

# CK Engineering LLC.

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Lake Forest Park, WA 98155

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**STRUCTURAL CALCULATIONS**  
Lateral & Gravity Design (REVISION)  
23-043



10/20/2024

NEW HOME AT:  
6715 SE 27TH ST.  
Mercer Island, WA 98040  
October 20, 2024

Design Criteria

Scope of Work:	Lateral & Gravity Design (REVISION)		
Site Address:	6715 SE 27TH ST. Mercer Island, WA 98040		
Number of Stories:	3	Engineer:	PK

Roof Loading

Roofing	Torch Down	2.0
Sheathing	3/4" Plywood	2.3
Insulation	Roll/Batt	3.0
Ceiling	5/8" GWB	2.8
Framing	Rafters & Beams	3.0
Miscellaneous	fixtures, mechanical, electrical, etc.	1.9
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

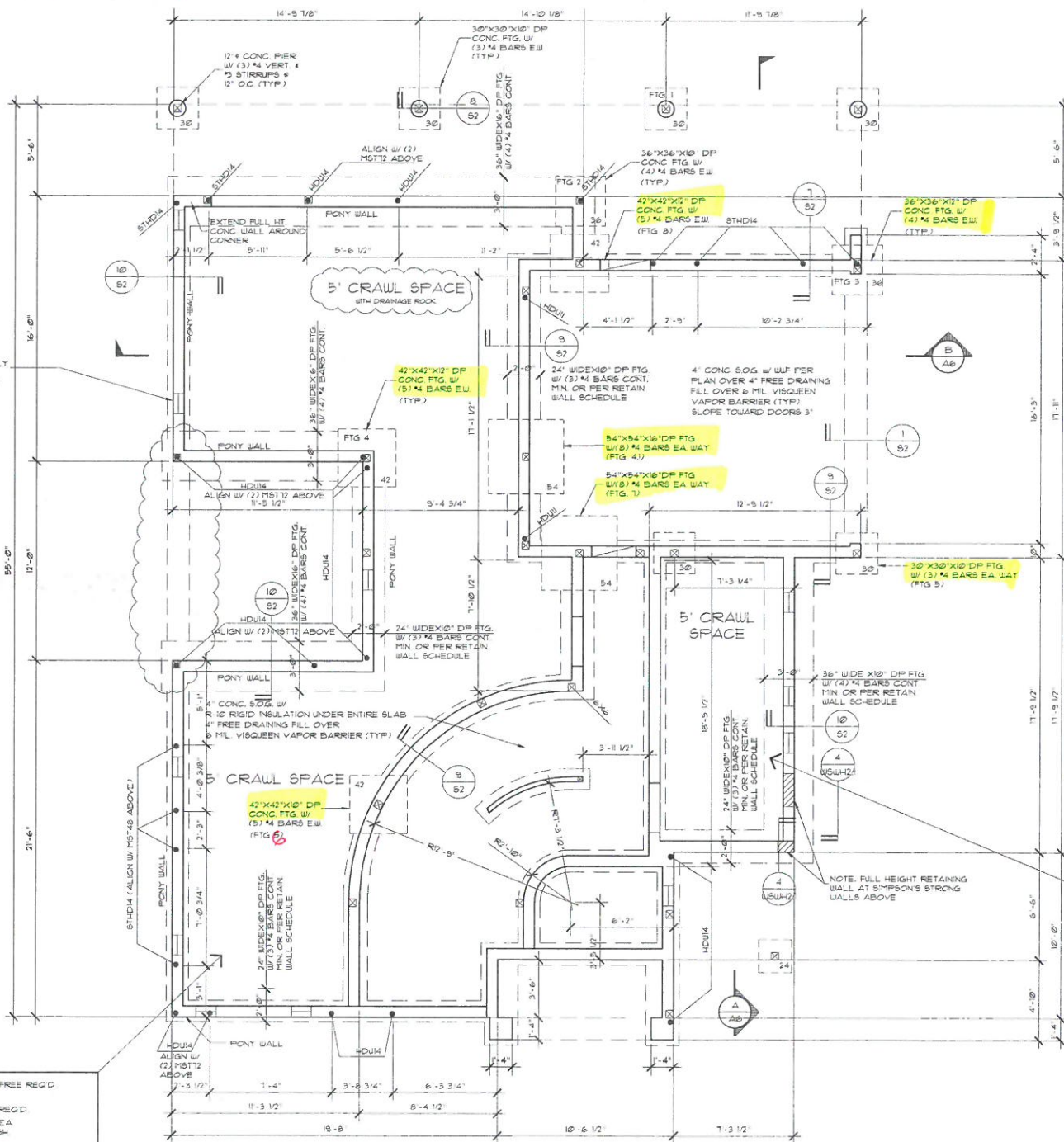
Floor Covering	Carpet/Hardwood/Tile	3.0
Sheathing	3/4" T&G	2.3
Ceiling	5/8" GWB	2.8
Joists	I-Joists	2.1
Beams		4.2
Miscellaneous	fixtures, mechanical, electrical, etc.	0.6
TOTAL DEAD LOAD:		15.0 psf
FLOOR LIVE LOAD:		40.0 psf

Soil Bearing Capacity:	1500 psf
Frost Depth:	18 in









6" x 16" SCREENED FOUNDATION VENTS EQUALLY SPACED AT FDN WALL COVER W/ 1/4" CORROSION RESISTANT WIRE MESH

6' SQ IN 60 FT NET FREE REQ'D  
 16 SQ FT OF UNDER FLOOR AREA  
 CORROSION RESISTANT WIRE MESH  
 1 TO CORNERS AS PRACTICAL  
 25 SQ IN

5' VENTS  
 REG'D

TILTATION CALCULATION


**FOUNDATION PLAN**  
 SCALE 1/4" = 1'-0"



WIND LOAD CALCULATIONS

LEFT → RIGHT

ΣV 3RD FLOOR =

WIND ZONE	A	C										
AVE. HEIGHT	6	6										
AVE. WIDTH	9	46										
Ps	16.01	10.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	864	2920	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	3,784 lbs											

ΣV 2ND FLOOR =

WIND ZONE	A	C										
AVE. HEIGHT	10.5	10.5										
AVE. WIDTH	9	46										
Ps	16.01	10.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	1513	5110	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	6,623 lbs											

ΣV (1ST FLOOR) =

WIND ZONE	A	C	C									
AVE. HEIGHT	10.5	10.5	7.5									
AVE. WIDTH	9	15	22									
Ps	16.01	10.58	10.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	1513	1666	1746	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	4,925 lbs											

**ρ CALCS:**

**3RD FLOOR CALCULATIONS:**

Plate Height:	9.00 ft
Total length of Shearwall in Shortest Line:	12.00 ft
Length of Shortest Segment within Shear Line:	3.00 ft
Length of Longest Segment in Shear Line:	3.00 ft

Tributary Area:	1.0
Total Area:	2.0

$\rho = 1.00$   
ASCE 7-16 12.3.4.2 b

**2ND FLOOR CALCULATIONS:**

Plate Height:	9.00 ft
Total length of Shearwall in Shortest Line:	9.00 ft
Length of Shortest Shearwall within Shear Line:	3.00 ft
Length of Longest Wall in Shear Line:	3.00 ft

Tributary Area:	1.0
Total Area:	2.0

$\rho = 1.00$   
ASCE 7-16 12.3.4.2 b

**MAIN FLOOR CALCULATIONS:**

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

$\rho = 1.00$   
ASCE 7-16 12.3.4.2 b

All loads in pounds per square foot

**SEISMIC DESIGN:**

$E = E_h + E_v$

$E = \rho Q_E + .2S_{DS}D$

$Q_E = V = C_s W$

WALL DEAD LOAD =	25 psf
FLAT ROOF SNOW LOAD =	25 psf
RED. S.L. (20%*S.L.) =	0

ROOF DEAD LOAD =	15.0 psf
UPPER FLOOR D.L. =	15.0 psf
LOWER FLOOR D.L. =	15.0 psf
FLOOR LIVE LOAD =	40.0 psf

$\rho =$	1.00
Site Class =	D
$I_E =$	1
R =	6.5
$h_n =$	29

Geotech Report **No** 20% Seismic Load Increase  
 Importance factor as defined in Table 11.5-1

Total height of structure

$V = 0.7S_{DS}I_E W / R$       $S_{DS} = 2/3 S_{MS}$   
 $V_{max} = S_{D1}I_E W / T_g R$       $S_{MS} = (F_a)(S_s)$   
 $T_g = 0.02h_n^{0.75}$       $S_{D1} = 2/3 S_{M1}$   
 $T_g = 0.25 s$       $S_{M1} = (F_v)(S_1)$

$S_s =$	140.0%	$S_{MS} =$	168.0%
$F_a =$	1.20	$S_{DS} =$	112.0%
$S_1 =$	48.8%	$S_{M1} =$	73.2%
$F_v =$	1.50	$S_{D1} =$	48.8%

$V =$  **0.121** W  
 $E =$  **0.121** W  
 $C_s =$  **0.121**

**3RD FLOOR DIAPHRAGM LOADING:**

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
28	20	15.0	8400
26	20	15.0	7800
34	17	15.0	8670
25	12	15.0	4500
		15.0	0

Area = 1958     Sub-Total= 29370

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	6	25.0	22500
150	6	25.0	22500
		25.0	0
		25.0	0
		25.0	0

Area = 1800     Sub-Total= 45000

TOTAL = 74370 lb

**2ND FLOOR DIAPHRAGM LOADING:**

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
20	10	15.0	3000
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 200     Sub-Total= 3000

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
1025	1	15.0	15375
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 1025     Sub-Total= 15375

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
150	9	25.0	33750
150	9	25.0	33750
		25.0	0
		25.0	0
		25.0	0

Area = 2700     Sub-Total= 67500

TOTAL = 85875 lbs

**1ST FLOOR DIAPHRAGM LOADING:**

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
1498	1	15.0	22470
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 1498     Sub-Total= 22470

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
150	7.5	25.0	28125
150	7.5	25.0	28125
		25.0	0
		25.0	0
		25.0	0

Area = 2250     Sub-Total= 56250

TOTAL = 78720 lb

V (3RD FLOOR) = .121 x 74370 lb = 8970 lbs  
 V (2ND FLOOR) = .121 x 85875 lb = 10358 lbs  
 V (1ST FLOOR) = .121 x 78720 lb = 9495 lbs

**REDISTRIBUTE:**

$\Sigma V \times \rho$	height	$\Sigma V \times \text{height}$
8970 lb	27	242194
10358 lb	17	176083
9495 lb	7	66464

TOTAL = 28823 lb     TOTAL = 484742

$E (3RD) = \frac{\Sigma V \times \text{height} \times \Sigma V \text{ TOTAL}}{\Sigma V \times \text{height TOTAL}} = 14401 \text{ lbs}$

$E (2ND) = \frac{\Sigma V \times \text{height} \times \Sigma V \text{ TOTAL}}{\Sigma V \times \text{height TOTAL}} = 10470 \text{ lbs}$

$E (1ST) = \frac{\Sigma V \times \text{height} \times \Sigma V \text{ TOTAL}}{\Sigma V \times \text{height TOTAL}} = 3952 \text{ lbs}$

### SUMMARY:

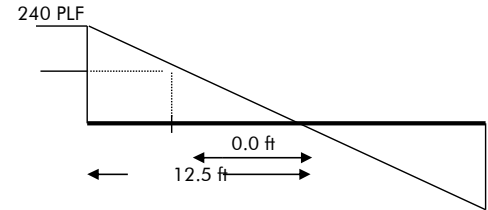
	WIND (front-rear)	WIND (left-right)	SEISMIC
$\Sigma V$ (3RD) =	3307 lbs	3784 lbs	17281 lbs
$\Sigma V$ (2ND) =	5788 lbs	6623 lbs	12564 lbs
$\Sigma V$ (MAIN) =	4661 lbs	4925 lbs	4742 lbs
TOTAL =	13757 lbs	15331 lbs	34587 lbs

### DIAPHRAGM SHEAR:

Total diaphragm length = 50.0 ft      Sub-diaphragm length = 22.0 ft  
 Diaphragm width = 25.0 ft       $\Sigma V$  (3RD) = 17,281 lbs

$$v = \frac{\Sigma V(\text{roof})}{(2)(\text{width})} = \frac{7604 \text{ lb}}{50 \text{ ft}} = 152 \text{ PLF}$$

IBC Table 2306.3.1  $\longrightarrow$  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 = 22.0 ft      Total-diaphragm length = 50.0 ft  
 Sub-diaphragm width = 25.0 ft

$$T = \frac{M}{B} = \frac{\Sigma V \times (\text{diaphragm length})}{8 \times (\text{diaphragm width})} = \frac{7604 \times 22 \text{ ft}}{8 \times 25 \text{ ft}} = 836 \text{ lbs}$$

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

Area = 8.25 in<sup>2</sup>       $F_t = 525 \text{ psi}$   
 Load duration ( $C_D$ ) = 1.33       $T_{\text{allowable}} = \text{Area} \times C_D \times F_t = 5,761 \text{ lbs}$

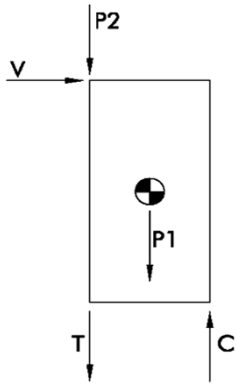
Since T allowable is greater than T applied, OK.

SHEAR CAPACITY OF 10d COMMON NAIL = 102 lbs       $102 \times C_d \times p = 136 \text{ lbs}$       2018 NDS

# OF NAILS PER 4 FT SPLICE =  $\frac{836 \text{ lbs}}{136 \text{ lbs}} = 6$

USE 2x6 HF #2 TOP PLATE W/ (8) 10d COMMON NAILS PER SPLICE.

### 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

$T = V \times H - 0.5P1 - P2 =$  Tension reaction to be resisted by holdown  
 $C = V \times H + 0.5P1 =$  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.  $(0.6 - 0.14S_{Ds})D + E \longrightarrow 0.44 D + E$

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

#### Compression Equations

5.  $D + W$

5.  $(1 + 0.14S_{Ds})D + E \longrightarrow 1.16 D + E$

6.  $D + 0.75W + 0.75L + 0.75S$

6.  $(1.0 + 0.105S_{Ds})D + 0.75E + 0.75L + 0.75S \longrightarrow 1.12 D + 0.75 E + 0.75 L + 0.75 S$

\*5.  $(1 + 0.14S_{Ds})D + 2.5E \longrightarrow 1.16 D + 2.5 E$

\*6.  $(1.0 + 0.105S_{Ds})D + 1.875E + 0.75L + 0.75S \longrightarrow 1.12 D + 1.875 E + 0.75 L + 0.75 S$

\* 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 (MASTER SUITE)

SHEARWALL

WIND

SEISMIC

**Floor Info**  
**Upper** 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)  
**5.50 ft** Total Length of Shearwalls

V(from upper)= 3784 lb      17281 lb  
 V(from main)= 0 lb      0 lb  
 V(from lower)= 0 lb      0 lb  
 Σ (Wind) = 3,784 lb      Σ (Smc) = 17,281 lb  
 v = 124 PLF      v = 566 PLF

Tributary Width (Upper Floor)  
**9.0** tributary width  
**50.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Tributary Area (Upper Floor)  
**9.0** tributary area  
**50.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **5.5 ft**

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

Aspect Ratio OK

Use alternate R factor for seismic? **No**

3x framing required per IBC

SDPWS, Table 4.3A → 0.93 x 707 = 658 PLF

USE **(2)SW4**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **3563 lbs** = 3563 lbs      Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **4691 lbs** = 4691 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 = 5090 lbs**

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

UPPER FL. MID 1 (DECK, ATTIC)

SHEARWALL

WIND

SEISMIC

**Floor Info**  
**Upper** 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)  
**13.00 ft** Total Length of Shearwalls

V(from upper)= 3784 lb      17281 lb  
 V(from main)= 0 lb      0 lb  
 V(from lower)= 0 lb      0 lb  
 Σ (Wind) = 3,784 lb      Σ (Smc) = 17,281 lb  
 v = 84 PLF      v = 386 PLF

Tributary Width (Upper Floor)  
**14.5** tributary width  
**50.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Tributary Area (Upper Floor)  
**14.5** tributary area  
**50.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **6.0 ft**

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

Aspect Ratio OK

Use alternate R factor for seismic? **No**

3x framing required per IBC

SDPWS, Table 4.3A → 0.93 x 456 = 424 PLF

USE **SW3**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **2429 lbs** = 2429 lbs      Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **3283 lbs** = 3283 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 = 3470 lbs**

USE SIMPSON DESIGNED HOLDOWN: **MST48**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **STHD14/RJ**

UPPER FL. MID 2 (DECK)

SHEARWALL

WIND

SEISMIC

**Floor Info**  
**Upper** 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)  
**9.00 ft** Total Length of Shearwalls

V(from upper)= 3784 lb      17281 lb  
 V(from main)= 0 lb      0 lb  
 V(from lower)= 0 lb      0 lb  
 Σ (Wind) = 3,784 lb      Σ (Smc) = 17,281 lb  
 v = 118 PLF      v = 538 PLF

Tributary Width (Upper Floor)  
**14.0** tributary width  
**50.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Tributary Area (Upper Floor)  
**14.0** tributary area  
**50.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **9.0 ft**

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

Aspect Ratio OK

Use alternate R factor for seismic? **No**

3x framing required per IBC

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

USE **SW2**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **3387 lbs** = 3387 lbs      Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **4583 lbs** = 4583 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 = 4839 lbs**

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

UPPER FL. FRONT (BDRM 3, ATTIC)

SHEARWALL

WIND

SEISMIC

Floor Info

**Upper** Floor Level, e.g. Upper, Main, Lower  
**Li-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)

**4.00 ft** Total Length of Shearwalls

V(from upper)= 3784 lb                      17281 lb  
 V(from main)= 0 lb                              0 lb  
 V(from lower)= 0 lb                            0 lb  
 $\Sigma$  (Wind) = 3,784 lb                       $\Sigma$  (Smc) = 17,281 lb  
 $v = 126$  PLF                                       $v = 573$  PLF

3x framing required per IBC

SDPWS, Table 4.3A  $\rightarrow$  (2w/h) x 0.93 x 707 = 584 PLF

$C_{TOTAL} =$  (floor above) + (this floor) =  + 3611 lbs = 3611 lbs  
 $T_{TOTAL} =$  (floor above) + (this floor) =  + 5018 lbs = 5018 lbs

Tributary Width (Upper Floor)  
**6.5** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **4.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**6.5** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

USE **(2)SW4**  
 Seismic controls shearwall design  
 Seismic controls  
 Load case 8 controls - Seismic  
 USE SIMPSON DESIGNED HOLDDOWN: **MST72**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **HDU8-SDS2.5**  
 Seismic controls holddown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 5158 lbs**

UPPER FL. LEFT (BDRM 3, M. BATH)

SHEARWALL

WIND

SEISMIC

Floor Info

**Upper** Floor Level, e.g. Upper, Main, Lower  
**Fi-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)

**23.50 ft** Total Length of Shearwalls

V(from upper)= 3307 lb                      17281 lb  
 V(from main)= 0 lb                              0 lb  
 V(from lower)= 0 lb                            0 lb  
 $\Sigma$  (Wind) = 3,307 lb                       $\Sigma$  (Smc) = 17,281 lb  
 $v = 19$  PLF                                       $v = 98$  PLF

SDPWS, Table 4.3A  $\rightarrow$  (2w/h) x 0.93 x 242 = 150 PLF

$C_{TOTAL} =$  (floor above) + (this floor) =  + 618 lbs = 618 lbs  
 $T_{TOTAL} =$  (floor above) + (this floor) =  + 766 lbs = 766 lbs

Tributary Width (Upper Floor)  
**6.0** tributary width  
**45.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **3.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**6.0** tributary area  
**45.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

USE **SW6**  
 Seismic controls shearwall design  
 Seismic controls  
 Load case 8 controls - Seismic  
 USE SIMPSON DESIGNED HOLDDOWN: **CS14**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **LSTHD8/RJ**  
 Seismic controls holddown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 882 lbs**

UPPER FL. MID 2 (ATTIC, M. SUITE)

SHEARWALL

WIND

SEISMIC

Floor Info

**Upper** Floor Level, e.g. Upper, Main, Lower  
**Fi-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)

**23.00 ft** Total Length of Shearwalls

V(from upper)= 3307 lb                      17281 lb  
 V(from main)= 0 lb                              0 lb  
 V(from lower)= 0 lb                            0 lb  
 $\Sigma$  (Wind) = 3,307 lb                       $\Sigma$  (Smc) = 17,281 lb  
 $v = 54$  PLF                                       $v = 284$  PLF

SDPWS, Table 4.3A  $\rightarrow$  0.93 x 353 = 328 PLF

$C_{TOTAL} =$  (floor above) + (this floor) =  + 1788 lbs = 1788 lbs  
 $T_{TOTAL} =$  (floor above) + (this floor) =  + 2345 lbs = 2345 lbs

Tributary Width (Upper Floor)  
**17.0** tributary width  
**45.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **7.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**17.0** tributary area  
**45.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

USE **SW4**  
 Seismic controls shearwall design  
 Seismic controls  
 Load case 8 controls - Seismic  
 USE SIMPSON DESIGNED HOLDDOWN: **CS14**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **STHD10/RJ**  
 Seismic controls holddown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 2555 lbs**

UPPER FL. RIGHT (ATTIC)

SHEARWALL

WIND

SEISMIC

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)  
**18.00 ft** Total Length of Shearwalls

Tributary Width (Upper Floor)  
**4.0** tributary width  
**38.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Tributary Area (Upper Floor)  
**4.0** tributary area  
**38.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

V(from upper)= 3307 lb 17281 lb  
 V(from main)= 0 lb 0 lb  
 V(from lower)= 0 lb 0 lb  
 Σ (Wind) = 3,307 lb Σ (Smc) = 17,281 lb  
 v = 19 PLF v = 101 PLF

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **4.0 ft**

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

Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

SDPWS, Table 4.3A → (2w/h) x 0.93 x 242 = 200 PLF

USE **SW6**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **637 lbs** = 637 lbs Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **770 lbs** = 770 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 = 910 lbs**

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

UPPER FL. MID 1 (WIC)

SHEARWALL

WIND

SEISMIC

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)  
**12.00 ft** Total Length of Shearwalls

Tributary Width (Upper Floor)  
**15.0** tributary width  
**45.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Tributary Area (Upper Floor)  
**15.0** tributary area  
**45.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

V(from upper)= 3307 lb 17281 lb  
 V(from main)= 0 lb 0 lb  
 V(from lower)= 0 lb 0 lb  
 Σ (Wind) = 3,307 lb Σ (Smc) = 17,281 lb  
 v = 92 PLF v = 480 PLF

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **12.0 ft**

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

Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

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

USE **SW2**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **3024 lbs** = 3024 lbs Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **3995 lbs** = 3995 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 = 4320 lbs**

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

MAIN FL. REAR (KITCHEN)

SHEARWALL

WIND

SEISMIC

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)  
**5.50 ft** Total Length of Shearwalls

Tributary Width (Upper Floor)  
**9.0** tributary width  
**50.0** total width  
 Tributary Width (Main Floor)  
**8.5** tributary width  
**50.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Tributary Area (Upper Floor)  
**9.0** tributary area  
**50.0** total area  
 Tributary Area (Main Floor)  
**8.5** tributary area  
**50.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

V(from upper)= 3784 lb 17281 lb  
 V(from main)= 6623 lb 12564 lb  
 V(from lower)= 0 lb 0 lb  
 Σ (Wind) = 10,407 lb Σ (Smc) = 29,845 lb  
 v = 329 PLF v = 954 PLF

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **5.5 ft**

Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **6.0 ft**  
 Length of adjoining wall = **2.0 ft**

Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

SDPWS, Table 4.3A → 0.93 x 1190 = 1107 PLF

USE **(2)SW2**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **3563** + 6010 lbs = 9573 lbs Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **4691** + 8206 lbs = 12897 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 = 8585 lbs**

USE SIMPSON DESIGNED HOLDOWN: **HD19 w/DF**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **HHDQ14-SDS2.5**

MAIN FL. MID 1 (DECK)

SHEARWALL

WIND

SEISMIC

**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)  
**11.50 ft** Total Length of Shearwalls  
 $V(\text{from upper}) = 3784 \text{ lb}$       17281 lb  
 $V(\text{from main}) = 6623 \text{ lb}$       12564 lb  
 $V(\text{from lower}) = 0 \text{ lb}$       0 lb  
 $\Sigma (\text{Wind}) = 10,407 \text{ lb}$        $\Sigma (\text{Smc}) = 29,845 \text{ lb}$   
 $v = 262 \text{ PLF}$        $v = 753 \text{ PLF}$

Tributary Width (Upper Floor)  
**14.5** tributary width  
**50.0** total width  
 Tributary Width (Main Floor)  
**14.5** tributary width  
**50.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **11.5 ft**

Tributary Area (Upper Floor)  
**14.5** tributary area  
**50.0** total area  
 Tributary Area (Main Floor)  
**14.5** tributary area  
**50.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

Use alternate R factor for seismic? **No**

SDPWS, Table 4.3A → 0.93 x 911 = 847 PLF

USE **(2)SW3**

*Seismic controls shearwall design*

$C_{TOTAL} = (\text{floor above}) + (\text{this floor}) = 2339 + 4741 \text{ lbs} = 7080 \text{ lbs}$       Seismic controls  
 $T_{TOTAL} = (\text{floor above}) + (\text{this floor}) = 3220 + 6459 \text{ lbs} = 9679 \text{ lbs}$       Load case 8 controls - Seismic

*Seismic controls holdown design*

HDU14

USE SIMPSON DESIGNED HOLDOWN: **HD19 w/DF**

OR AT FOUNDATION / INTERIOR WALLS USE: **HHDQ14-SDS2.5**

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 6774 lbs**

MAIN FL. MID 2 (DECK)

SHEARWALL

WIND

SEISMIC

**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)  
**9.00 ft** Total Length of Shearwalls  
 $V(\text{from upper}) = 3784 \text{ lb}$       17281 lb  
 $V(\text{from main}) = 6623 \text{ lb}$       12564 lb  
 $V(\text{from lower}) = 0 \text{ lb}$       0 lb  
 $\Sigma (\text{Wind}) = 10,407 \text{ lb}$        $\Sigma (\text{Smc}) = 29,845 \text{ lb}$   
 $v = 324 \text{ PLF}$        $v = 929 \text{ PLF}$

Tributary Width (Upper Floor)  
**14.0** tributary width  
**50.0** total width  
 Tributary Width (Main Floor)  
**14.0** tributary width  
**50.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **9.0 ft**  
*Aspect Ratio OK*

Tributary Area (Upper Floor)  
**14.0** tributary area  
**50.0** total area  
 Tributary Area (Main Floor)  
**14.0** tributary area  
**50.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

Use alternate R factor for seismic? **No**

SDPWS, Table 4.3A → 0.93 x 1190 = 1107 PLF

USE **(2)SW2**

*Seismic controls shearwall design*

$C_{TOTAL} = (\text{floor above}) + (\text{this floor}) = 3387 + 5850 \text{ lbs} = 9237 \text{ lbs}$       Seismic controls  
 $T_{TOTAL} = (\text{floor above}) + (\text{this floor}) = 4583 + 8101 \text{ lbs} = 12684 \text{ lbs}$       Load case 8 controls - Seismic

*Seismic controls holdown design*

HDU14

USE SIMPSON DESIGNED HOLDOWN: **HD19 w/DF**

OR AT FOUNDATION / INTERIOR WALLS USE: **HHDQ14-SDS2.5**

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 8357 lbs**

MAIN FL. FRONT (FOYER, GREAT RM)

SHEARWALL

WIND

SEISMIC

**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)  
**7.00 ft** Total Length of Shearwalls  
 $V(\text{from upper}) = 3784 \text{ lb}$       17281 lb  
 $V(\text{from main}) = 6623 \text{ lb}$       12564 lb  
 $V(\text{from lower}) = 0 \text{ lb}$       0 lb  
 $\Sigma (\text{Wind}) = 10,407 \text{ lb}$        $\Sigma (\text{Smc}) = 29,845 \text{ lb}$   
 $v = 197 \text{ PLF}$        $v = 566 \text{ PLF}$

Tributary Width (Upper Floor)  
**6.5** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**6.5** tributary width  
**49.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **3.0 ft**  
*Aspect Ratio OK*

Tributary Area (Upper Floor)  
**6.5** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**6.5** tributary area  
**49.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

Use alternate R factor for seismic? **No**

SDPWS, Table 4.3A → (2w/h) x 0.93 x 1190 = 738 PLF

USE **(2)SW2**

*Seismic controls shearwall design*

$C_{TOTAL} = (\text{floor above}) + (\text{this floor}) = 3611 + 3563 \text{ lbs} = 7174 \text{ lbs}$       Seismic controls  
 $T_{TOTAL} = (\text{floor above}) + (\text{this floor}) = 5018 + 4974 \text{ lbs} = 9992 \text{ lbs}$       Load case 8 controls - Seismic

*Seismic controls holdown design*

HDU14

USE SIMPSON DESIGNED HOLDOWN: **HD19 w/DF**

OR AT FOUNDATION / INTERIOR WALLS USE: **HHDQ14-SDS2.5**

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 5090 lbs**

**MAIN FL. LEFT (GUEST, LAUND., KITCHEN) 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)  
**14.00 ft** Total Length of Shearwalls  
 $V_{(from\ upper)} = 3307\ lb$        $17281\ lb$   
 $V_{(from\ main)} = 5788\ lb$        $12564\ lb$   
 $V_{(from\ lower)} = 0\ lb$        $0\ lb$   
 $\Sigma (Wind) = 9,095\ lb$        $\Sigma (Smc) = 29,845\ lb$   
 $v = 87\ PLF$        $v = 284\ PLF$

**WIND**  
 Tributary Width (Upper Floor)  
**6.0** tributary width  
**45.0** total width  
 Tributary Width (Main Floor)  
**6.0** tributary width  
**45.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **7.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

**SEISMIC**  
 Tributary Area (Upper Floor)  
**6.0** tributary area  
**45.0** total area  
 Tributary Area (Main Floor)  
**6.0** tributary area  
**45.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 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*  
 $C_{TOTAL} = (floor\ above) + (this\ floor) = 618 + 1791\ lbs = 2409\ lbs$       Seismic controls  
 $T_{TOTAL} = (floor\ above) + (this\ floor) = 766 + 2349\ lbs = 3115\ lbs$       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:  $E = 2558\ lbs$   
 USE SIMPSON DESIGNED HOLDOWN: **MST48**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **STHD14/RJ**

**MAIN FL MID 1 (DECK) 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)  
**12.00 ft** Total Length of Shearwalls  
 $V_{(from\ upper)} = 3307\ lb$        $17281\ lb$   
 $V_{(from\ main)} = 5788\ lb$        $12564\ lb$   
 $V_{(from\ lower)} = 0\ lb$        $0\ lb$   
 $\Sigma (Wind) = 9,095\ lb$        $\Sigma (Smc) = 29,845\ lb$   
 $v = 253\ PLF$        $v = 829\ PLF$

**WIND**  
 Tributary Width (Upper Floor)  
**15.0** tributary width  
**45.0** total width  
 Tributary Width (Main Floor)  
**15.0** tributary width  
**45.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **12.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

**SEISMIC**  
 Tributary Area (Upper Floor)  
**15.0** tributary area  
**45.0** total area  
 Tributary Area (Main Floor)  
**15.0** tributary area  
**45.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 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 911 = 847 PLF → USE **(2)SW3**

*Seismic controls shearwall design*  
 $C_{TOTAL} = (floor\ above) + (this\ floor) = 3024 + 5223\ lbs = 8247\ lbs$       Seismic controls  
 $T_{TOTAL} = (floor\ above) + (this\ floor) = 3995 + 7136\ lbs = 11131\ lbs$       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:  $E = 7461\ lbs$   
 USE SIMPSON DESIGNED HOLDOWN: **HD19 w/DF**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **HHDQ14-SDS2.5**

**MAIN FL. MID 2 (FOYER, HALLWAY) 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)  
**23.00 ft** Total Length of Shearwalls  
 $V_{(from\ upper)} = 3307\ lb$        $17281\ lb$   
 $V_{(from\ main)} = 5788\ lb$        $12564\ lb$   
 $V_{(from\ lower)} = 0\ lb$        $0\ lb$   
 $\Sigma (Wind) = 9,095\ lb$        $\Sigma (Smc) = 29,845\ lb$   
 $v = 198\ PLF$        $v = 649\ PLF$

**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  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **11.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

**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  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area  
 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 707 = 658 PLF → USE **(2)SW4**

*Seismic controls shearwall design*  
 $C_{TOTAL} = (floor\ above) + (this\ floor) = 1788 + 4087\ lbs = 5875\ lbs$       Seismic controls  
 $T_{TOTAL} = (floor\ above) + (this\ floor) = 2345 + 5537\ lbs = 7882\ lbs$       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:  $E = 5839\ lbs$   
 USE SIMPSON DESIGNED HOLDOWN: **HDU11-SDS2.5**

MAIN FL. RIGHT (GREAT RM)

SHEARWALL

WIND

SEISMIC

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)

**4.00 ft** Total Length of Shearwalls

V(from upper)= 3307 lb 17281 lb  
 V(from main)= 5788 lb 12564 lb  
 V(from lower)= 0 lb 0 lb  
 Σ (Wind) = 9,095 lb Σ (Smc) = 29,845 lb  
 v = 239 PLF v = 785 PLF

3x framing required per IBC

SDPWS, Table 4.3A → (2w/h) x 0.93 x 1432 = 888 PLF

C<sub>TOTAL</sub> = (floor above) + (this floor) = 637  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = 770

Tributary Width (Upper Floor)  
**4.0** tributary width  
**38.0** total width  
 Tributary Width (Main Floor)  
**4.0** tributary width  
**38.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Height of Shearwall = 12.0 ft  
 Length of Shearwall = 4.0 ft

Aspect Ratio OK

Use alternate R factor for seismic? No

Tributary Area (Upper Floor)  
**4.0** tributary area  
**38.0** total area  
 Tributary Area (Main Floor)  
**4.0** tributary area  
**38.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

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

USE SIMPSON WSWH24x12

USE **10d@2"o/c**

Seismic controls shearwall design

Seismic controls holdown design

USE WSWH-AB1x36HS

USE SIMPSON DESIGNED HOLDDOWN:

**HD19 w/DF**

OR AT FOUNDATION / INTERIOR WALLS USE:

**HHDQ14-SDS2.5**

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 9425 lbs

LOWER FL. REAR (CRAWLSPACE, GARAGE)

SHEARWALL

WIND

SEISMIC

Floor Info

**Lower** 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

**M/FL** Resisting Dead Load  
 (e.g. Roof, Upper Floor, Main Floor)

**31.00 ft** Total Length of Shearwalls

V(from upper)= 3784 lb 17281 lb  
 V(from main)= 6623 lb 12564 lb  
 V(from lower)= 4925 lb 4742 lb  
 Σ (Wind) = 15,331 lb Σ (Smc) = 34,587 lb  
 v = 85 PLF v = 195 PLF

SDPWS, Table 4.3A → (2w/h) x 0.93 x 353 = 219 PLF

C<sub>TOTAL</sub> = (floor above) + (this floor) =  
 T<sub>TOTAL</sub> = (floor above) + (this floor) =

Tributary Width (Upper Floor)  
**9.0** tributary width  
**50.0** total width  
 Tributary Width (Main Floor)  
**8.5** tributary width  
**50.0** total width  
 Tributary Width (Lower Floor)  
**8.5** tributary width  
**50.0** total width

Height of Shearwall = 9.0 ft  
 Length of Shearwall = 3.0 ft

Aspect Ratio OK

Use alternate R factor for seismic? No

Tributary Area (Upper Floor)  
**9.0** tributary area  
**50.0** total area  
 Tributary Area (Main Floor)  
**8.5** tributary area  
**50.0** total area  
 Tributary Area (Lower Floor)  
**8.5** tributary area  
**50.0** total area

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

USE **SW4**

Seismic controls shearwall design

Seismic controls holdown design

USE SIMPSON DESIGNED HOLDDOWN:

**CS14**

OR AT FOUNDATION / INTERIOR WALLS USE:

**LSTHD8/RJ**

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1757 lbs

LOWER FL. MID (GARAGE)

SHEARWALL

WIND

SEISMIC

Floor Info

**Lower** 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

**M/FL** Resisting Dead Load  
 (e.g. Roof, Upper Floor, Main Floor)

**16.00 ft** Total Length of Shearwalls

V(from upper)= 3307 lb 17281 lb  
 V(from main)= 5788 lb 12564 lb  
 V(from lower)= 4661 lb 4742 lb  
 Σ (Wind) = 13,757 lb Σ (Smc) = 34,587 lb  
 v = 325 PLF v = 817 PLF

SDPWS, Table 4.3A → 0.93 x 911 = 847 PLF

C<sub>TOTAL</sub> = (floor above) + (this floor) =  
 T<sub>TOTAL</sub> = (floor above) + (this floor) =

Tributary Width (Upper Floor)  
**17.0** tributary width  
**45.0** total width  
 Tributary Width (Main Floor)  
**17.0** tributary width  
**45.0** total width  
 Tributary Width (Lower Floor)  
**17.0** tributary width  
**45.0** total width

Height of Shearwall = 9.0 ft  
 Length of Shearwall = 16.0 ft

Aspect Ratio OK

Use alternate R factor for seismic? No

Tributary Area (Upper Floor)  
**17.0** tributary area  
**45.0** total area  
 Tributary Area (Main Floor)  
**17.0** tributary area  
**45.0** total area  
 Tributary Area (Lower Floor)  
**17.0** tributary area  
**45.0** total area

Weight of Shearwall = 10.0 lbs  
 Tributary width for dead load = 5.0 ft  
 Length of adjoining wall = 1.0 ft

USE **(2)SW3**

Seismic controls shearwall design

Seismic controls holdown design

USE SIMPSON DESIGNED HOLDDOWN:

**HDU11-SDS2.5**

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 7350 lbs

LOW. FL. MID (GARAGE)

SHEARWALL

WIND

SEISMIC

Floor Info

**Lower** 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  
**M/FL** Resisting Dead Load  
 (e.g. Roof, Upper Floor, Main Floor)  
**27.00 ft** Total Length of Shearwalls

V(from upper)= 3784 lb 17281 lb  
 V(from main)= 6623 lb 12564 lb  
 V(from lower)= 4925 lb 4742 lb  
 $\Sigma$  (Wind) = 15,331 lb  $\Sigma$  (Smc) = 34,587 lb  
 v = 165 PLF v = 371 PLF

3x framing required per IBC

SDPWS, Table 4.3A → 0.93 x 456 = 424 PLF

Tributary Width (Upper Floor)  
**14.5** tributary width  
**50.0** total width  
 Tributary Width (Main Floor)  
**14.5** tributary width  
**50.0** total width  
 Tributary Width (Lower Floor)  
**14.5** tributary width  
**50.0** total width

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **16.0 ft**

Aspect Ratio OK

Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**14.5** tributary area  
**50.0** total area  
 Tributary Area (Main Floor)  
**14.5** tributary area  
**50.0** total area  
 Tributary Area (Lower Floor)  
**14.5** tributary area  
**50.0** total area

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

USE **SW3**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **2340 lbs** = 2340 lbs Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **2925 lbs** = 2925 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 = 3343 lbs**

USE SIMPSON DESIGNED HOLDOWN: **MST48**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **STHD14/RJ**

UPPER FL. MID 3 (BDRM 3)

SHEARWALL

WIND

SEISMIC

Floor Info

**Upper** 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)  
**6.00 ft** Total Length of Shearwalls

V(from upper)= 3784 lb 17281 lb  
 V(from main)= 0 lb 0 lb  
 V(from lower)= 0 lb 0 lb  
 $\Sigma$  (Wind) = 3,784 lb  $\Sigma$  (Smc) = 17,281 lb  
 v = 129 PLF v = 588 PLF

3x framing required per IBC

SDPWS, Table 4.3A → 0.93 x 707 = 658 PLF

Tributary Width (Upper Floor)  
**10.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**0.0** tributary width  
**2.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **6.0 ft**

Aspect Ratio OK

Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**10.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**0.0** tributary area  
**2.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

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

USE **(2)SW4**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **3703 lbs** = 3703 lbs Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **5104 lbs** = 5104 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 = 5290 lbs**

USE SIMPSON DESIGNED HOLDOWN: **MST72**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **HDU8-SDS2.5**

MAIN FL. MID 3 (GUEST/DEN)

SHEARWALL

WIND

SEISMIC

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  
**M/FL** Resisting Dead Load  
 (e.g. Roof, Upper Floor, Main Floor)  
**9.00 ft** Total Length of Shearwalls

V(from upper)= 3784 lb 17281 lb  
 V(from main)= 6623 lb 12564 lb  
 V(from lower)= 0 lb 0 lb  
 $\Sigma$  (Wind) = 10,407 lb  $\Sigma$  (Smc) = 29,845 lb  
 v = 236 PLF v = 677 PLF

3x framing required per IBC

SDPWS, Table 4.3A → 0.93 x 911 = 847 PLF

Tributary Width (Upper Floor)  
**10.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**10.0** tributary width  
**49.0** total width  
 Tributary Width (Lower Floor)  
**1.0** tributary width  
**2.0** total width

Height of Shearwall = **9.0 ft**  
 Length of Shearwall = **9.0 ft**

Aspect Ratio OK

Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**10.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**10.0** tributary area  
**49.0** total area  
 Tributary Area (Lower Floor)  
**1.0** tributary area  
**2.0** total area

Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **10.0 ft**  
 Length of adjoining wall = **0.0 ft**

USE **(2)SW3**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **3703** + 4264 lbs = 7967 lbs Seismic controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **5104** + 5612 lbs = 10716 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 = 6091 lbs**

USE SIMPSON DESIGNED HOLDOWN: **HD19 w/DF**  
 OR AT FOUNDATION / INTERIOR WALLS USE: **HHDQ14-SDS2.5**

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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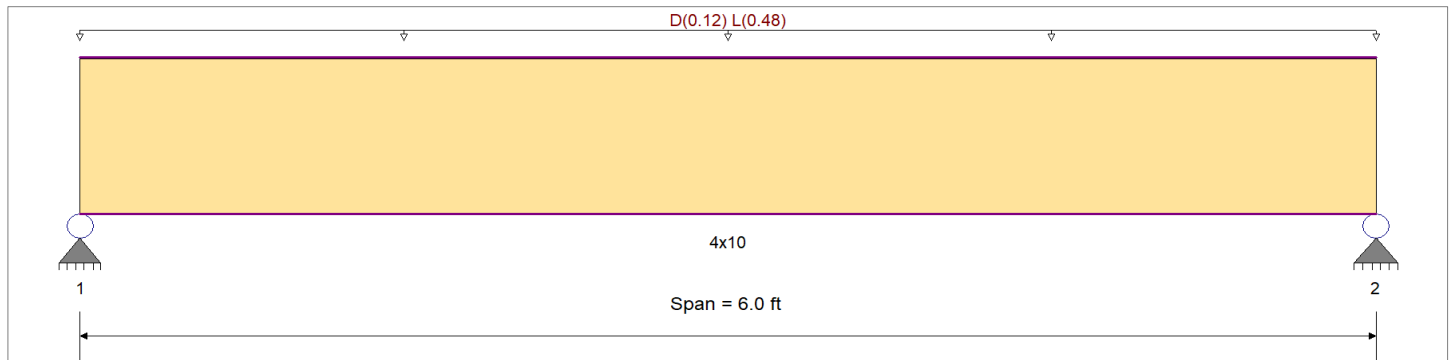
**DESCRIPTION:** HDR#4 (10-8-2024)

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

**Material Properties**

Analysis Method : Allowable Stress Design	Fb +	875 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	875 psi	Ebend- xx	1300ksi
	Fc - Prll	600 psi	Eminbend - xx	470ksi
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	625 psi		
Wood Grade : No.2	Fv	170 psi		
	Ft	425 psi	Density	30.59pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



**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 = 0.060 ksf, Tributary Width = 8.0 ft, (ROOF)

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.625</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.369</b> : 1
Section used for this span		<b>4x10</b>	Section used for this span		<b>4x10</b>
fb: Actual	=	656.59psi	fv: Actual	=	62.80 psi
F'b	=	1,050.00psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.047 in	Ratio = 1534	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.059 in	Ratio = 1213	>=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										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only	Length = 6.0 ft	1	0.145	0.086	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.57	137.3	945.0	0.00	0.00	0.0	0.0	153.0
+D+L	Length = 6.0 ft	1	0.625	0.369	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.00	2.73	656.6	1,050.0	1.36	62.8	170.0	0.0	0.0
+D+0.750L	Length = 6.0 ft	1	0.401	0.237	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	2.19	526.8	1,312.5	1.09	50.4	212.5	0.0	0.0
+0.60D	Length = 6.0 ft	1	0.049	0.029	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.34	82.4	1,680.0	0.17	7.9	272.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION: HDR#4 (10-8-2024)**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0593	3.022		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.821	1.821
Max Upward from Load Combinations	1.821	1.821
Max Upward from Load Cases	1.440	1.440
D Only	0.381	0.381
+D+L	1.821	1.821
+D+0.750L	1.461	1.461
+0.60D	0.228	0.228
L Only	1.440	1.440

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION:** HDR#9 (10-8-2024)

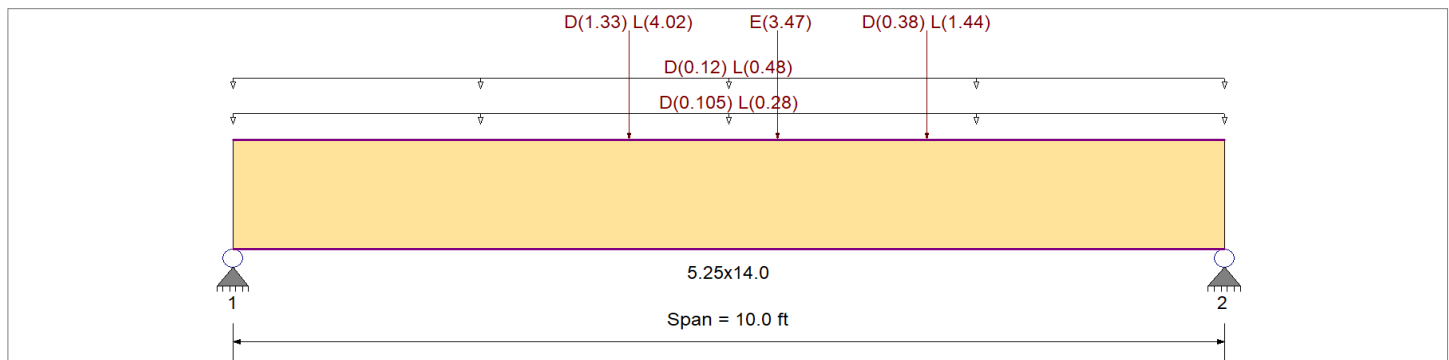
### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,900.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0ksi
	Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade : Parallam PSL 2.0E	Fv	290.0 psi		
	Ft	2,025.0 psi	Density	45.070pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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 = 7.0 ft, (FLOOR)

Point Load : E = 3.470 k @ 5.50 ft, (SW3)

Point Load : D = 0.380, L = 1.440 k @ 7.0 ft, (HDR#4)

Point Load : D = 1.330, L = 4.020 k @ 4.0 ft, (BM#6)

Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 8.0 ft, (DECK)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.771</b> : 1	Maximum Shear Stress Ratio	=	<b>0.556</b> : 1
Section used for this span		<b>5.25x14.0</b>	Section used for this span		<b>5.25x14.0</b>
fb: Actual	=	3,518.53psi	fv: Actual	=	258.04 psi
F'b	=	4,561.28psi	F'v	=	464.00 psi
Load Combination	=	+1.118D+0.750L+3.413E	Load Combination	=	+1.118D+0.750L+3.413E
Location of maximum on span	=	5.511 ft	Location of maximum on span	=	8.869 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.146 in Ratio =	<b>821</b> >=360	Span: 1 : L Only	
Max Upward Transient Deflection		0 in Ratio =	<b>0</b> <360	n/a	
Max Downward Total Deflection		0.193 in Ratio =	<b>621</b> >=240	Span: 1 : +D+L	
Max Upward Total Deflection		0 in Ratio =	<b>0</b> <240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 10.0 ft	1		0.181	0.146	0.90	1.00	1.00	1.00	0.983	1.00	1.00	1.00	6.62	463.3	2,565.7	1.87	38.2	261.0		
+D+L																				
Length = 10.0 ft	1		0.665	0.539	1.00	1.00	1.00	1.00	0.983	1.00	1.00	1.00	27.11	1,897.0	2,850.8	7.66	156.2	290.0		
+D+0.750L																				
Length = 10.0 ft	1		0.432	0.350	1.25	1.00	1.00	1.00	0.983	1.00	1.00	1.00	21.99	1,538.6	3,563.5	6.21	126.7	362.5		

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION: HDR#9 (10-8-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	fv	F <sub>v</sub>
+1.157D+4.550E	Length = 10.0 ft	1	0.706	0.471	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	46.02	3,220.0	4,561.3	10.72	218.7	464.0
+1.118D+0.750L+3.413E	Length = 10.0 ft	1	0.771	0.556	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	50.29	3,518.5	4,561.3	12.64	258.0	464.0
+0.60D	Length = 10.0 ft	1	0.061	0.049	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	3.97	278.0	4,561.3	1.12	22.9	464.0
+0.4432D+4.550E	Length = 10.0 ft	1	0.639	0.416	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	41.68	2,916.2	4,561.3	9.46	193.1	464.0

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1930	4.964		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	8.796	8.454
Max Upward from Load Combinations	8.796	8.454
Max Upward from Load Cases	6.644	6.416
D Only	2.152	2.038
+D+L	8.796	8.454
+D+0.750L	7.135	6.850
+D+0.70E	3.245	3.374
+D+0.750L+0.5250E	7.955	7.852
+0.60D	1.291	1.223
+0.60D+0.70E	2.384	2.559
L Only	6.644	6.416
E Only	1.562	1.909

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION:** HDR#10 (10-8-2024)

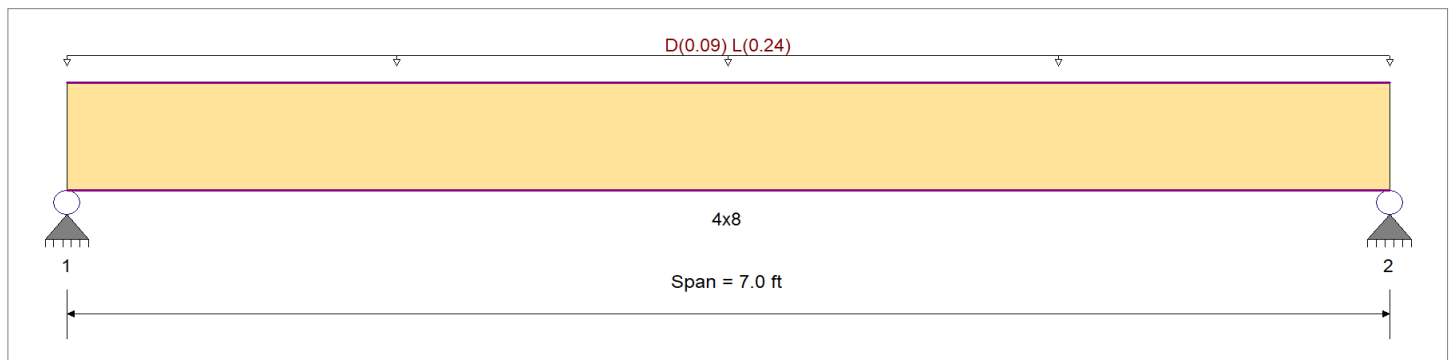
### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	875 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	875 psi	Ebend- xx	1300ksi
	Fc - Prll	600 psi	Eminbend - xx	470ksi
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	625 psi		
Wood Grade : No.2	Fv	170 psi		
	Ft	425 psi	Density	30.59pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.707 : 1</b>	<b>Maximum Shear Stress Ratio</b>	=	<b>0.340 : 1</b>
Section used for this span		<b>4x8</b>	Section used for this span		<b>4x8</b>
fb: Actual	=	803.98psi	fv: Actual	=	57.74 psi
F'b	=	1,137.50psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.500ft	Location of maximum on span	=	6.412 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.090 in	Ratio =	930	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.126 in	Ratio =	665	>=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										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only	Length = 7.0 ft	1	0.223	0.107	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.58	228.7	1,023.8	0.0	0.00	0.0	0.0	153.0
+D+L	Length = 7.0 ft	1	0.707	0.340	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.05	804.0	1,137.5	0.98	57.7	170.0	0.0	
+D+0.750L	Length = 7.0 ft	1	0.464	0.223	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.69	660.2	1,421.9	0.80	47.4	212.5	0.0	
+1.157D	Length = 7.0 ft	1	0.145	0.070	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.68	264.5	1,820.0	0.32	19.0	272.0	0.0	
+1.118D+0.750L	Length = 7.0 ft	1	0.377	0.181	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.76	687.0	1,820.0	0.83	49.3	272.0	0.0	

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: HDR#10 (10-8-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	f <sub>v</sub>	F <sub>v</sub>
+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 = 7.0 ft	<b>1</b>		0.075	0.036	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.35	137.2	1,820.0	0.17	9.9	272.0
+0.4432D						1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 7.0 ft	<b>1</b>		0.056	0.027	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.26	101.3	1,820.0	0.12	7.3	272.0

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1261	3.526		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.174	1.174
Max Upward from Load Combinations	1.174	1.174
Max Upward from Load Cases	0.840	0.840
D Only	0.334	0.334
+D+L	1.174	1.174
+D+0.750L	0.964	0.964
+0.60D	0.200	0.200
L Only	0.840	0.840

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

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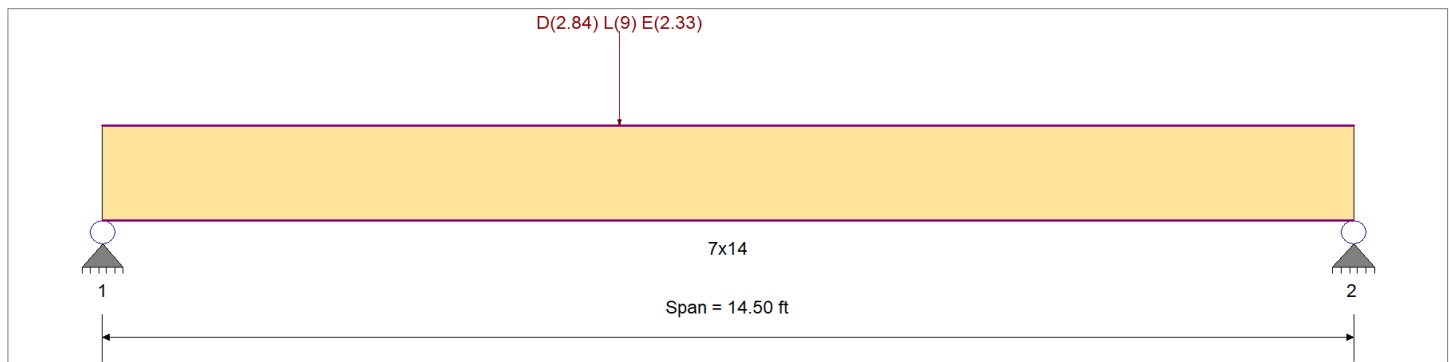
**DESCRIPTION:** HDR#12 (10-31-2024)

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	2,900.0 psi	Ebend- xx 2,000.0ksi
	Fc - Prll	2,900.0 psi	Eminbend - xx 1,016.54ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : Parallam PSL 2.0E	Fv	290.0 psi	
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Ft	2,025.0 psi	Density 45.070pcf



### Applied Loads

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

Beam self weight calculated and added to loading  
 Point Load : D = 2.840, L = 9.0, E = 2.330 k @ 6.0 ft, (BM#16)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.778</b> : 1	Maximum Shear Stress Ratio	=	<b>0.376</b> : 1
Section used for this span		<b>7x14</b>	Section used for this span		<b>7x14</b>
fb: Actual	=	2,219.10psi	fv: Actual	=	109.09 psi
F'b	=	2,850.80psi	F'v	=	290.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	5.980ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.298 in	Ratio = <b>583</b> >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = <b>0</b> <360	n/a		
Max Downward Total Deflection	0.402 in	Ratio = <b>432</b> >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = <b>0</b> <240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 14.50 ft	1	0.220	0.109	0.90	1.00	1.00	1.00	0.983	1.00	1.00	1.00	10.74	563.5	2,565.7	0.0	0.00	0.0	0.0
+D+L	Length = 14.50 ft	1	0.778	0.376	1.00	1.00	1.00	1.00	0.983	1.00	1.00	1.00	42.29	2,219.1	2,850.8	7.13	109.1	290.0	
+D+0.750L	Length = 14.50 ft	1	0.507	0.245	1.25	1.00	1.00	1.00	0.983	1.00	1.00	1.00	34.40	1,805.2	3,563.5	5.81	88.9	362.5	
+1.157D+4.550E	Length = 14.50 ft	1	0.570	0.276	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	49.58	2,602.1	4,561.3	8.36	127.9	464.0	
+1.118D+0.750L+3.413E	Length = 14.50 ft	1				1.00	1.00	1.00	0.983	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: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: HDR#12 (10-31-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	fv	F <sub>v</sub>
Length = 14.50 ft	+0.60D	1	0.731	0.353	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	63.53	3,334.1	4,561.3	10.69	163.6	464.0
															0.0	0.00	0.0	0.0
Length = 14.50 ft	+0.4432D+4.550E	1	0.074	0.037	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	6.44	338.1	4,561.3	1.11	17.0	464.0
															0.0	0.00	0.0	0.0
Length = 14.50 ft		1	0.482	0.232	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	41.92	2,200.0	4,561.3	7.04	107.7	464.0

**Overall Maximum Deflections**

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.4021	6.932		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	7.163	5.122
Max Upward from Load Combinations	7.163	5.122
Max Upward from Load Cases	5.276	3.724
D Only	1.887	1.398
+D+L	7.163	5.122
+D+0.750L	5.844	4.191
+D+0.70E	2.843	2.072
+D+0.750L+0.5250E	6.561	4.697
+0.60D	1.132	0.839
+0.60D+0.70E	2.088	1.513
L Only	5.276	3.724
E Only	1.366	0.964

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

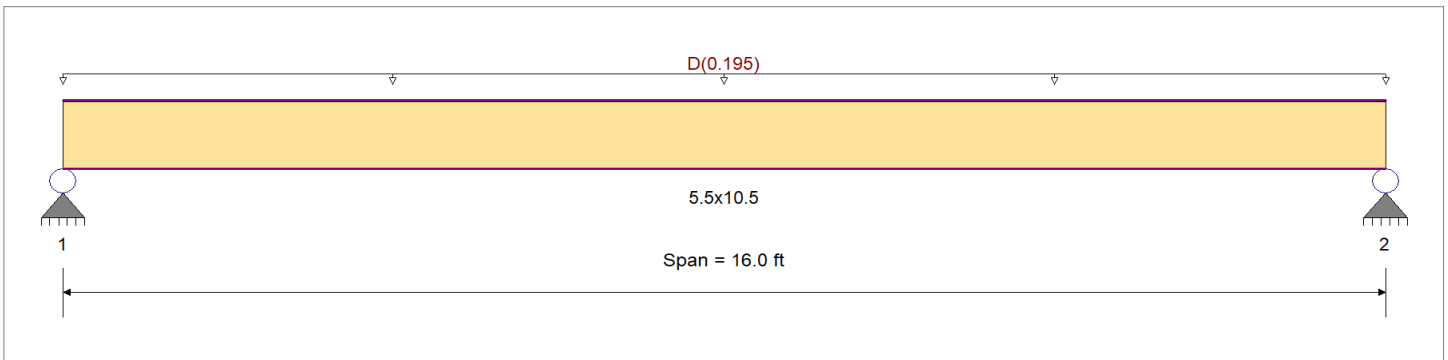
**DESCRIPTION:** BM#0.2 (10-8-2024)

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Species : DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Wood Grade : 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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 ksf, Tributary Width = 13.0 ft, (ROOF)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.365</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.162</b> : 1
Section used for this span		<b>5.5x10.5</b>	Section used for this span		<b>5.5x10.5</b>
fb: Actual	=	788.49psi	fv: Actual	=	38.71 psi
F'b	=	2,160.00psi	F'v	=	238.50 psi
Load Combination		D Only	Load Combination		D Only
Location of maximum on span	=	8.000ft	Location of maximum on span	=	15.182 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0 in Ratio =	0 <360	n/a	
Max Upward Transient Deflection		0 in Ratio =	0 <360	n/a	
Max Downward Total Deflection		0.322 in Ratio =	595 >=240	Span: 1 : D Only	
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 <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only																0.0	0.00	0.0	0.0	0.0
Length = 16.0 ft	1	0.365	0.162	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	6.64	788.5	2,160.0	1.49	38.7	238.5		
+0.60D																0.0	0.00	0.0	0.0	0.0
Length = 16.0 ft	1	0.123	0.055	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.98	473.1	3,840.0	0.89	23.2	424.0		

### Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.3223	8.058		0.0000	0.000

Project Title:  
Engineer:  
Project ID:  
Project Descr:

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION:** BM#0.2 (10-8-2024)

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.660	1.660
Max Upward from Load Combinations	0.996	0.996
Max Upward from Load Cases	1.660	1.660
D Only	1.660	1.660
+0.60D	0.996	0.996

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION:** BM#4.1 (10-5-2024)

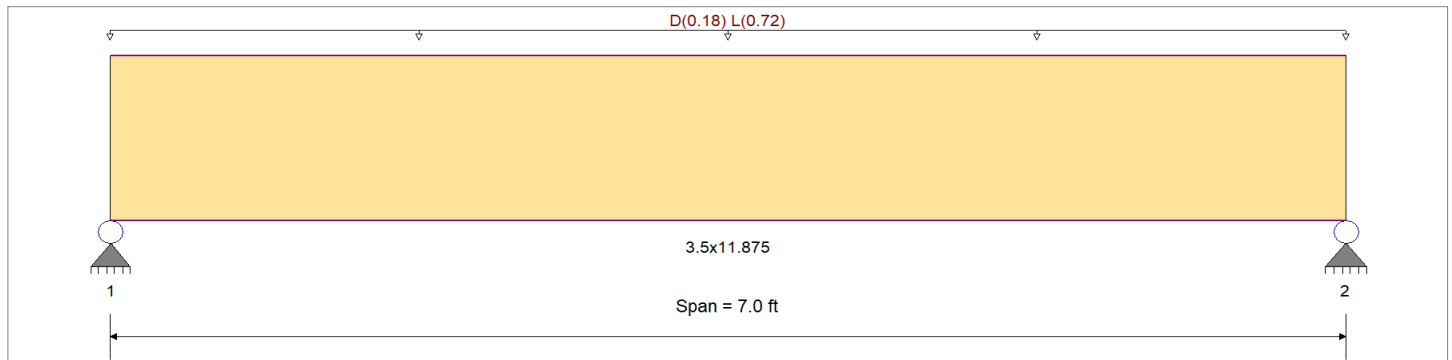
### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,900.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	2,900.0 psi	Ebend- xx 2,000.0ksi
	Fc - Prll	2,900.0 psi	Eminbend - xx 1,016.54ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : Parallam PSL 2.0E	Fv	290.0 psi	
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Ft	2,025.0 psi	Density 45.070pcf



### 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 = 0.060 ksf, Tributary Width = 12.0 ft, (ROOF)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.281</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.287</b> : 1
Section used for this span		<b>3.5x11.875</b>	Section used for this span		<b>3.5x11.875</b>
fb: Actual	=	815.79psi	fv: Actual	=	83.34 psi
F'b	=	2,903.37psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.500ft	Location of maximum on span	=	6.029 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.040 in	Ratio = 2097	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.051 in	Ratio = 1653	>=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										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only	Length = 7.0 ft	1	0.066	0.068	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.18	172.5	2,613.0	0.0	0.00	0.0	0.0	261.0
+D+L	Length = 7.0 ft	1	0.281	0.287	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	5.59	815.8	2,903.4	0.0	0.00	0.0	0.0	290.0
+D+0.750L	Length = 7.0 ft	1	0.180	0.185	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.49	655.0	3,629.2	1.85	66.9	0.0	0.0	362.5
+0.60D	Length = 7.0 ft	1	0.022	0.023	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.71	103.5	4,645.4	0.29	10.6	0.0	0.0	464.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** BM#4.1 (10-5-2024)

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0508	3.526		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.196	3.196
Max Upward from Load Combinations	3.196	3.196
Max Upward from Load Cases	2.520	2.520
D Only	0.676	0.676
+D+L	3.196	3.196
+D+0.750L	2.566	2.566
+0.60D	0.405	0.405
L Only	2.520	2.520

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** BM#4.2 (10-5-2024)

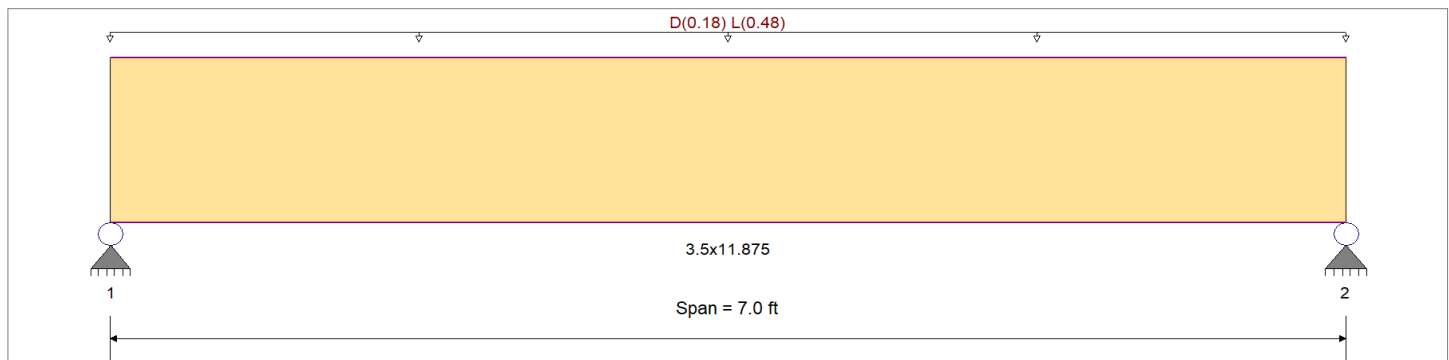
### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,900.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0ksi
	Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade : Parallam PSL 2.0E	Fv	290.0 psi		
	Ft	2,025.0 psi	Density	45.070pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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 = 12.0 ft, (FLOOR)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.207</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.212</b> : 1
Section used for this span		<b>3.5x11.875</b>	Section used for this span		<b>3.5x11.875</b>
fb: Actual	=	601.35psi	fv: Actual	=	61.43 psi
F'b	=	2,903.37psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.500ft	Location of maximum on span	=	6.029 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.027 in	Ratio = 3145	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.037 in	Ratio = 2243	>=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										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only	Length = 7.0 ft	1	0.066	0.068	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	1.18	172.5	2,613.0	0.0	0.00	0.0	0.0	261.0
+D+L	Length = 7.0 ft	1	0.207	0.212	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.12	601.3	2,903.4	1.70	61.4	290.0	0.0	0.0
+D+0.750L	Length = 7.0 ft	1	0.136	0.139	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	3.39	494.1	3,629.2	1.40	50.5	362.5	0.0	0.0
+0.60D	Length = 7.0 ft	1	0.022	0.023	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.71	103.5	4,645.4	0.29	10.6	464.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION:** BM#4.2 (10-5-2024)

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0374	3.526		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.356	2.356
Max Upward from Load Combinations	2.356	2.356
Max Upward from Load Cases	1.680	1.680
D Only	0.676	0.676
+D+L	2.356	2.356
+D+0.750L	1.936	1.936
+0.60D	0.405	0.405
L Only	1.680	1.680

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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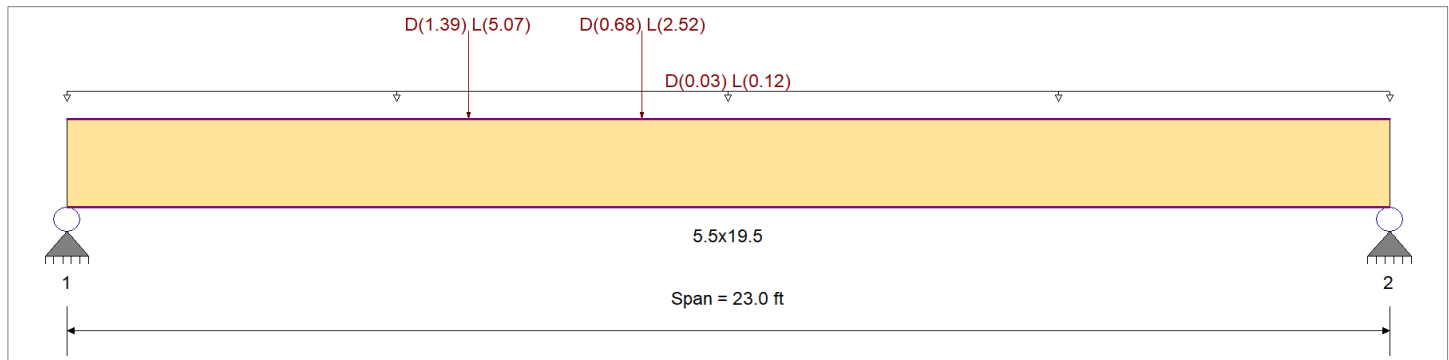
**DESCRIPTION: BM#6 (10-5-2024)**

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
Wood Species : DF/DF	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Grade : 24F-V4	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf



### 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 = 0.060 ksf, Tributary Width = 2.0 ft, (ROOF)  
 Point Load : D = 1.390, L = 5.070 k @ 7.0 ft, (BM#5)  
 Point Load : D = 0.680, L = 2.520 k @ 10.0 ft, (BM#5)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.840</b> : 1	Maximum Shear Stress Ratio	=	<b>0.423</b> : 1
Section used for this span		<b>5.5x19.5</b>	Section used for this span		<b>5.5x19.5</b>
fb: Actual	=	1,890.25psi	fv: Actual	=	112.15 psi
F'b	=	2,249.61 psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	9.989ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.596 in	Ratio =	<b>462</b> >=360	Span: 1 : L Only
Max Upward Transient Deflection		0 in	Ratio =	<b>0</b> <360	n/a
Max Downward Total Deflection		0.780 in	Ratio =	<b>353</b> >=240	Span: 1 : +D+L
Max Upward Total Deflection		0 in	Ratio =	<b>0</b> <240	n/a

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 23.0 ft	1	0.218	0.110	0.90	1.00	1.00	1.00	0.937	1.00	1.00	1.00	12.80	440.8	2,024.7	0.0	0.00	0.0	0.0
+D+L	Length = 23.0 ft	1	0.840	0.423	1.00	1.00	1.00	1.00	0.937	1.00	1.00	1.00	54.91	1,890.3	2,249.6	8.02	112.1	265.0	0.0
+D+0.750L	Length = 23.0 ft	1	0.543	0.274	1.25	1.00	1.00	1.00	0.937	1.00	1.00	1.00	44.38	1,527.9	2,812.0	6.48	90.7	331.3	0.0
+0.60D	Length = 23.0 ft	1	0.073	0.037	1.60	1.00	1.00	1.00	0.937	1.00	1.00	1.00	7.68	264.5	3,599.4	1.13	15.8	424.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: BM#6 (10-5-2024)**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.7801	10.828		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	8.295	5.350
Max Upward from Load Combinations	8.295	5.350
Max Upward from Load Cases	6.331	4.019
D Only	1.964	1.331
+D+L	8.295	5.350
+D+0.750L	6.712	4.345
+0.60D	1.178	0.799
L Only	6.331	4.019

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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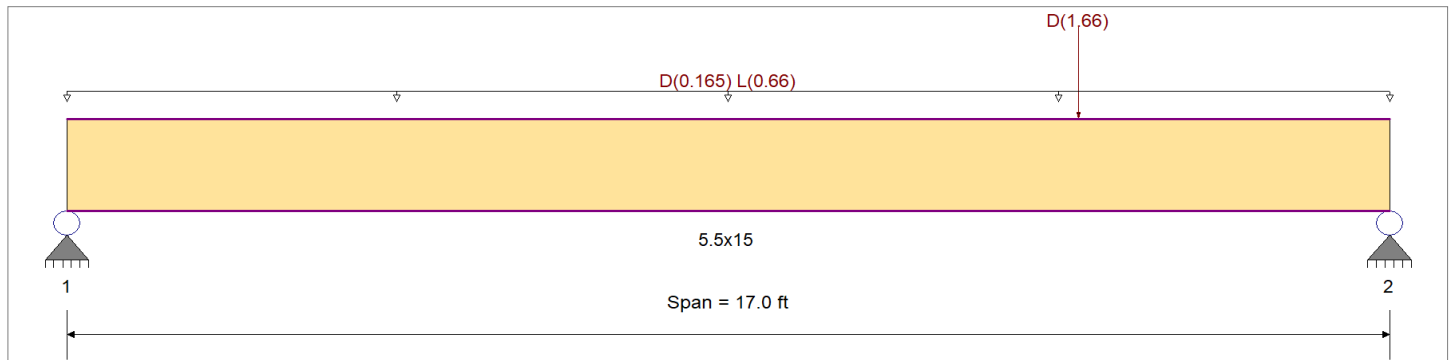
**DESCRIPTION: BM#8 (10-8-2024)**

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Species : DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Wood Grade : 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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 = 0.060 ksf, Tributary Width = 11.0 ft, (DECK)  
 Point Load : D = 1.660 k @ 13.0 ft, (BM#0.2)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.828</b> < 1	Maximum Shear Stress Ratio	=	<b>0.507</b> < 1
Section used for this span		<b>5.5x15</b>	Section used for this span		<b>5.5x15</b>
fb: Actual	=	1,969.99psi	fv: Actual	=	134.33 psi
F'b	=	2,380.29psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	8.934ft	Location of maximum on span	=	15.759 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.448 in	Ratio = <b>455</b> >= 360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = <b>0</b> < 360	n/a		
Max Downward Total Deflection	0.642 in	Ratio = <b>317</b> >= 240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = <b>0</b> < 240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 17.0 ft	1	0.281	0.198	0.90	1.00	1.00	1.00	0.992	1.00	1.00	1.00	10.34	601.8	2,142.3	0.0	0.00	0.0	0.0
+D+L	Length = 17.0 ft	1	0.828	0.507	1.00	1.00	1.00	1.00	0.992	1.00	1.00	1.00	33.86	1,970.0	2,380.3	7.39	134.3	265.0	0.0
+D+0.750L	Length = 17.0 ft	1	0.546	0.340	1.25	1.00	1.00	1.00	0.992	1.00	1.00	1.00	27.92	1,624.5	2,975.4	6.19	112.5	331.3	0.0
+0.60D	Length = 17.0 ft	1	0.095	0.067	1.60	1.00	1.00	1.00	0.992	1.00	1.00	1.00	6.21	361.1	3,808.5	1.56	28.3	424.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: BM#8 (10-8-2024)**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.6416	8.624		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	7.555	8.434
Max Upward from Load Combinations	7.555	8.434
Max Upward from Load Cases	5.610	5.610
D Only	1.945	2.824
+D+L	7.555	8.434
+D+0.750L	6.153	7.031
+0.60D	1.167	1.694
L Only	5.610	5.610

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION: BM#9 (10-8-2024)**

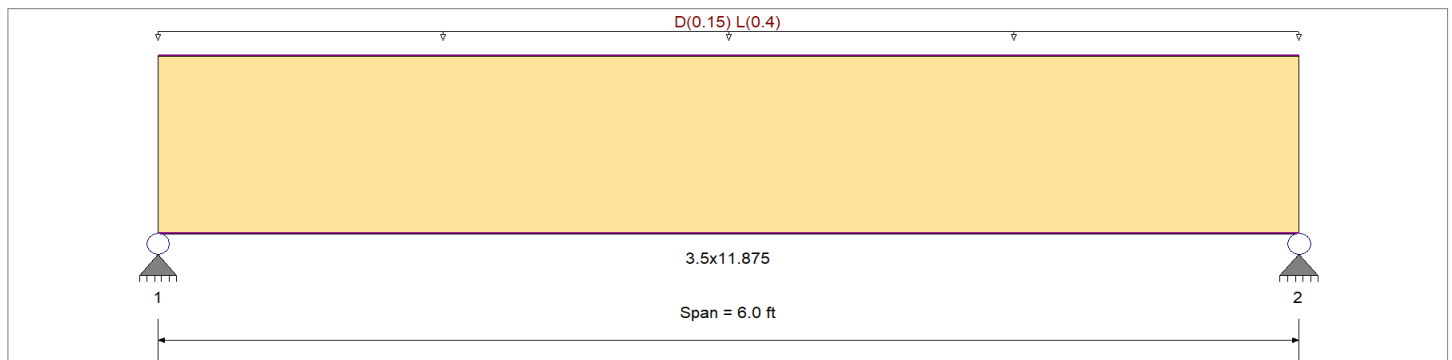
### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,900.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0ksi
	Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade : Parallam PSL 2.0E	Fv	290.0 psi		
	Ft	2,025.0 psi	Density	45.070pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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 = 10.0 ft, (FLOOR)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.127</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.141</b> : 1
Section used for this span		<b>3.5x11.875</b>	Section used for this span		<b>3.5x11.875</b>
fb: Actual	=	369.59psi	fv: Actual	=	40.93 psi
F'b	=	2,903.37psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.000ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.012 in	Ratio = 5994	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.017 in	Ratio = 4259	>=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										Moment Values			Shear Values						
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v				
D Only																						
Length = 6.0 ft	1	0.041	0.045	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.73	107.0	2,613.0	0.00	0.00	0.00	0.00	11.9	261.0	0.0	
+D+L																						
Length = 6.0 ft	1	0.127	0.141	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.53	369.6	2,903.4	1.13	40.9	290.0	0.00	0.00	0.00	0.00	
+D+0.750L																						
Length = 6.0 ft	1	0.084	0.093	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.08	303.9	3,629.2	0.93	33.7	362.5	0.00	0.00	0.00	0.00	
+0.60D																						
Length = 6.0 ft	1	0.014	0.015	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	0.44	64.2	4,645.4	0.20	7.1	464.0	0.00	0.00	0.00	0.00	

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: BM#9 (10-8-2024)**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0169	3.022		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.689	1.689
Max Upward from Load Combinations	1.689	1.689
Max Upward from Load Cases	1.200	1.200
D Only	0.489	0.489
+D+L	1.689	1.689
+D+0.750L	1.389	1.389
+0.60D	0.293	0.293
L Only	1.200	1.200

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: BM#10 (10-8-2024)**

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2018

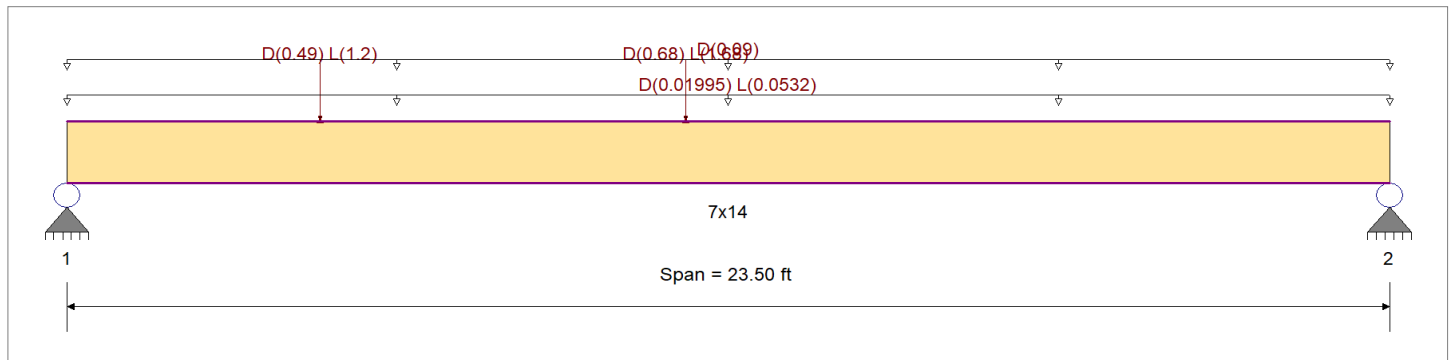
### Material Properties

Analysis Method : Allowable Stress Design  
 Load Combination : IBC 2018

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	E : Modulus of Elasticity	
Fb -	2,900.0 psi	Ebend- xx	2,000.0ksi
Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54ksi
Fc - Perp	750.0 psi		
Fv	290.0 psi		
Ft	2,025.0 psi	Density	45.070pcf



### 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)

Uniform Load : D = 0.010 ksf, Tributary Width = 9.0 ft, (WALL)

Point Load : D = 0.490, L = 1.20 k @ 4.50 ft, (BM#9)

Point Load : D = 0.680, L = 1.680 k @ 11.0 ft, (BM#4.2)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.574</b> : 1	Maximum Shear Stress Ratio	=	<b>0.247</b> : 1
Section used for this span		<b>7x14</b>	Section used for this span		<b>7x14</b>
fb: Actual	=	1,634.98psi	fv: Actual	=	71.68 psi
F'b	=	2,850.80psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	10.978ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.457 in	Ratio =	<b>617</b>	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	<b>0</b>	<360	n/a
Max Downward Total Deflection	0.899 in	Ratio =	<b>313</b>	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	<b>0</b>	<240	n/a

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 23.50 ft	1	0.303	0.132	0.90	1.00	1.00	1.00	0.983	1.00	1.00	1.00	14.81	777.3	2,565.7	0.0	0.00	0.0	0.0
+D+L	Length = 23.50 ft	1	0.574	0.247	1.00	1.00	1.00	1.00	0.983	1.00	1.00	1.00	31.16	1,635.0	2,850.8	4.68	71.7	290.0	0.0
+D+0.750L	Length = 23.50 ft	1	0.399	0.172	1.25	1.00	1.00	1.00	0.983	1.00	1.00	1.00	27.07	1,420.5	3,563.5	4.08	62.4	362.5	0.0
+0.60D						1.00	1.00	1.00	0.983	1.00	1.00	1.00			0.0	0.00	0.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION: BM#10 (10-8-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Max Stress Ratios											Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v
Length = 23.50 ft	1	0.102	0.045	1.60	1.00	1.00	1.00	0.983	1.00	1.00	1.00	8.89	466.4	4,561.3	1.35	20.7	464.0

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.8987	11.493		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.899	3.706
Max Upward from Load Combinations	4.899	3.706
Max Upward from Load Cases	2.489	2.064
D Only	2.410	2.064
+D+L	4.899	3.706
+D+0.750L	4.277	3.295
+0.60D	1.446	1.239
L Only	2.489	1.641

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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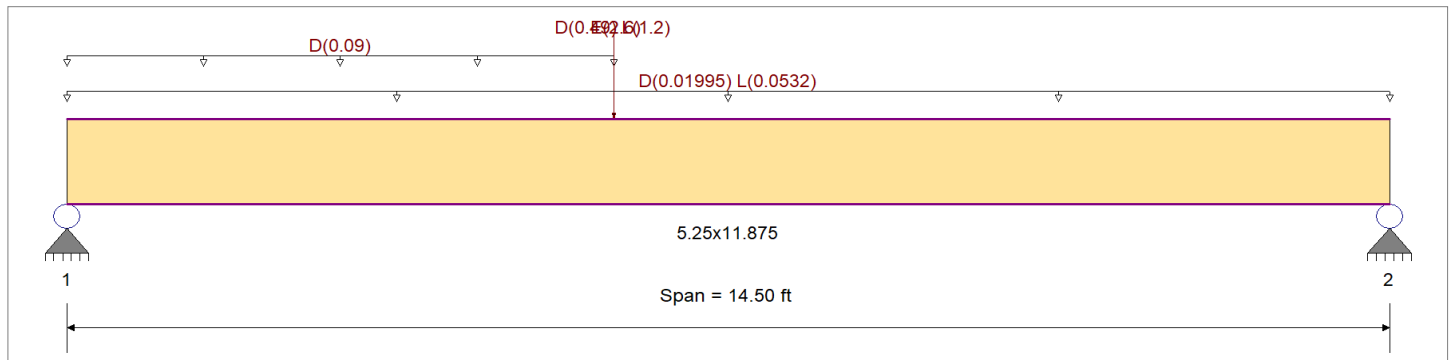
**DESCRIPTION:** BM#10.1 (10-8-2024)

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,900.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,900.0 psi	Ebend- xx
	Fc - Prll	2,900.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : Parallam PSL 2.0E	Fv	290.0 psi	
	Ft	2,025.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			45.070pcf



### 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)  
 Uniform Load : D = 0.010 ksf, Extent = 0.0 --> 6.0 ft, Tributary Width = 9.0 ft, (WALL)  
 Point Load : D = 0.490, L = 1.20 k @ 6.0 ft, (BM#4)  
 Point Load : E = 2.60 k @ 6.0 ft, (SW#4)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.957</b> : 1	Maximum Shear Stress Ratio	=	<b>0.412</b> : 1
Section used for this span		<b>5.25x11.875</b>	Section used for this span		<b>5.25x11.875</b>
fb: Actual	=	4,446.52psi	fv: Actual	=	191.30 psi
F'b	=	4,645.40psi	F'v	=	464.00 psi
Load Combination	=	+1.157D+4.550E	Load Combination	=	+1.157D+4.550E
Location of maximum on span	=	5.980ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.188 in Ratio =	<b>924</b> >=360	Span: 1 : E Only	
Max Upward Transient Deflection		0 in Ratio =	<b>0</b> <360	n/a	
Max Downward Total Deflection		0.276 in Ratio =	<b>630</b> >=240	Span: 1 : +D+0.750L+0.5250E	
Max Upward Total Deflection		0 in Ratio =	<b>0</b> <240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only	Length = 14.50 ft	1	0.137	0.081	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	3.67	357.4	2,613.0	0.00	0.00	0.0	0.0	261.0
+D+L	Length = 14.50 ft	1	0.309	0.159	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	9.24	898.3	2,903.4	0.00	0.00	0.0	0.0	290.0
+D+0.750L	Length = 14.50 ft	1	0.210	0.110	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	7.85	763.1	3,629.2	0.00	0.00	0.0	0.0	362.5
+1.157D+4.550E						1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.00	0.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: BM#10.1 (10-8-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values										
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	fv	F <sub>v</sub>								
Length = 14.50 ft +1.118D+0.750L+3.413E	1	0.957	0.412	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	45.72	4,446.5	4,645.4	7.95	191.3	464.0
Length = 14.50 ft +0.60D	1	0.824	0.361	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	39.38	3,829.9	4,645.4	6.96	167.5	464.0
Length = 14.50 ft +0.4432D+4.550E	1	0.046	0.027	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.20	214.4	4,645.4	0.53	12.7	464.0
Length = 14.50 ft	1	0.902	0.380	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	43.10	4,191.5	4,645.4	7.32	176.2	464.0

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.5250E	1	0.2762	6.932		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.619	1.827
Max Upward from Load Combinations	2.619	1.827
Max Upward from Load Cases	1.524	1.076
D Only	1.002	0.601
+D+L	2.091	1.483
+D+0.750L	1.818	1.262
+D+0.70E	2.069	1.354
+D+0.750L+0.5250E	2.619	1.827
+0.60D	0.601	0.360
+0.60D+0.70E	1.668	1.113
L Only	1.089	0.882
E Only	1.524	1.076

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

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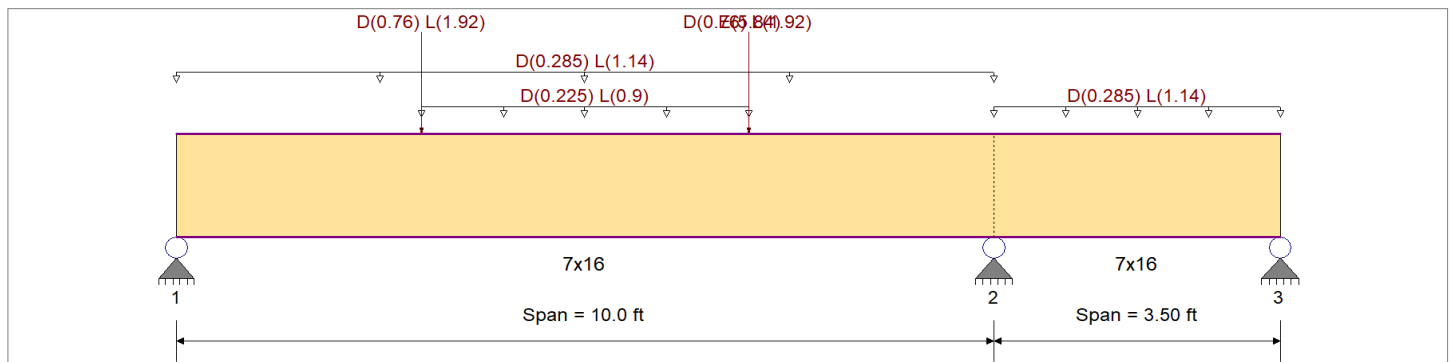
**DESCRIPTION:** BM#13 (10-31-2024)

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,900.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,900.0 psi	Ebend- xx
	Fc - Prll	2,900.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : Parallam PSL 2.0E	Fv	290.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling	Ft	2,025.0 psi	45.070pcf



### Applied Loads

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

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0150, L = 0.060 ksf, Extent = 3.0 -->> 7.0 ft, Tributary Width = 15.0 ft, (UPPER FLOOR)

Point Load : D = 0.760, L = 1.920 k @ 3.0 ft, (BM#9)

Point Load : D = 0.760, L = 1.920 k @ 7.0 ft, (BM#9)

Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 19.0 ft, (MAIN FLOOR)

Point Load : E = 5.840 k @ 7.0 ft, (2SW4)

Load for Span Number 2

Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 19.0 ft, (MAIN FLOOR)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.432</b>	1	Maximum Shear Stress Ratio	=	<b>0.792</b>	: 1
Section used for this span		<b>7x16</b>		Section used for this span		<b>7x16</b>	
fb: Actual	=	1,939.62psi		fv: Actual	=	367.30 psi	
F'b	=	4,494.17psi		F'v	=	464.00 psi	
Load Combination		+1.118D+0.750L+3.413E		Load Combination		+1.118D+0.750L+3.413E	
Location of maximum on span	=	10.000ft		Location of maximum on span	=	8.715 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
<b>Maximum Deflection</b>							
Max Downward Transient Deflection		0.057 in	Ratio = <b>2092</b>	>=360		Span: 1 : L Only	
Max Upward Transient Deflection		-0.005 in	Ratio = <b>8326</b>	>=360		Span: 2 : L Only	
Max Downward Total Deflection		0.075 in	Ratio = <b>1610</b>	>=240		Span: 1 : +D+L	
Max Upward Total Deflection		-0.007 in	Ratio = <b>6395</b>	>=240		Span: 2 : +D+L	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	CLx	CLy	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only																			
Length = 10.0 ft		<b>1</b>	0.096	0.154	0.90	1.00	1.00	1.00	0.969	1.00	1.00	1.00	6.05	243.0	2,528.0	0.0	3.00	40.2	261.0
Length = 3.50 ft		<b>2</b>	0.096	0.154	0.90	1.00	1.00	1.00	0.969	1.00	1.00	1.00	6.05	243.0	2,528.0	1.86	40.2	261.0	

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

### DESCRIPTION: BM#13 (10-31-2024)

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	fv	F <sub>v</sub>
+D+L						1.00	1.00	1.00	0.969	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.376	0.599	1.00	1.00	1.00	1.00	0.969	1.00	1.00	1.00	26.27	1,055.4	2,808.9	12.98	173.9	290.0	
Length = 3.50 ft	2	0.376	0.599	1.00	1.00	1.00	1.00	0.969	1.00	1.00	1.00	26.27	1,055.4	2,808.9	8.12	173.9	290.0	
+D+0.750L						1.00	1.00	1.00	0.969	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 10.0 ft	1	0.243	0.387	1.25	1.00	1.00	1.00	0.969	1.00	1.00	1.00	21.21	852.3	3,511.1	10.49	140.4	362.5	
Length = 3.50 ft	2	0.243	0.387	1.25	1.00	1.00	1.00	0.969	1.00	1.00	1.00	21.21	852.3	3,511.1	6.55	140.4	362.5	
+1.157D+4.550E						1.00	1.00	1.00	0.969	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 10.0 ft	1	0.377	0.739	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	42.13	1,692.7	4,494.2	25.59	342.7	464.0	
Length = 3.50 ft	2	0.377	0.739	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	42.13	1,692.7	4,494.2	12.19	342.7	464.0	
+1.118D+0.750L+3.413E						1.00	1.00	1.00	0.969	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 10.0 ft	1	0.432	0.792	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	48.28	1,939.6	4,494.2	27.43	367.3	464.0	
Length = 3.50 ft	2	0.432	0.792	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	48.28	1,939.6	4,494.2	14.30	367.3	464.0	
+0.60D						1.00	1.00	1.00	0.969	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 10.0 ft	1	0.032	0.052	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	3.63	145.8	4,494.2	1.80	24.1	464.0	
Length = 3.50 ft	2	0.032	0.052	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	3.63	145.8	4,494.2	1.12	24.1	464.0	
+0.4432D+4.550E						1.00	1.00	1.00	0.969	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 10.0 ft	1	0.338	0.677	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	37.81	1,519.3	4,494.2	23.45	314.0	464.0	
Length = 3.50 ft	2	0.338	0.677	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	37.81	1,519.3	4,494.2	10.86	314.0	464.0	

### Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.0745	4.525		0.0000	0.000
2		0.0000	4.525	+D+L	-0.0066	1.447

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	9.603	24.918	
Max Upward from Load Combinations	9.603	24.918	
Max Upward from Load Cases	7.398	19.215	
Max Downward from all Load Conditions (Resisting Uplift)			-5.163
Max Downward from Load Combinations (Resisting Uplift)			-5.163
Max Downward from Load Cases (Resisting Uplift)			-3.783
D Only	2.206	5.703	-1.168
+D+L	9.603	24.918	-4.950
+D+0.750L	7.754	20.114	-4.005
+D+0.70E	2.891	10.649	-2.712
+D+0.750L+0.5250E	8.268	23.824	-5.163
+0.60D	1.323	3.422	-0.701
+0.60D+0.70E	2.009	8.368	-2.245
L Only	7.398	19.215	-3.783
E Only	0.980	7.066	-2.206

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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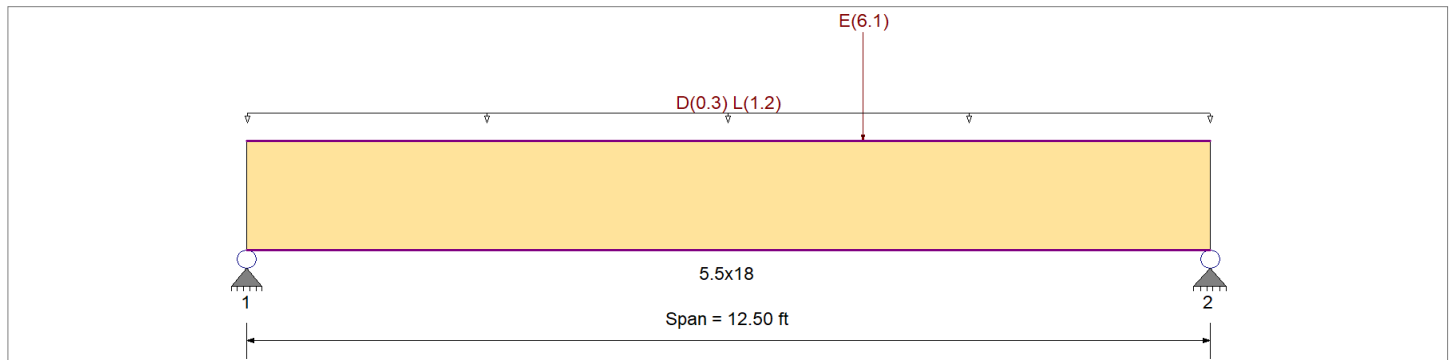
**DESCRIPTION:** BM#14.1 (10-8-2024)

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Species : DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Wood Grade : 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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 = 0.060 ksf, Tributary Width = 20.0 ft, (FLOOR/S)  
 Point Load : E = 6.10 k @ 8.0 ft, (2SW3)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.910</b> : 1	Maximum Shear Stress Ratio	=	<b>0.698</b> : 1
Section used for this span		<b>5.5x18</b>	Section used for this span		<b>5.5x18</b>
fb: Actual	=	3,493.92psi	fv: Actual	=	296.13 psi
F'b	=	3,840.00psi	F'v	=	424.00 psi
Load Combination	=	+1.157D+4.550E	Load Combination	=	+1.157D+4.550E
Location of maximum on span	=	7.984ft	Location of maximum on span	=	11.040 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.138 in	Ratio = <b>1088</b> >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = <b>0</b> <360	n/a		
Max Downward Total Deflection	0.182 in	Ratio = <b>822</b> >=240	Span: 1 : +D+0.750L+0.5250E		
Max Upward Total Deflection	0 in	Ratio = <b>0</b> <240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values					
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 12.50 ft	1	0.117	0.098	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.28	253.7	2,160.0	0.0	0.00	0.0	0.0	238.5	
+D+L																				
Length = 12.50 ft	1	0.500	0.417	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	29.72	1,200.6	2,400.0	0.0	0.00	0.0	0.0	265.0	
+D+0.750L																				
Length = 12.50 ft	1	0.321	0.268	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	23.86	963.9	3,000.0	0.0	0.00	0.0	0.0	331.3	
+1.157D+4.550E																				
Length = 12.50 ft	1	0.910	0.698	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	86.47	3,493.9	3,840.0	19.54	296.1	424.0	0.0	0.0	
+1.118D+0.750L+3.413E																				
Length = 12.50 ft	1				1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	0.0	0.0	

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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**DESCRIPTION: BM#14.1 (10-8-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	f <sub>v</sub>	F <sub>v</sub>
Length = 12.50 ft	1	0.868	0.692	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	82.53	3,334.6	3,840.0	19.35	293.2	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 = 12.50 ft	1	0.040	0.033	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.77	152.2	3,840.0	0.92	14.0	424.0	
+0.4432D+4.550E					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 12.50 ft	1	0.866	0.659	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	82.34	3,326.8	3,840.0	18.45	279.5	424.0	

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.5250E	1	0.1824	6.387		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	9.509	9.684
Max Upward from Load Combinations	9.509	9.684
Max Upward from Load Cases	7.500	7.500
D Only	2.009	2.009
+D+L	9.509	9.509
+D+0.750L	7.634	7.634
+D+0.70E	3.546	4.742
+D+0.750L+0.5250E	8.787	9.684
+0.60D	1.205	1.205
+0.60D+0.70E	2.743	3.938
L Only	7.500	7.500
E Only	2.196	3.904

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

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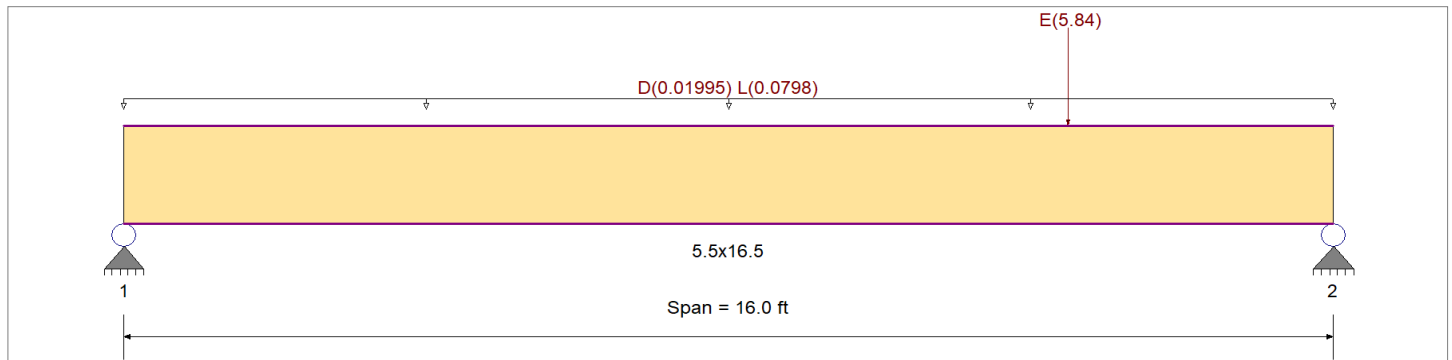
**DESCRIPTION:** BM#15 (10-8-2024)

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Species : DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Wood Grade : 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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 = 0.060 ksf, Tributary Width = 1.330 ft, (FLOOR/S)  
 Point Load : E = 5.840 k @ 12.50 ft, (2SW4)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.933</b> : 1	Maximum Shear Stress Ratio	=	<b>0.821</b> : 1
Section used for this span		<b>5.5x16.5</b>	Section used for this span		<b>5.5x16.5</b>
fb: Actual	=	3,540.91 psi	fv: Actual	=	348.17 psi
F'b	=	3,795.28psi	F'v	=	424.00 psi
Load Combination	=	+1.157D+4.550E	Load Combination	=	+1.157D+4.550E
Location of maximum on span	=	12.496ft	Location of maximum on span	=	14.657 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.146 in Ratio = <b>1313</b> >=360	Span: 1 : E Only		
Max Upward Transient Deflection		0 in Ratio = <b>0</b> <360	n/a		
Max Downward Total Deflection		0.118 in Ratio = <b>1628</b> >=240	Span: 1 : +D+0.70E		
Max Upward Total Deflection		0 in Ratio = <b>0</b> <240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 16.0 ft	1	0.029	0.018	0.90	1.00	1.00	1.00	0.988	1.00	1.00	1.00	1.27	61.0	2,134.8	0.0	0.00	0.0	0.0
+D+L	Length = 16.0 ft	1				1.00	1.00	1.00	0.988	1.00	1.00	1.00	3.82	183.7	2,372.1	0.0	0.00	0.0	0.0
+D+0.750L	Length = 16.0 ft	1				1.00	1.00	1.00	0.988	1.00	1.00	1.00	3.18	153.1	2,965.1	0.0	0.00	0.0	0.0
+1.157D+4.550E	Length = 16.0 ft	1				1.00	1.00	1.00	0.988	1.00	1.00	1.00				0.0	0.00	0.0	0.0
+1.118D+0.750L+3.413E	Length = 16.0 ft	1	0.933	0.821	1.60	1.00	1.00	1.00	0.988	1.00	1.00	1.00	73.64	3,540.9	3,795.3	21.06	348.2	424.0	
						1.00	1.00	1.00	0.988	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: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: BM#15 (10-8-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	f <sub>v</sub>	F <sub>v</sub>
Length = 16.0 ft	1	0.719	0.634	1.60	1.00	1.00	1.00	0.988	1.00	1.00	1.00	56.76	2,729.1	3,795.3	16.26	268.8	424.0	
+0.60D					1.00	1.00	1.00	0.988	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 16.0 ft	1	0.010	0.006	1.60	1.00	1.00	1.00	0.988	1.00	1.00	1.00	0.76	36.6	3,795.3	0.16	2.6	424.0	
+0.4432D+4.550E					1.00	1.00	1.00	0.988	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 16.0 ft	1	0.925	0.814	1.60	1.00	1.00	1.00	0.988	1.00	1.00	1.00	73.02	3,511.2	3,795.3	20.88	345.1	424.0	

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
E Only	1	0.1461	9.051		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.466	4.563
Max Upward from Load Combinations	1.466	3.511
Max Upward from Load Cases	1.278	4.563
D Only	0.317	0.317
+D+L	0.955	0.955
+D+0.750L	0.796	0.796
+D+0.70E	1.211	3.511
+D+0.750L+0.5250E	1.466	3.191
+0.60D	0.190	0.190
+0.60D+0.70E	1.084	3.384
L Only	0.638	0.638
E Only	1.278	4.563

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** BM#16 (10-31-2024)

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : IBC 2018

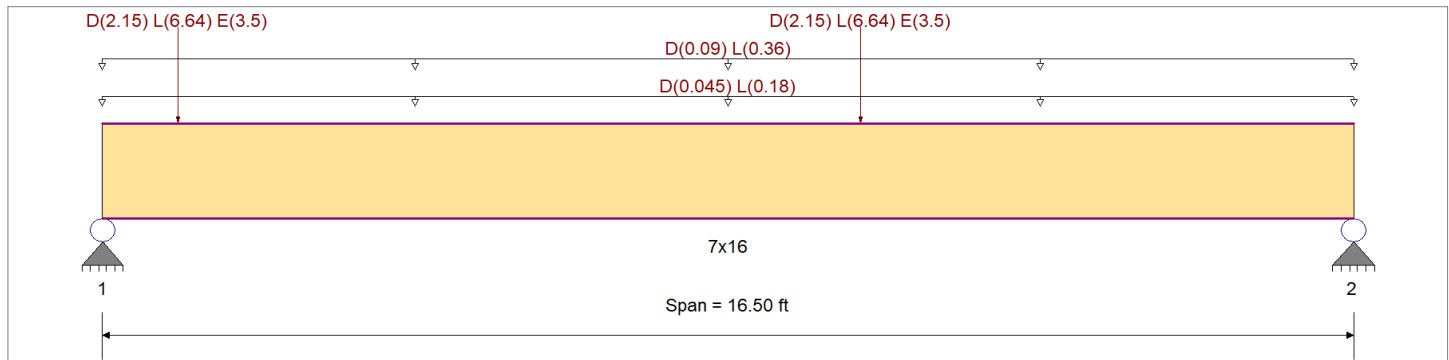
### Material Properties

Analysis Method : Allowable Stress Design  
 Load Combination : IBC 2018

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	<i>E : Modulus of Elasticity</i>
Fb -	2,900.0 psi	Ebend- xx
Fc - Prll	2,900.0 psi	Eminbend - xx
Fc - Perp	750.0 psi	
Fv	290.0 psi	
Ft	2,025.0 psi	Density
		45.070pcf



### 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 = 0.060 ksf, Tributary Width = 3.0 ft, (FLOOR)

Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 6.0 ft, (DECK)

Point Load : D = 2.150, L = 6.640, E = 3.50 k @ 1.0 ft, (HDR#9)

Point Load : D = 2.150, L = 6.640, E = 3.50 k @ 10.0 ft, (HDR#9)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.921 : 1</b>	Maximum Shear Stress Ratio	=	<b>0.498 : 1</b>
Section used for this span		<b>7x16</b>	Section used for this span		<b>7x16</b>
fb: Actual	=	4,141.13psi	fv: Actual	=	144.34 psi
F'b	=	4,494.17psi	F'v	=	290.00 psi
Load Combination		+1.118D+0.750L+3.413E	Load Combination		+D+L
Location of maximum on span	=	9.996ft	Location of maximum on span	=	15.175 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.442 in	Ratio = <b>447</b>	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = <b>0</b>	<360	n/a	
Max Downward Total Deflection	0.584 in	Ratio = <b>339</b>	>=240	Span: 1 : +D+L	
Max Upward Total Deflection	0 in	Ratio = <b>0</b>	<240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 16.50 ft	1	0.236	0.134	0.90	1.00	1.00	1.00	0.969	1.00	1.00	1.00	14.84	596.3	2,528.0	0.0	0.00	0.0	0.0
+D+L	Length = 16.50 ft	1	0.875	0.498	1.00	1.00	1.00	1.00	0.969	1.00	1.00	1.00	61.16	2,457.3	2,808.9	10.78	144.3	290.0	0.0
+D+0.750L	Length = 16.50 ft	1	0.567	0.323	1.25	1.00	1.00	1.00	0.969	1.00	1.00	1.00	49.58	1,992.1	3,511.1	8.74	117.0	362.5	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: BM#16 (10-31-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	fv	F <sub>v</sub>
+1.157D+4.550E						1.00	1.00	1.00	0.969	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.50 ft	<b>1</b>		0.770	0.394	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	86.16	3,461.7	4,494.2	13.64	182.6	464.0
+1.118D+0.750L+3.413E						1.00	1.00	1.00	0.969	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.50 ft	<b>1</b>		0.921	0.491	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	103.07	4,141.1	4,494.2	17.01	227.7	464.0
+0.60D						1.00	1.00	1.00	0.969	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.50 ft	<b>1</b>		0.080	0.045	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	8.91	357.8	4,494.2	1.57	21.0	464.0
+0.4432D+4.550E						1.00	1.00	1.00	0.969	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 16.50 ft	<b>1</b>		0.676	0.340	1.60	1.00	1.00	1.00	0.969	1.00	1.00	1.00	75.57	3,036.2	4,494.2	11.77	157.7	464.0

**Overall Maximum Deflections**

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.5841	8.431		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	17.578	11.718
Max Upward from Load Combinations	17.578	11.718
Max Upward from Load Cases	13.308	8.882
D Only	4.270	2.836
+D+L	17.578	11.718
+D+0.750L	14.251	9.498
+D+0.70E	7.536	4.470
+D+0.750L+0.5250E	16.701	10.723
+0.60D	2.562	1.702
+0.60D+0.70E	5.828	3.335
L Only	13.308	8.882
E Only	4.667	2.333

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

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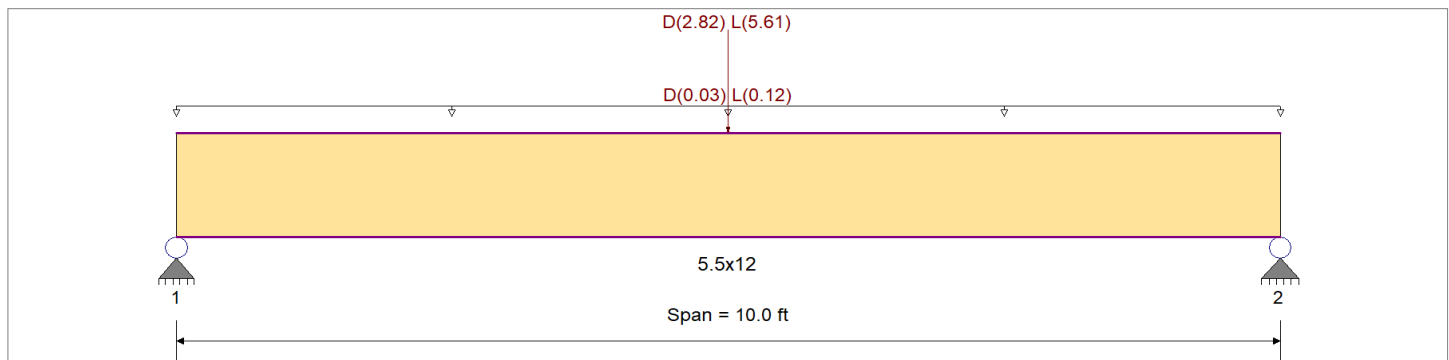
**DESCRIPTION:** BM#17 (10-8-2024)

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1,850.0 psi	Ebend- xx	1,800.0ksi
	Fc - Prll	1,650.0 psi	Eminbend - xx	950.0ksi
Wood Species : DF/DF	Fc - Perp	650.0 psi	Ebend- yy	1,600.0ksi
Wood Grade : 24F-V4	Fv	265.0 psi	Eminbend - yy	850.0ksi
	Ft	1,100.0 psi	Density	31.210pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



### 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 = 0.060 ksf, Tributary Width = 2.0 ft, (DECK)  
 Point Load : D = 2.820, L = 5.610 k @ 5.0 ft, (BM#8)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.876</b> : 1	Maximum Shear Stress Ratio	=	<b>0.418</b> : 1
Section used for this span		<b>5.5x12</b>	Section used for this span		<b>5.5x12</b>
fb: Actual	=	2,102.62psi	fv: Actual	=	110.79 psi
F'b	=	2,400.00psi	F'v	=	265.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	5.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.161 in	Ratio = <b>743</b> >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = <b>0</b> <360	n/a		
Max Downward Total Deflection	0.240 in	Ratio = <b>499</b> >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = <b>0</b> <240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only																0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.320	0.151	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.60	691.3	2,160.0	1.59	36.1	238.5		
+D+L																0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.876	0.418	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	23.13	2,102.6	2,400.0	4.87	110.8	265.0		
+D+0.750L																0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.583	0.278	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	19.25	1,749.8	3,000.0	4.05	92.1	331.3		
+1.157D																0.0	0.00	0.0	0.0
Length = 10.0 ft	1	0.208	0.098	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.80	799.6	3,840.0	1.84	41.7	424.0		

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

## Wood Beam

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: BM#17 (10-8-2024)**

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	fv	F <sub>v</sub>
+1.118D+0.750L	Length = 10.0 ft	1	0.477	0.227	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	20.14	1,831.1	3,840.0	4.24	96.4	424.0
+0.60D	Length = 10.0 ft	1	0.108	0.051	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.56	414.8	3,840.0	0.95	21.7	424.0
+0.4432D	Length = 10.0 ft	1	0.080	0.038	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.37	306.4	3,840.0	0.70	16.0	424.0

### Overall Maximum Deflections

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.2401	5.036		0.0000	0.000

### Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.037	5.037
Max Upward from Load Combinations	5.037	5.037
Max Upward from Load Cases	3.405	3.405
D Only	1.632	1.632
+D+L	5.037	5.037
+D+0.750L	4.185	4.185
+0.60D	0.979	0.979
L Only	3.405	3.405

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

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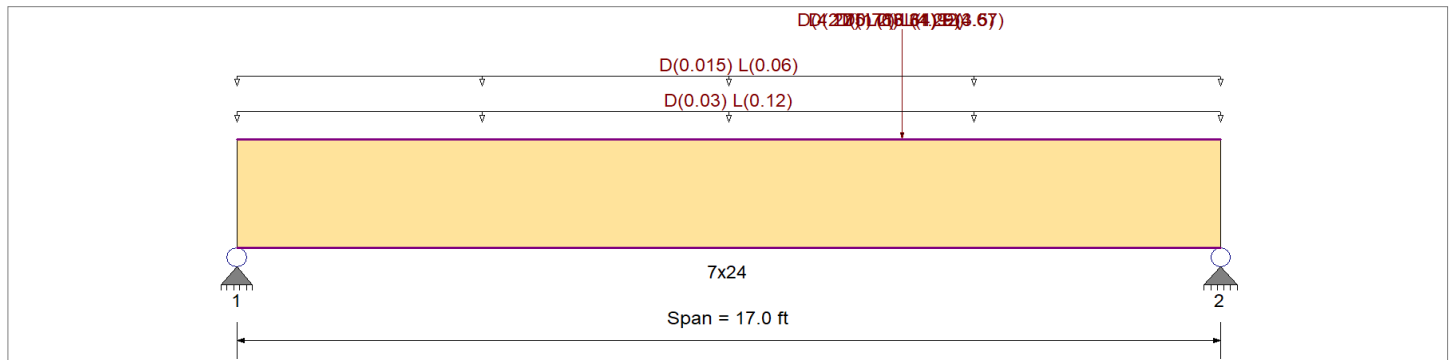
**DESCRIPTION: BM#18 (10-31-2024)**

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021  
 Load Combination Set : IBC 2018

**Material Properties**

Analysis Method : Allowable Stress Design	Fb +	2,900.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0ksi
	Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade : Parallam PSL 2.0E	Fv	290.0 psi		
	Ft	2,025.0 psi	Density	45.070pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



**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 = 0.060 ksf, Tributary Width = 2.0 ft, (FLOOR)
- Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 1.0 ft, (DECK)
- Point Load : D = 4.270, L = 13.310, E = 4.670 k @ 11.50 ft, (BM#16)
- Point Load : D = 2.150, L = 6.640, E = 3.50 k @ 11.50 ft, (HDR#9)
- Point Load : D = 0.760, L = 1.920 k @ 11.50 ft, (BM#9)
- Point Load : D = 1.20, L = 4.290 k @ 11.50 ft, (BM#1)

**DESIGN SUMMARY**

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.911</b> : 1	Maximum Shear Stress Ratio	=	<b>0.775</b> : 1
Section used for this span		<b>7x24</b>	Section used for this span		<b>7x24</b>
fb: Actual	=	2,447.52psi	fv: Actual	=	224.76 psi
F'b	=	2,685.24psi	F'v	=	290.00 psi
Load Combination			Load Combination		
Location of maximum on span	=	11.478ft	Location of maximum on span	=	15.015 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.264 in	Ratio = <b>772</b> >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = <b>0</b> <360	n/a		
Max Downward Total Deflection	0.354 in	Ratio = <b>577</b> >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = <b>0</b> <240	n/a		

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 17.0 ft	1	0.253	0.216	0.90	1.00	1.00	1.00	0.926	1.00	1.00	1.00	34.21	610.9	2,416.7	0.0	6.30	56.3	261.0
+D+L	Length = 17.0 ft	1	0.911	0.775	1.00	1.00	1.00	1.00	0.926	1.00	1.00	1.00	137.06	2,447.5	2,685.2	25.17	224.8	290.0	

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

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**DESCRIPTION: BM#18 (10-31-2024)**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	f <sub>v</sub>	F <sub>v</sub>
+D+0.750L						1.00	1.00	1.00	0.926	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.0 ft	<b>1</b>		0.592	0.504	1.25	1.00	1.00	1.00	0.926	1.00	1.00	1.00	111.35	1,988.4	3,356.6	20.46	182.6	362.5
+1.157D+4.550E						1.00	1.00	1.00	0.926	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.0 ft	<b>1</b>		0.738	0.624	1.60	1.00	1.00	1.00	0.926	1.00	1.00	1.00	177.62	3,171.8	4,296.4	32.44	289.6	464.0
+1.118D+0.750L+3.413E						1.00	1.00	1.00	0.926	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.0 ft	<b>1</b>		0.910	0.771	1.60	1.00	1.00	1.00	0.926	1.00	1.00	1.00	218.90	3,909.0	4,296.4	40.06	357.7	464.0
+0.60D						1.00	1.00	1.00	0.926	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.0 ft	<b>1</b>		0.085	0.073	1.60	1.00	1.00	1.00	0.926	1.00	1.00	1.00	20.53	366.6	4,296.4	3.78	33.8	464.0
+0.4432D+4.550E						1.00	1.00	1.00	0.926	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 17.0 ft	<b>1</b>		0.637	0.538	1.60	1.00	1.00	1.00	0.926	1.00	1.00	1.00	153.21	2,735.8	4,296.4	27.94	249.5	464.0

**Overall Maximum Deflections**

Span	Load Combination	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
1	+D+L	0.3535	9.245		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	13.534	25.725
Max Upward from Load Combinations	13.534	25.725
Max Upward from Load Cases	9.994	19.226
D Only	3.541	6.498
+D+L	13.534	25.725
+D+0.750L	11.036	20.918
+D+0.70E	5.391	10.367
+D+0.750L+0.5250E	12.423	23.820
+0.60D	2.124	3.899
+0.60D+0.70E	3.975	7.768
L Only	9.994	19.226
E Only	2.643	5.527

## General Footing

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** FTNG#3 (10-31-2024)

### Code References

Calculations per ACI 318-19, IBC 2021  
 Load Combinations Used : IBC 2018

### 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

#### 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

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
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

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

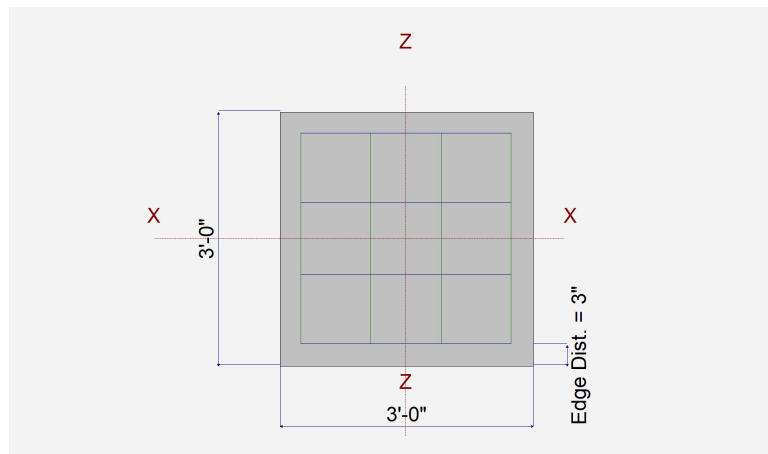
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



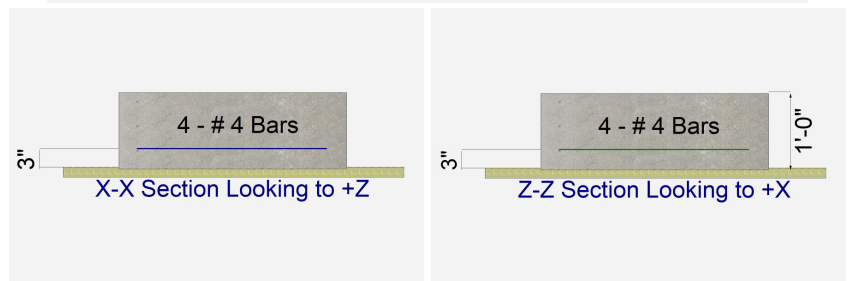
### Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	4
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	
Number of Bars	=	4
Reinforcing Bar Size	=	# 4

#### 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



### Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	3.030		7.130			1.0	k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#3 (10-31-2024)**

**DESIGN SUMMARY**

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8493	Soil Bearing	1.274 ksf	1.50 ksf	+D+L 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	0.2674	Z Flexure (+X)	1.881 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L
PASS	0.2674	Z Flexure (-X)	1.881 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L
PASS	0.2674	X Flexure (+Z)	1.881 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L
PASS	0.2674	X Flexure (-Z)	1.881 k-ft/ft	7.033 k-ft/ft	+1.20D+1.60L
PASS	0.2863	1-way Shear (+X)	11.608 psi	40.548 psi	+1.20D+1.60L
PASS	0.2863	1-way Shear (-X)	11.608 psi	40.548 psi	+1.20D+1.60L
PASS	0.2863	1-way Shear (+Z)	11.608 psi	40.548 psi	+1.20D+1.60L
PASS	0.2863	1-way Shear (-Z)	11.608 psi	40.548 psi	+1.20D+1.60L
PASS	0.2902	2-way Punching	43.530 psi	150.0 psi	+1.20D+1.60L

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
		Zecc (in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.4817	0.4817	n/a	n/a	0.321
X-X, +D+L	1.50	n/a	0.0	1.274	1.274	n/a	n/a	0.849
X-X, +D+0.750L	1.50	n/a	0.0	1.076	1.076	n/a	n/a	0.717
X-X, +D+0.70E	1.50	n/a	0.0	0.5594	0.5594	n/a	n/a	0.373
X-X, +D+0.750L+0.5250E	1.50	n/a	0.0	1.134	1.134	n/a	n/a	0.756
X-X, +0.60D	1.50	n/a	0.0	0.2890	0.2890	n/a	n/a	0.193
X-X, +0.60D+0.70E	1.50	n/a	0.0	0.3668	0.3668	n/a	n/a	0.245
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.4817	0.4817	0.321
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.274	1.274	0.849
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.076	1.076	0.717
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.5594	0.5594	0.373
Z-Z, +D+0.750L+0.5250E	1.50	0.0	n/a	n/a	n/a	1.134	1.134	0.756
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2890	0.2890	0.193
Z-Z, +0.60D+0.70E	1.50	0.0	n/a	n/a	n/a	0.3668	0.3668	0.245

**Overturning Stability**

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

**Sliding Stability**

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	0.5303	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.40D	0.5303	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.20D+1.60L	1.881	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.20D+1.60L	1.881	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.20D+0.50L	0.9001	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.20D+0.50L	0.9001	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.20D	0.4545	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.20D	0.4545	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.20D+0.50L+E	1.025	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +1.20D+0.50L+E	1.025	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +0.90D	0.3409	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#3 (10-31-2024)**

**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, +0.90D	0.3409	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +0.90D+E	0.4659	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
X-X, +0.90D+E	0.4659	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.40D	0.5303	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.40D	0.5303	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.20D+1.60L	1.881	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.20D+1.60L	1.881	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.20D+0.50L	0.9001	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.20D+0.50L	0.9001	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.20D	0.4545	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.20D	0.4545	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.20D+0.50L+E	1.025	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +1.20D+0.50L+E	1.025	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +0.90D	0.3409	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +0.90D	0.3409	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +0.90D+E	0.4659	-X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK
Z-Z, +0.90D+E	0.4659	+X	Bottom	0.2592	ACI 7.6.1.1	0.2667	7.033	OK

**One Way Shear X**

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.27 psi	3.27 psi	3.27 psi	40.55 psi	0.08	OK
+1.20D+1.60L	11.61 psi	11.61 psi	11.61 psi	40.55 psi	0.29	OK
+1.20D+0.50L	5.56 psi	5.56 psi	5.56 psi	40.55 psi	0.14	OK
+1.20D	2.81 psi	2.81 psi	2.81 psi	40.55 psi	0.07	OK
+1.20D+0.50L+E	6.33 psi	6.33 psi	6.33 psi	40.55 psi	0.16	OK
+0.90D	2.10 psi	2.10 psi	2.10 psi	40.55 psi	0.05	OK
+0.90D+E	2.88 psi	2.88 psi	2.88 psi	40.55 psi	0.07	OK

**One Way Shear Z**

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.27 psi	3.27 psi	3.27 psi	40.55 psi	0.08	OK
+1.20D+1.60L	11.61 psi	11.61 psi	11.61 psi	40.55 psi	0.29	OK
+1.20D+0.50L	5.56 psi	5.56 psi	5.56 psi	40.55 psi	0.14	OK
+1.20D	2.81 psi	2.81 psi	2.81 psi	40.55 psi	0.07	OK
+1.20D+0.50L+E	6.33 psi	6.33 psi	6.33 psi	40.55 psi	0.16	OK
+0.90D	2.10 psi	2.10 psi	2.10 psi	40.55 psi	0.05	OK
+0.90D+E	2.88 psi	2.88 psi	2.88 psi	40.55 psi	0.07	OK

**Two-Way "Punching" Shear**

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	12.27 psi	150.00psi	0.08183	OK
+1.20D+1.60L	43.53 psi	150.00psi	0.2902	OK
+1.20D+0.50L	20.84 psi	150.00psi	0.1389	OK
+1.20D	10.52 psi	150.00psi	0.07014	OK
+1.20D+0.50L+E	23.73 psi	150.00psi	0.1582	OK
+0.90D	7.89 psi	150.00psi	0.0526	OK
+0.90D+E	10.78 psi	150.00psi	0.07189	OK

## General Footing

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** FTNG#4 (10-8-2024)

### Code References

Calculations per ACI 318-19, IBC 2021, SDPWS 2021  
 Load Combinations Used : IBC 2018

### 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

#### 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

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
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

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

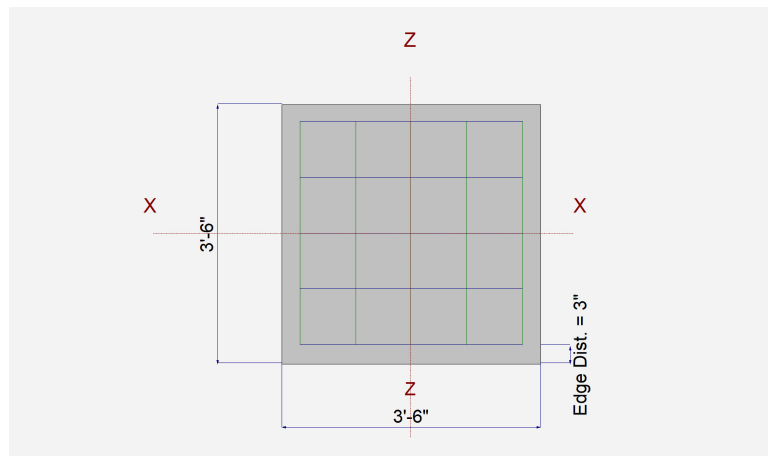
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	3.50 ft
Length parallel to Z-Z Axis	=	3.50 ft
Footing Thickness	=	12.0 in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



### Reinforcing

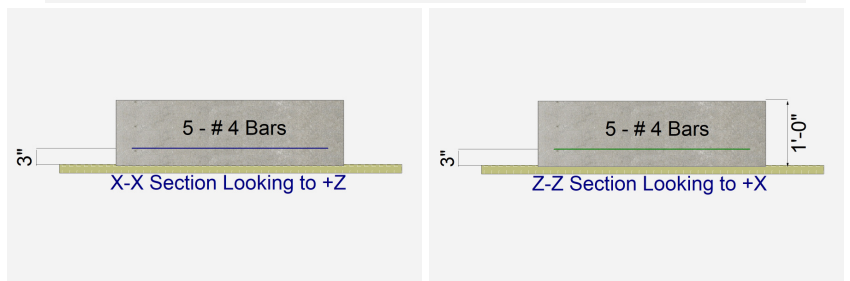
Bars parallel to X-X Axis	=	
Number of Bars	=	5.0
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	5.0
Reinforcing Bar Size	=	# 4

#### Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

# Bars required within zone

# Bars required on each side of zone



### Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	2.880		9.420			4.090	k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#4 (10-8-2024)**

**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)	k-ft/ft	k-ft/ft	
PASS	Z Flexure (-X)	k-ft/ft	k-ft/ft	
PASS	X Flexure (+Z)	k-ft/ft	k-ft/ft	
PASS	X Flexure (-Z)	k-ft/ft	k-ft/ft	
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	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.3801	0.3801	n/a	n/a	0.253
X-X, +D+L	1.50	n/a	0.0	1.149	1.149	n/a	n/a	0.766
X-X, +D+0.750L	1.50	n/a	0.0	0.9568	0.9568	n/a	n/a	0.638
X-X, +D+0.70E	1.50	n/a	0.0	0.6138	0.6138	n/a	n/a	0.409
X-X, +D+0.750L+0.5250E	1.50	n/a	0.0	1.132	1.132	n/a	n/a	0.755
X-X, +0.60D	1.50	n/a	0.0	0.2281	0.2281	n/a	n/a	0.152
X-X, +0.60D+0.70E	1.50	n/a	0.0	0.4618	0.4618	n/a	n/a	0.308
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.3801	0.3801	0.253
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.149	1.149	0.766
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	0.9568	0.9568	0.638
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.6138	0.6138	0.409
Z-Z, +D+0.750L+0.5250E	1.50	0.0	n/a	n/a	n/a	1.132	1.132	0.755
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2281	0.2281	0.152
Z-Z, +0.60D+0.70E	1.50	0.0	n/a	n/a	n/a	0.4618	0.4618	0.308

**Overturning Stability**

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

**Sliding Stability**

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	0.5040	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.40D	0.5040	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+1.60L	2.316	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+1.60L	2.316	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+0.50L	1.021	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+0.50L	1.021	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D	0.4320	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D	0.4320	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.424D+0.50L+6.50E	4.425	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.424D+0.50L+6.50E	4.425	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.90D	0.3240	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#4 (10-8-2024)**

**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, +0.90D	0.3240	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.6760D+6.50E	3.566	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.6760D+6.50E	3.566	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.40D	0.5040	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.40D	0.5040	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+1.60L	2.316	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+1.60L	2.316	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+0.50L	1.021	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+0.50L	1.021	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D	0.4320	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D	0.4320	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.424D+0.50L+6.50E	4.425	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.424D+0.50L+6.50E	4.425	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.90D	0.3240	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.90D	0.3240	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.6760D+6.50E	3.566	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.6760D+6.50E	3.566	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK

**One Way Shear X**

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.09 psi	3.09 psi	3.09 psi	41.49 psi	0.07	OK
+1.20D+1.60L	14.22 psi	14.22 psi	14.22 psi	41.49 psi	0.34	OK
+1.20D+0.50L	6.27 psi	6.27 psi	6.27 psi	41.49 psi	0.15	OK
+1.20D	2.65 psi	2.65 psi	2.65 psi	41.49 psi	0.06	OK
+1.424D+0.50L+6.50E	27.16 psi	27.16 psi	27.16 psi	41.49 psi	0.65	OK
+0.90D	1.99 psi	1.99 psi	1.99 psi	41.49 psi	0.05	OK
+0.6760D+6.50E	21.89 psi	21.89 psi	21.89 psi	41.49 psi	0.53	OK

**One Way Shear Z**

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.09 psi	3.09 psi	3.09 psi	41.49 psi	0.07	OK
+1.20D+1.60L	14.22 psi	14.22 psi	14.22 psi	41.49 psi	0.34	OK
+1.20D+0.50L	6.27 psi	6.27 psi	6.27 psi	41.49 psi	0.15	OK
+1.20D	2.65 psi	2.65 psi	2.65 psi	41.49 psi	0.06	OK
+1.424D+0.50L+6.50E	27.16 psi	27.16 psi	27.16 psi	41.49 psi	0.65	OK
+0.90D	1.99 psi	1.99 psi	1.99 psi	41.49 psi	0.05	OK
+0.6760D+6.50E	21.89 psi	21.89 psi	21.89 psi	41.49 psi	0.53	OK

**Two-Way "Punching" Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	11.84 psi	150.00psi	0.07895	OK
+1.20D+1.60L	54.42 psi	150.00psi	0.3628	OK
+1.20D+0.50L	23.98 psi	150.00psi	0.1599	OK
+1.20D	10.15 psi	150.00psi	0.06767	OK
+1.424D+0.50L+6.50E	103.96 psi	150.00psi	0.6931	OK
+0.90D	7.61 psi	150.00psi	0.05075	OK
+0.6760D+6.50E	83.80 psi	150.00psi	0.5587	OK

All units k

## General Footing

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** FTNG#4.1 (10-31-2024)

### Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : IBC 2018

### 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

#### 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

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
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

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

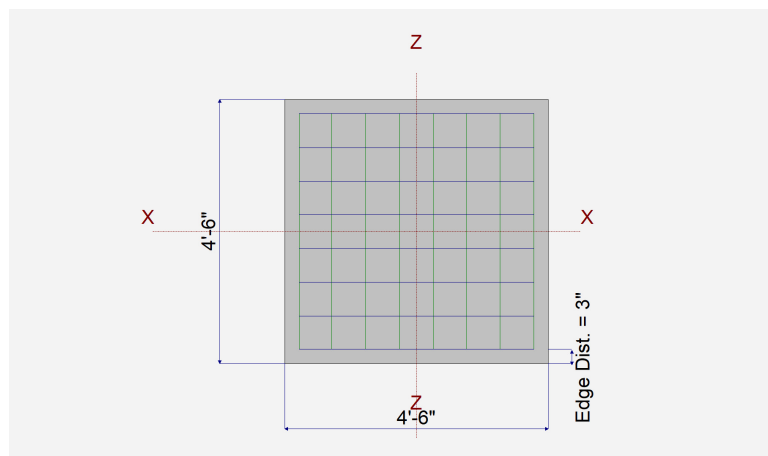
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	4.50 ft
Length parallel to Z-Z Axis	=	4.50 ft
Footing Thickness	=	16.0 in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



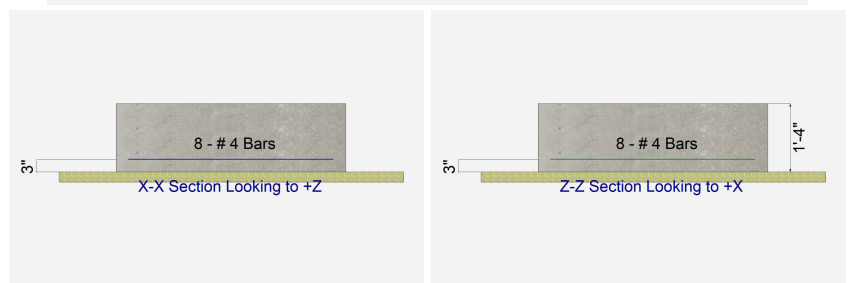
### Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	8
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	
Number of Bars	=	8
Reinforcing Bar Size	=	# 4

#### 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



### Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	5.70		19.210			7.10	k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#4.1 (10-31-2024)**

**DESIGN SUMMARY**

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9487	Soil Bearing	1.423 ksf	1.50 ksf	+D+L 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	0.5884	Z Flexure (+X)	7.984 k-ft/ft	13.569 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5884	Z Flexure (-X)	7.984 k-ft/ft	13.569 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5884	X Flexure (+Z)	7.984 k-ft/ft	13.569 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5884	X Flexure (-Z)	7.984 k-ft/ft	13.569 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5992	1-way Shear (+X)	23.656 psi	39.480 psi	+1.424D+0.50L+6.50E
PASS	0.5992	1-way Shear (-X)	23.656 psi	39.480 psi	+1.424D+0.50L+6.50E
PASS	0.5992	1-way Shear (+Z)	23.656 psi	39.480 psi	+1.424D+0.50L+6.50E
PASS	0.5992	1-way Shear (-Z)	23.656 psi	39.480 psi	+1.424D+0.50L+6.50E
PASS	0.5936	2-way Punching	89.043 psi	150.0 psi	+1.424D+0.50L+6.50E

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.4748	0.4748	n/a	n/a	0.317
X-X, +D+L	1.50	n/a	0.0	1.423	1.423	n/a	n/a	0.949
X-X, +D+0.750L	1.50	n/a	0.0	1.186	1.186	n/a	n/a	0.791
X-X, +D+0.70E	1.50	n/a	0.0	0.7202	0.7202	n/a	n/a	0.480
X-X, +D+0.750L+0.5250E	1.50	n/a	0.0	1.370	1.370	n/a	n/a	0.913
X-X, +0.60D	1.50	n/a	0.0	0.2849	0.2849	n/a	n/a	0.190
X-X, +0.60D+0.70E	1.50	n/a	0.0	0.5303	0.5303	n/a	n/a	0.354
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.4748	0.4748	0.317
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.423	1.423	0.949
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.186	1.186	0.791
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.7202	0.7202	0.480
Z-Z, +D+0.750L+0.5250E	1.50	0.0	n/a	n/a	n/a	1.370	1.370	0.913
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2849	0.2849	0.190
Z-Z, +0.60D+0.70E	1.50	0.0	n/a	n/a	n/a	0.5303	0.5303	0.354

**Overturning Stability**

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

**Sliding Stability**

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	0.9975	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.40D	0.9975	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D+1.60L	4.697	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D+1.60L	4.697	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D+0.50L	2.056	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D+0.50L	2.056	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D	0.8550	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D	0.8550	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.424D+0.50L+6.50E	7.984	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.424D+0.50L+6.50E	7.984	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +0.90D	0.6413	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#4.1 (10-31-2024)**

**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, +0.90D	0.6413	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +0.6760D+6.50E	6.250	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +0.6760D+6.50E	6.250	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.40D	0.9975	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.40D	0.9975	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D+1.60L	4.697	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D+1.60L	4.697	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D+0.50L	2.056	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D+0.50L	2.056	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D	0.8550	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D	0.8550	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.424D+0.50L+6.50E	7.984	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.424D+0.50L+6.50E	7.984	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +0.90D	0.6413	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +0.90D	0.6413	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +0.6760D+6.50E	6.250	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +0.6760D+6.50E	6.250	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK

**One Way Shear X**

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.96 psi	2.96 psi	2.96 psi	39.48 psi	0.07	OK
+1.20D+1.60L	13.92 psi	13.92 psi	13.92 psi	39.48 psi	0.35	OK
+1.20D+0.50L	6.09 psi	6.09 psi	6.09 psi	39.48 psi	0.15	OK
+1.20D	2.53 psi	2.53 psi	2.53 psi	39.48 psi	0.06	OK
+1.424D+0.50L+6.50E	23.66 psi	23.66 psi	23.66 psi	39.48 psi	0.60	OK
+0.90D	1.90 psi	1.90 psi	1.90 psi	39.48 psi	0.05	OK
+0.6760D+6.50E	18.52 psi	18.52 psi	18.52 psi	39.48 psi	0.47	OK

**One Way Shear Z**

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.96 psi	2.96 psi	2.96 psi	39.48 psi	0.07	OK
+1.20D+1.60L	13.92 psi	13.92 psi	13.92 psi	39.48 psi	0.35	OK
+1.20D+0.50L	6.09 psi	6.09 psi	6.09 psi	39.48 psi	0.15	OK
+1.20D	2.53 psi	2.53 psi	2.53 psi	39.48 psi	0.06	OK
+1.424D+0.50L+6.50E	23.66 psi	23.66 psi	23.66 psi	39.48 psi	0.60	OK
+0.90D	1.90 psi	1.90 psi	1.90 psi	39.48 psi	0.05	OK
+0.6760D+6.50E	18.52 psi	18.52 psi	18.52 psi	39.48 psi	0.47	OK

**Two-Way "Punching" Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	11.13 psi	150.00psi	0.07417	OK
+1.20D+1.60L	52.38 psi	150.00psi	0.3492	OK
+1.20D+0.50L	22.93 psi	150.00psi	0.1528	OK
+1.20D	9.54 psi	150.00psi	0.06357	OK
+1.424D+0.50L+6.50E	89.04 psi	150.00psi	0.5936	OK
+0.90D	7.15 psi	150.00psi	0.04768	OK
+0.6760D+6.50E	69.71 psi	150.00psi	0.4647	OK

All units k

## General Footing

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** FTNG#5 (10-31-2024)

### Code References

Calculations per ACI 318-19, IBC 2021  
 Load Combinations Used : IBC 2018

### 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

#### 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

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
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

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

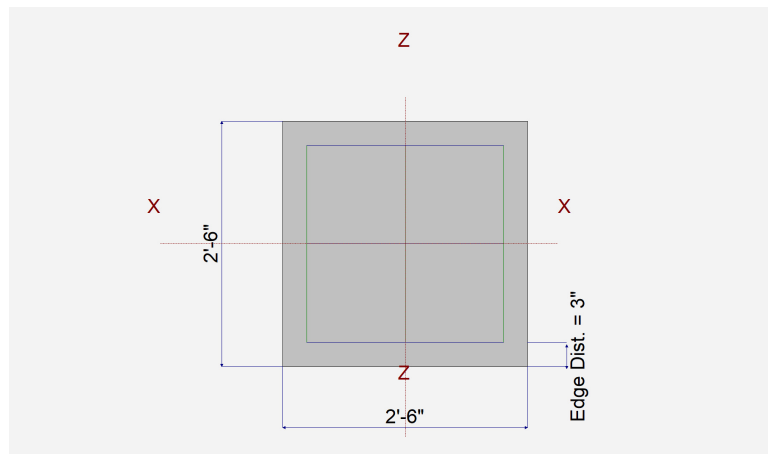
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

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

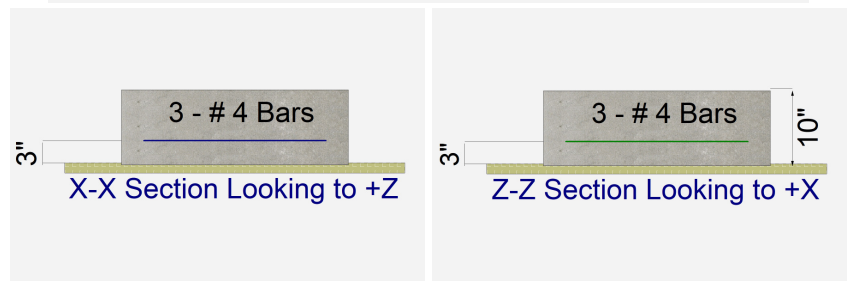
#### Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



### Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	3
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	3
Reinforcing Bar Size	=	# 4
<b>Bandwidth Distribution Check (ACI 15.4.4.2)</b>		
Direction Requiring Closer Separation		n/a
# Bars required within zone		n/a
# Bars required on each side of zone		n/a



### Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	1.90		5.280			1.370	k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#5 (10-31-2024)**

**DESIGN SUMMARY**

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8467	Soil Bearing	1.270 ksf	1.50 ksf	+D+L 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	0.3632	Z Flexure (+X)	1.781 k-ft/ft	4.904 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.3632	Z Flexure (-X)	1.781 k-ft/ft	4.904 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.3632	X Flexure (+Z)	1.781 k-ft/ft	4.904 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.3632	X Flexure (-Z)	1.781 k-ft/ft	4.904 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.4304	1-way Shear (+X)	18.322 psi	42.570 psi	+1.424D+0.50L+6.50E
PASS	0.4304	1-way Shear (-X)	18.322 psi	42.570 psi	+1.424D+0.50L+6.50E
PASS	0.4304	1-way Shear (+Z)	18.322 psi	42.570 psi	+1.424D+0.50L+6.50E
PASS	0.4304	1-way Shear (-Z)	18.322 psi	42.570 psi	+1.424D+0.50L+6.50E
PASS	0.4568	2-way Punching	68.519 psi	150.0 psi	+1.424D+0.50L+6.50E

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
		Zecc (in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.4248	0.4248	n/a	n/a	0.283
X-X, +D+L	1.50	n/a	0.0	1.270	1.270	n/a	n/a	0.847
X-X, +D+0.750L	1.50	n/a	0.0	1.058	1.058	n/a	n/a	0.705
X-X, +D+0.70E	1.50	n/a	0.0	0.5783	0.5783	n/a	n/a	0.386
X-X, +D+0.750L+0.5250E	1.50	n/a	0.0	1.174	1.174	n/a	n/a	0.783
X-X, +0.60D	1.50	n/a	0.0	0.2549	0.2549	n/a	n/a	0.170
X-X, +0.60D+0.70E	1.50	n/a	0.0	0.4083	0.4083	n/a	n/a	0.272
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.4248	0.4248	0.283
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.270	1.270	0.847
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.058	1.058	0.705
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.5783	0.5783	0.386
Z-Z, +D+0.750L+0.5250E	1.50	0.0	n/a	n/a	n/a	1.174	1.174	0.783
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2549	0.2549	0.170
Z-Z, +0.60D+0.70E	1.50	0.0	n/a	n/a	n/a	0.4083	0.4083	0.272

**Overturning Stability**

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

**Sliding Stability**

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	0.3325	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.40D	0.3325	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+1.60L	1.341	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+1.60L	1.341	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+0.50L	0.6150	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D+0.50L	0.6150	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D	0.2850	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.20D	0.2850	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.424D+0.50L+6.50E	1.781	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +1.424D+0.50L+6.50E	1.781	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +0.90D	0.2138	+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: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#5 (10-31-2024)**

**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, +0.90D	0.2138	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +0.6760D+6.50E	1.274	+Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
X-X, +0.6760D+6.50E	1.274	-Z	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.40D	0.3325	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.40D	0.3325	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+1.60L	1.341	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+1.60L	1.341	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+0.50L	0.6150	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D+0.50L	0.6150	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D	0.2850	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.20D	0.2850	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.424D+0.50L+6.50E	1.781	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +1.424D+0.50L+6.50E	1.781	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +0.90D	0.2138	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +0.90D	0.2138	+X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +0.6760D+6.50E	1.274	-X	Bottom	0.2160	ACI 7.6.1.1	0.240	4.904	OK
Z-Z, +0.6760D+6.50E	1.274	+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	3.42 psi	3.42 psi	3.42 psi	42.57 psi	0.08	OK
+1.20D+1.60L	13.79 psi	13.79 psi	13.79 psi	42.57 psi	0.32	OK
+1.20D+0.50L	6.33 psi	6.33 psi	6.33 psi	42.57 psi	0.15	OK
+1.20D	2.93 psi	2.93 psi	2.93 psi	42.57 psi	0.07	OK
+1.424D+0.50L+6.50E	18.32 psi	18.32 psi	18.32 psi	42.57 psi	0.43	OK
+0.90D	2.20 psi	2.20 psi	2.20 psi	42.57 psi	0.05	OK
+0.6760D+6.50E	13.10 psi	13.10 psi	13.10 psi	42.57 psi	0.31	OK

**One Way Shear Z**

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.42 psi	3.42 psi	3.42 psi	42.57 psi	0.08	OK
+1.20D+1.60L	13.79 psi	13.79 psi	13.79 psi	42.57 psi	0.32	OK
+1.20D+0.50L	6.33 psi	6.33 psi	6.33 psi	42.57 psi	0.15	OK
+1.20D	2.93 psi	2.93 psi	2.93 psi	42.57 psi	0.07	OK
+1.424D+0.50L+6.50E	18.32 psi	18.32 psi	18.32 psi	42.57 psi	0.43	OK
+0.90D	2.20 psi	2.20 psi	2.20 psi	42.57 psi	0.05	OK
+0.6760D+6.50E	13.10 psi	13.10 psi	13.10 psi	42.57 psi	0.31	OK

**Two-Way "Punching" Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	12.79 psi	150.00psi	0.08527	OK
+1.20D+1.60L	51.58 psi	150.00psi	0.3439	OK
+1.20D+0.50L	23.66 psi	150.00psi	0.1577	OK
+1.20D	10.96 psi	150.00psi	0.07308	OK
+1.424D+0.50L+6.50E	68.52 psi	150.00psi	0.4568	OK
+0.90D	8.22 psi	150.00psi	0.05481	OK
+0.6760D+6.50E	48.99 psi	150.00psi	0.3266	OK

All units k

## General Footing

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** FTNG#6 (10-8-2024)

### Code References

Calculations per ACI 318-19, IBC 2021, SDPWS 2021

Load Combinations Used : IBC 2018

### 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

#### 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

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
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

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

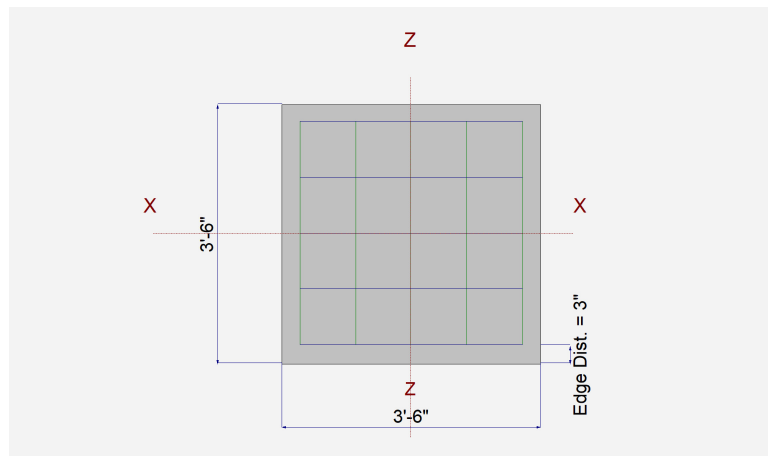
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	3.50 ft
Length parallel to Z-Z Axis	=	3.50 ft
Footing Thickness	=	12.0 in

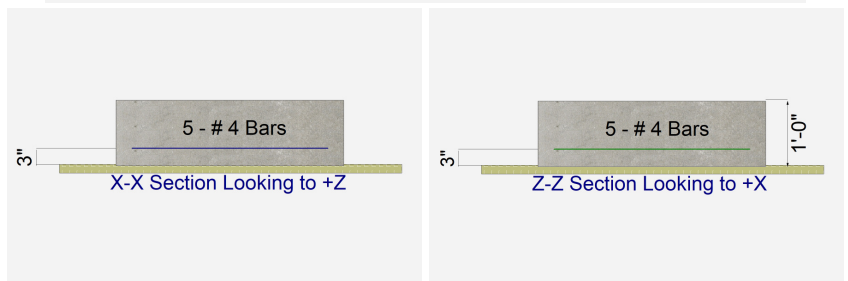
#### Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



### Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 4
<b>Bandwidth Distribution Check (ACI 15.4.4.2)</b>		
Direction Requiring Closer Separation		n/a
# Bars required within zone		n/a
# Bars required on each side of zone		n/a



### Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	2.010		7.50			3.90	k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

## General Footing

Project File: 23-043.ec6

LIC#: KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#6 (10-8-2024)**

### DESIGN SUMMARY

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6236	Soil Bearing	0.9354 ksf	1.50 ksf	+D+0.750L+0.5250E about Z-Z axis
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
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	0.5311	Z Flexure (+X)	3.995 k-ft/ft	7.522 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5311	Z Flexure (-X)	3.995 k-ft/ft	7.522 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5311	X Flexure (+Z)	3.995 k-ft/ft	7.522 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5311	X Flexure (-Z)	3.995 k-ft/ft	7.522 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5910	1-way Shear (+X)	24.521 psi	41.491 psi	+1.424D+0.50L+6.50E
PASS	0.5910	1-way Shear (-X)	24.521 psi	41.491 psi	+1.424D+0.50L+6.50E
PASS	0.5910	1-way Shear (+Z)	24.521 psi	41.491 psi	+1.424D+0.50L+6.50E
PASS	0.5910	1-way Shear (-Z)	24.521 psi	41.491 psi	+1.424D+0.50L+6.50E
PASS	0.6258	2-way Punching	93.874 psi	150.0 psi	+1.424D+0.50L+6.50E

### Detailed Results

#### Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.3091	0.3091	n/a	n/a	0.206
X-X, +D+L	1.50	n/a	0.0	0.9213	0.9213	n/a	n/a	0.614
X-X, +D+0.750L	1.50	n/a	0.0	0.7683	0.7683	n/a	n/a	0.512
X-X, +D+0.70E	1.50	n/a	0.0	0.5319	0.5319	n/a	n/a	0.355
X-X, +D+0.750L+0.5250E	1.50	n/a	0.0	0.9354	0.9354	n/a	n/a	0.624
X-X, +0.60D	1.50	n/a	0.0	0.1854	0.1854	n/a	n/a	0.124
X-X, +0.60D+0.70E	1.50	n/a	0.0	0.4083	0.4083	n/a	n/a	0.272
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.3091	0.3091	0.206
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	0.9213	0.9213	0.614
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	0.7683	0.7683	0.512
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.5319	0.5319	0.355
Z-Z, +D+0.750L+0.5250E	1.50	0.0	n/a	n/a	n/a	0.9354	0.9354	0.624
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.1854	0.1854	0.124
Z-Z, +0.60D+0.70E	1.50	0.0	n/a	n/a	n/a	0.4083	0.4083	0.272

#### Overturing Stability

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

#### Sliding Stability

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	0.3518	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.40D	0.3518	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+1.60L	1.802	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+1.60L	1.802	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+0.50L	0.7703	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+0.50L	0.7703	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D	0.3015	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D	0.3015	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.424D+0.50L+6.50E	3.995	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.424D+0.50L+6.50E	3.995	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.90D	0.2261	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.03

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#6 (10-8-2024)**

**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, +0.90D	0.2261	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.6760D+6.50E	3.339	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.6760D+6.50E	3.339	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.40D	0.3518	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.40D	0.3518	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+1.60L	1.802	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+1.60L	1.802	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+0.50L	0.7703	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+0.50L	0.7703	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D	0.3015	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D	0.3015	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.424D+0.50L+6.50E	3.995	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.424D+0.50L+6.50E	3.995	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.90D	0.2261	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.90D	0.2261	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.6760D+6.50E	3.339	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.6760D+6.50E	3.339	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK

**One Way Shear X**

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.16 psi	2.16 psi	2.16 psi	41.49 psi	0.05	OK
+1.20D+1.60L	11.06 psi	11.06 psi	11.06 psi	41.49 psi	0.27	OK
+1.20D+0.50L	4.73 psi	4.73 psi	4.73 psi	41.49 psi	0.11	OK
+1.20D	1.85 psi	1.85 psi	1.85 psi	41.49 psi	0.04	OK
+1.424D+0.50L+6.50E	24.52 psi	24.52 psi	24.52 psi	41.49 psi	0.59	OK
+0.90D	1.39 psi	1.39 psi	1.39 psi	41.49 psi	0.03	OK
+0.6760D+6.50E	20.49 psi	20.49 psi	20.49 psi	41.49 psi	0.49	OK

**One Way Shear Z**

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	2.16 psi	2.16 psi	2.16 psi	41.49 psi	0.05	OK
+1.20D+1.60L	11.06 psi	11.06 psi	11.06 psi	41.49 psi	0.27	OK
+1.20D+0.50L	4.73 psi	4.73 psi	4.73 psi	41.49 psi	0.11	OK
+1.20D	1.85 psi	1.85 psi	1.85 psi	41.49 psi	0.04	OK
+1.424D+0.50L+6.50E	24.52 psi	24.52 psi	24.52 psi	41.49 psi	0.59	OK
+0.90D	1.39 psi	1.39 psi	1.39 psi	41.49 psi	0.03	OK
+0.6760D+6.50E	20.49 psi	20.49 psi	20.49 psi	41.49 psi	0.49	OK

**Two-Way "Punching" Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	8.27 psi	150.00psi	0.0551	OK
+1.20D+1.60L	42.33 psi	150.00psi	0.2822	OK
+1.20D+0.50L	18.10 psi	150.00psi	0.1207	OK
+1.20D	7.08 psi	150.00psi	0.04723	OK
+1.424D+0.50L+6.50E	93.87 psi	150.00psi	0.6258	OK
+0.90D	5.31 psi	150.00psi	0.03542	OK
+0.6760D+6.50E	78.45 psi	150.00psi	0.523	OK

All units k

## General Footing

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** FTNG#7 (10-31-2024)

### Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : IBC 2018

### 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

#### 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

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
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

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

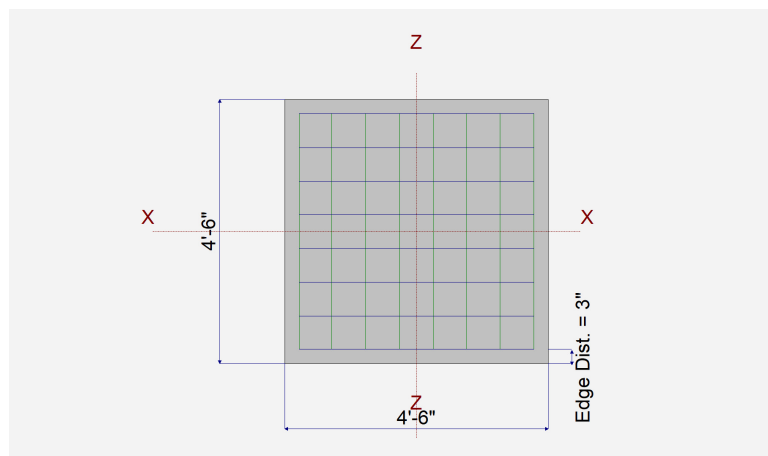
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	4.50 ft
Length parallel to Z-Z Axis	=	4.50 ft
Footing Thickness	=	16.0 in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



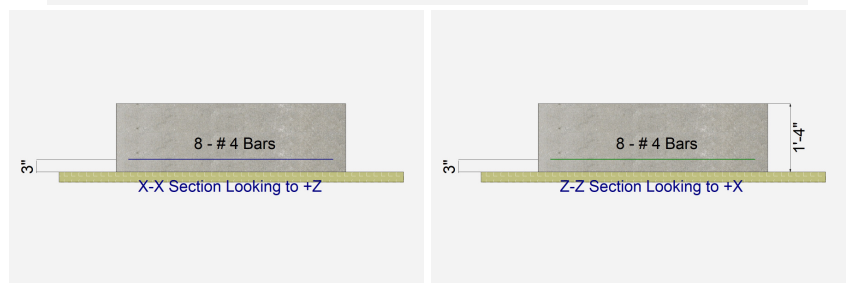
### Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	8
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	
Number of Bars	=	8
Reinforcing Bar Size	=	# 4

#### 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



### Applied Loads

	D	Lr	L	S	W	E	H	
P : Column Load	=	6.50		19.230			5.530	k
OB : Overburden	=							ksf
M-xx	=							k-ft
M-zz	=							k-ft
V-x	=							k
V-z	=							k

**General Footing**

Project File: 23-043.ec6

LIC#: KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#7 (10-31-2024)**

**DESIGN SUMMARY**

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9760	Soil Bearing	1.464 ksf	1.50 ksf	+D+L 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	0.5050	Z Flexure (+X)	6.852 k-ft/ft	13.569 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5050	Z Flexure (-X)	6.852 k-ft/ft	13.569 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5050	X Flexure (+Z)	6.852 k-ft/ft	13.569 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5050	X Flexure (-Z)	6.852 k-ft/ft	13.569 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5142	1-way Shear (+X)	20.302 psi	39.480 psi	+1.424D+0.50L+6.50E
PASS	0.5142	1-way Shear (-X)	20.302 psi	39.480 psi	+1.424D+0.50L+6.50E
PASS	0.5142	1-way Shear (+Z)	20.302 psi	39.480 psi	+1.424D+0.50L+6.50E
PASS	0.5142	1-way Shear (-Z)	20.302 psi	39.480 psi	+1.424D+0.50L+6.50E
PASS	0.5095	2-way Punching	76.418 psi	150.0 psi	+1.424D+0.50L+6.50E

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.5143	0.5143	n/a	n/a	0.343
X-X, +D+L	1.50	n/a	0.0	1.464	1.464	n/a	n/a	0.976
X-X, +D+0.750L	1.50	n/a	0.0	1.227	1.227	n/a	n/a	0.818
X-X, +D+0.70E	1.50	n/a	0.0	0.7055	0.7055	n/a	n/a	0.470
X-X, +D+0.750L+0.5250E	1.50	n/a	0.0	1.370	1.370	n/a	n/a	0.913
X-X, +0.60D	1.50	n/a	0.0	0.3086	0.3086	n/a	n/a	0.206
X-X, +0.60D+0.70E	1.50	n/a	0.0	0.4998	0.4998	n/a	n/a	0.333
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.5143	0.5143	0.343
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.464	1.464	0.976
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.227	1.227	0.818
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.7055	0.7055	0.470
Z-Z, +D+0.750L+0.5250E	1.50	0.0	n/a	n/a	n/a	1.370	1.370	0.913
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.3086	0.3086	0.206
Z-Z, +0.60D+0.70E	1.50	0.0	n/a	n/a	n/a	0.4998	0.4998	0.333

**Overturning Stability**

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

**Sliding Stability**

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

All units k

**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	1.138	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.40D	1.138	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D+1.60L	4.821	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D+1.60L	4.821	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D+0.50L	2.177	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D+0.50L	2.177	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D	0.9750	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.20D	0.9750	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.424D+0.50L+6.50E	6.852	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +1.424D+0.50L+6.50E	6.852	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +0.90D	0.7313	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#7 (10-31-2024)**

**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, +0.90D	0.7313	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +0.6760D+6.50E	5.042	+Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
X-X, +0.6760D+6.50E	5.042	-Z	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.40D	1.138	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.40D	1.138	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D+1.60L	4.821	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D+1.60L	4.821	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D+0.50L	2.177	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D+0.50L	2.177	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D	0.9750	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.20D	0.9750	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.424D+0.50L+6.50E	6.852	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +1.424D+0.50L+6.50E	6.852	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +0.90D	0.7313	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +0.90D	0.7313	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +0.6760D+6.50E	5.042	-X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK
Z-Z, +0.6760D+6.50E	5.042	+X	Bottom	0.3456	ACI 7.6.1.1	0.3556	13.569	OK

**One Way Shear X**

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.37 psi	3.37 psi	3.37 psi	39.48 psi	0.09	OK
+1.20D+1.60L	14.28 psi	14.28 psi	14.28 psi	39.48 psi	0.36	OK
+1.20D+0.50L	6.45 psi	6.45 psi	6.45 psi	39.48 psi	0.16	OK
+1.20D	2.89 psi	2.89 psi	2.89 psi	39.48 psi	0.07	OK
+1.424D+0.50L+6.50E	20.30 psi	20.30 psi	20.30 psi	39.48 psi	0.51	OK
+0.90D	2.17 psi	2.17 psi	2.17 psi	39.48 psi	0.05	OK
+0.6760D+6.50E	14.94 psi	14.94 psi	14.94 psi	39.48 psi	0.38	OK

**One Way Shear Z**

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.37 psi	3.37 psi	3.37 psi	39.48 psi	0.09	OK
+1.20D+1.60L	14.28 psi	14.28 psi	14.28 psi	39.48 psi	0.36	OK
+1.20D+0.50L	6.45 psi	6.45 psi	6.45 psi	39.48 psi	0.16	OK
+1.20D	2.89 psi	2.89 psi	2.89 psi	39.48 psi	0.07	OK
+1.424D+0.50L+6.50E	20.30 psi	20.30 psi	20.30 psi	39.48 psi	0.51	OK
+0.90D	2.17 psi	2.17 psi	2.17 psi	39.48 psi	0.05	OK
+0.6760D+6.50E	14.94 psi	14.94 psi	14.94 psi	39.48 psi	0.38	OK

**Two-Way "Punching" Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	12.69 psi	150.00psi	0.08457	OK
+1.20D+1.60L	53.77 psi	150.00psi	0.3584	OK
+1.20D+0.50L	24.28 psi	150.00psi	0.1619	OK
+1.20D	10.87 psi	150.00psi	0.07249	OK
+1.424D+0.50L+6.50E	76.42 psi	150.00psi	0.5095	OK
+0.90D	8.16 psi	150.00psi	0.05437	OK
+0.6760D+6.50E	56.24 psi	150.00psi	0.3749	OK

All units k

## General Footing

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION:** FTNG#8 (10-31-2024)

### Code References

Calculations per ACI 318-19, IBC 2021

Load Combinations Used : IBC 2018

### 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

#### 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

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
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

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

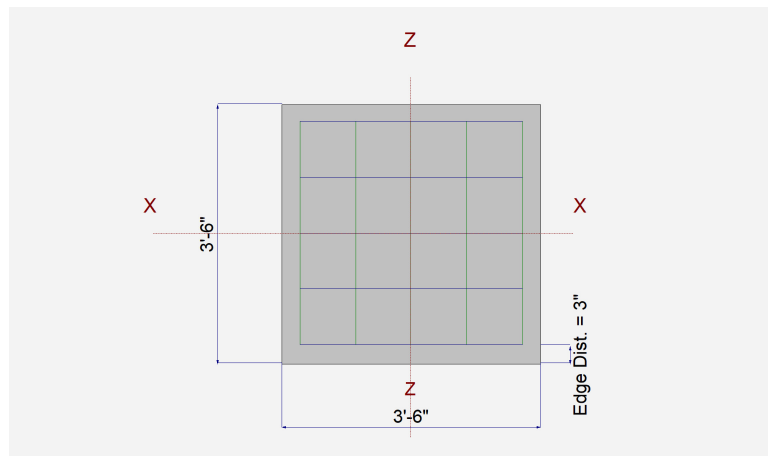
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	3.50 ft
Length parallel to Z-Z Axis	=	3.50 ft
Footing Thickness	=	12.0 in

#### Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



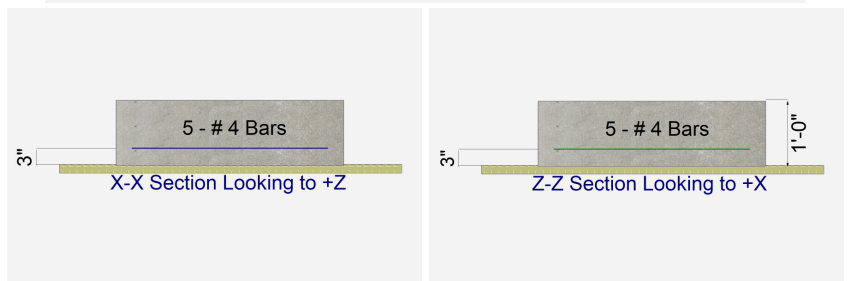
### Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	
Number of Bars	=	5
Reinforcing Bar Size	=	# 4

#### 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



### Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	3.540		10.0		2.640	k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

## General Footing

Project File: 23-043.ec6

LIC#: KW-06016495, Build:20.24.10.30

CK Engineering LLC

(c) ENERCALC, LLC 1982-2024

**DESCRIPTION: FTNG#8 (10-31-2024)**

### DESIGN SUMMARY

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8333	Soil Bearing	1.250 ksf	1.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
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	0.4520	Z Flexure (+X)	3.40 k-ft/ft	7.522 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.4520	Z Flexure (-X)	3.40 k-ft/ft	7.522 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.4520	X Flexure (+Z)	3.40 k-ft/ft	7.522 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.4520	X Flexure (-Z)	3.40 k-ft/ft	7.522 k-ft/ft	+1.424D+0.50L+6.50E
PASS	0.5030	1-way Shear (+X)	20.868 psi	41.491 psi	+1.424D+0.50L+6.50E
PASS	0.5030	1-way Shear (-X)	20.868 psi	41.491 psi	+1.424D+0.50L+6.50E
PASS	0.5030	1-way Shear (+Z)	20.868 psi	41.491 psi	+1.424D+0.50L+6.50E
PASS	0.5030	1-way Shear (-Z)	20.868 psi	41.491 psi	+1.424D+0.50L+6.50E
PASS	0.5326	2-way Punching	79.890 psi	150.0 psi	+1.424D+0.50L+6.50E

### Detailed Results

#### Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.4340	0.4340	n/a	n/a	0.289
X-X, +D+L	1.50	n/a	0.0	1.250	1.250	n/a	n/a	0.833
X-X, +D+0.750L	1.50	n/a	0.0	1.046	1.046	n/a	n/a	0.697
X-X, +D+0.70E	1.50	n/a	0.0	0.5848	0.5848	n/a	n/a	0.390
X-X, +D+0.750L+0.5250E	1.50	n/a	0.0	1.159	1.159	n/a	n/a	0.773
X-X, +0.60D	1.50	n/a	0.0	0.2604	0.2604	n/a	n/a	0.174
X-X, +0.60D+0.70E	1.50	n/a	0.0	0.4112	0.4112	n/a	n/a	0.274
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.4340	0.4340	0.289
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.250	1.250	0.833
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.046	1.046	0.697
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.5848	0.5848	0.390
Z-Z, +D+0.750L+0.5250E	1.50	0.0	n/a	n/a	n/a	1.159	1.159	0.773
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2604	0.2604	0.174
Z-Z, +0.60D+0.70E	1.50	0.0	n/a	n/a	n/a	0.4112	0.4112	0.274

#### Overturing Stability

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

#### Sliding Stability

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	0.6195	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.40D	0.6195	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+1.60L	2.531	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+1.60L	2.531	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+0.50L	1.156	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D+0.50L	1.156	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D	0.5310	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.20D	0.5310	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.424D+0.50L+6.50E	3.40	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +1.424D+0.50L+6.50E	3.40	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.90D	0.3983	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**General Footing**

Project File: 23-043.ec6

LIC# : KW-06016495, Build:20.24.10.30

CK Engineering LLC

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**DESCRIPTION: FTNG#8 (10-31-2024)**

**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, +0.90D	0.3983	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.6760D+6.50E	2.444	+Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
X-X, +0.6760D+6.50E	2.444	-Z	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.40D	0.6195	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.40D	0.6195	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+1.60L	2.531	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+1.60L	2.531	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+0.50L	1.156	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D+0.50L	1.156	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D	0.5310	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.20D	0.5310	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.424D+0.50L+6.50E	3.40	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +1.424D+0.50L+6.50E	3.40	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.90D	0.3983	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.90D	0.3983	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.6760D+6.50E	2.444	-X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK
Z-Z, +0.6760D+6.50E	2.444	+X	Bottom	0.2592	ACI 7.6.1.1	0.2857	7.522	OK

**One Way Shear X**

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.80 psi	3.80 psi	3.80 psi	41.49 psi	0.09	OK
+1.20D+1.60L	15.53 psi	15.53 psi	15.53 psi	41.49 psi	0.37	OK
+1.20D+0.50L	7.10 psi	7.10 psi	7.10 psi	41.49 psi	0.17	OK
+1.20D	3.26 psi	3.26 psi	3.26 psi	41.49 psi	0.08	OK
+1.424D+0.50L+6.50E	20.87 psi	20.87 psi	20.87 psi	41.49 psi	0.50	OK
+0.90D	2.44 psi	2.44 psi	2.44 psi	41.49 psi	0.06	OK
+0.6760D+6.50E	15.00 psi	15.00 psi	15.00 psi	41.49 psi	0.36	OK

**One Way Shear Z**

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.80 psi	3.80 psi	3.80 psi	41.49 psi	0.09	OK
+1.20D+1.60L	15.53 psi	15.53 psi	15.53 psi	41.49 psi	0.37	OK
+1.20D+0.50L	7.10 psi	7.10 psi	7.10 psi	41.49 psi	0.17	OK
+1.20D	3.26 psi	3.26 psi	3.26 psi	41.49 psi	0.08	OK
+1.424D+0.50L+6.50E	20.87 psi	20.87 psi	20.87 psi	41.49 psi	0.50	OK
+0.90D	2.44 psi	2.44 psi	2.44 psi	41.49 psi	0.06	OK
+0.6760D+6.50E	15.00 psi	15.00 psi	15.00 psi	41.49 psi	0.36	OK

**Two-Way "Punching" Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	14.56 psi	150.00psi	0.09704	OK
+1.20D+1.60L	59.47 psi	150.00psi	0.3965	OK
+1.20D+0.50L	27.16 psi	150.00psi	0.1811	OK
+1.20D	12.48 psi	150.00psi	0.08318	OK
+1.424D+0.50L+6.50E	79.89 psi	150.00psi	0.5326	OK
+0.90D	9.36 psi	150.00psi	0.06238	OK
+0.6760D+6.50E	57.43 psi	150.00psi	0.3829	OK

All units k