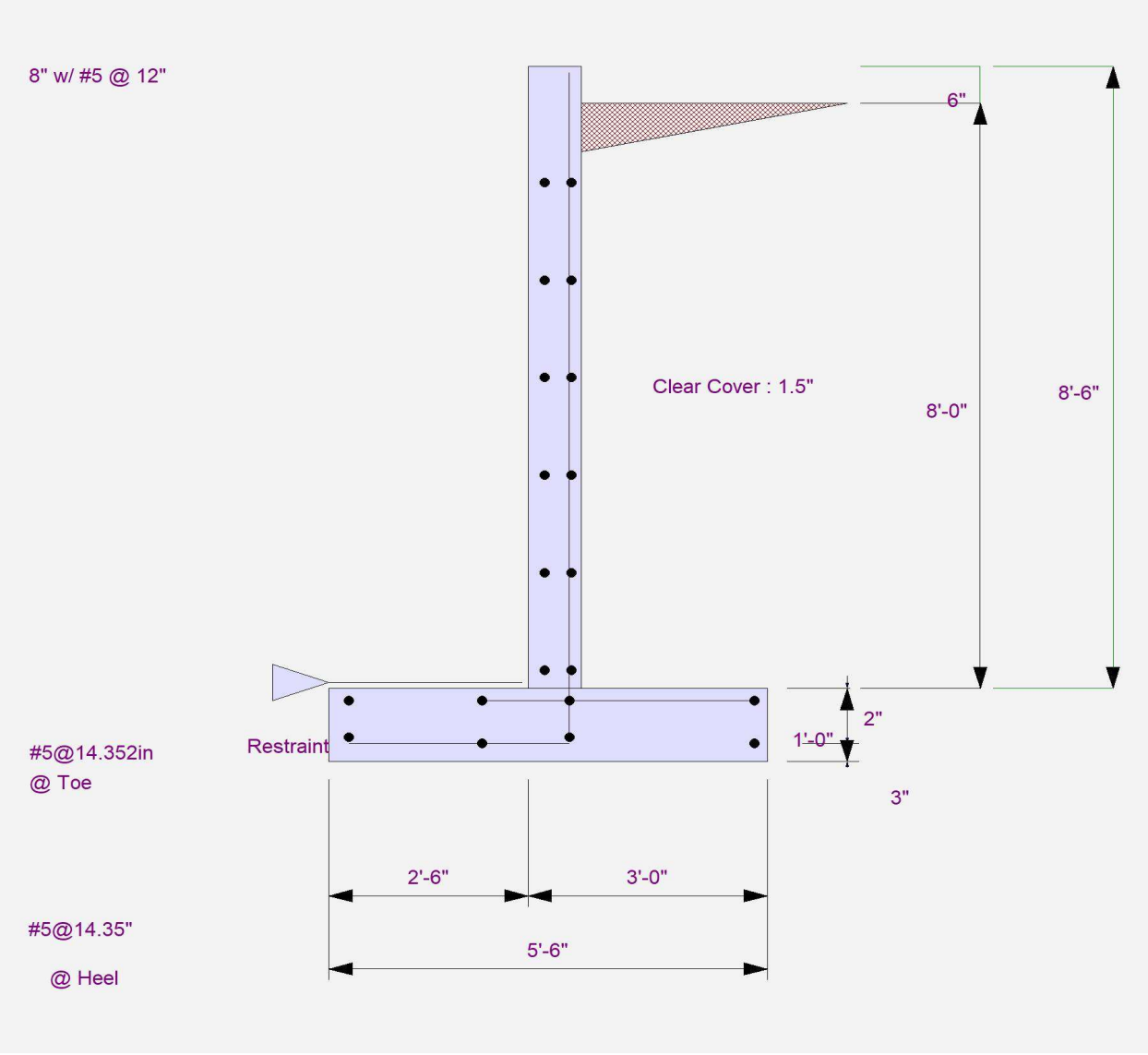

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