

CK Engineering LLC.

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Lake Forest Park, WA 98155

Phone: (206) 417-0670

STRUCTURAL CALCULATIONS

Lateral & Gravity Design
22-021



2/15/2023

HELIX HOMES
6922 SE 33rd ST.
Mercer Island, WA 98040
February 15, 2023

Search Information

Address: 6922 SE 33rd St, Mercer Island, WA 98040, USA

Coordinates: 47.58136409999999, -122.2448425

Elevation: 263 ft

Timestamp: 2022-04-16T16:21:32.515Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: I

Site Class: D-default



Basic Parameters

Name	Value	Description
S_S	1.409	MCE_R ground motion (period=0.2s)
S_1	0.49	MCE_R ground motion (period=1.0s)
S_{MS}	1.691	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.127	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

▼Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.902	Coefficient of risk (0.2s)
CR_1	0.896	Coefficient of risk (1.0s)
PGA	0.603	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.723	Site modified peak ground acceleration

T _L	6	Long-period transition period (s)
SsRT	1.409	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.562	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	3.364	Factored deterministic acceleration value (0.2s)
S1RT	0.49	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.547	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.361	Factored deterministic acceleration value (1.0s)
PGAd	1.156	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey [Seismic Design Web Services](#).

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Search Information

Address: 6922 SE 33rd St, Mercer Island, WA 98040, USA
Coordinates: 47.58136409999999, -122.2448425
Elevation: 263 ft
Timestamp: 2022-04-16T16:20:28.849Z
Hazard Type: Wind



ASCE 7-16

MRI 10-Year 67 mph
 MRI 25-Year 73 mph
 MRI 50-Year 78 mph
 MRI 100-Year 83 mph
 Risk Category I 92 mph
 Risk Category II 97 mph
 Risk Category III 104 mph
 Risk Category IV 108 mph

ASCE 7-10

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

ASCE 7-05

ASCE 7-05 Wind Speed 85 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

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Design Criteria

Scope of Work:	Lateral & Gravity Design		
Site Address:	6922 SE 33rd ST. Mercer Island, WA 98040		
Number of Stories:	1	Engineer:	PK

Roof Loading

Roofing	Composition	3.0
Sheathing	5/8" Plywood	1.8
Insulation	Roll/Batt	3.0
Ceiling	5/8" GWB	2.8
Framing	Trusses	2.2
Miscellaneous	fixtures, mechanical, electrical, etc.	2.2
TOTAL DEAD LOAD:		15.0 psf
ROOF SNOW LOAD:		25.0 psf

Main Floor Loading

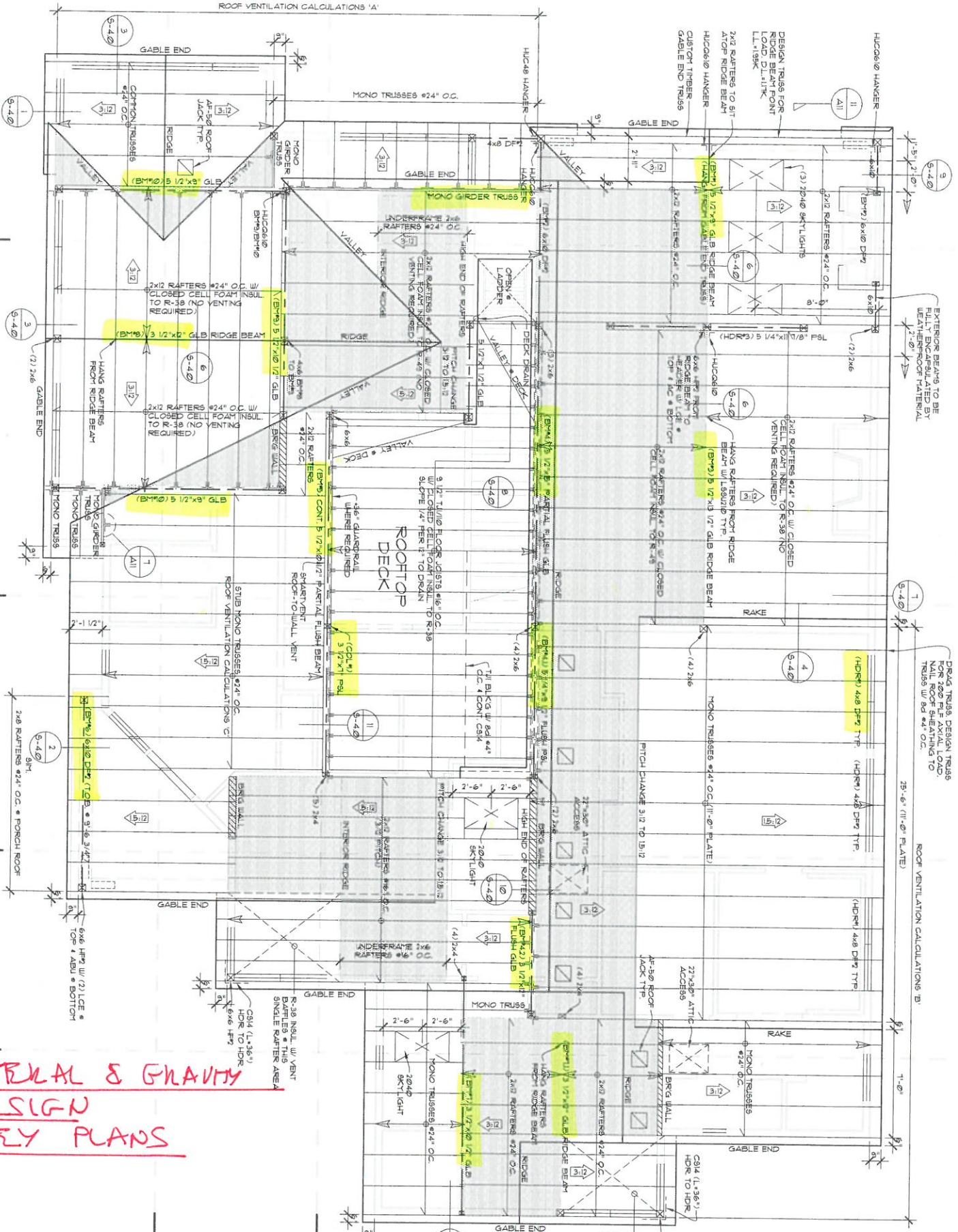
Floor Covering	Carpet/Hardwood/Tile	3.0
Sheathing	3/4" T&G	2.3
Ceiling	1/2" GWB	2.2
Joists	Solid Sawn @ 16" o/c	3.3
Beams		2.8
Miscellaneous	fixtures, mechanical, electrical, etc.	1.4
TOTAL DEAD LOAD:		15.0 psf
FLOOR LIVE LOAD:		40.0 psf

Not Used

Floor Covering	Carpet/Hardwood/Tile	0.0
Sheathing	3/4" T&G	0.0
Ceiling	5/8" GWB	0.0
Joists	I-Joists	0.0
Beams		4.2
Miscellaneous	fixtures, mechanical, electrical, etc.	0.6
TOTAL DEAD LOAD:		4.8 psf
FLOOR LIVE LOAD:		0.0 psf

Soil Bearing Capacity:	3000 psf
Frost Depth:	18 in

ROOF VENTILATION CALCULATIONS 'A'



**LATERAL & GRAVITY
DESIGN
WELY PLANS**

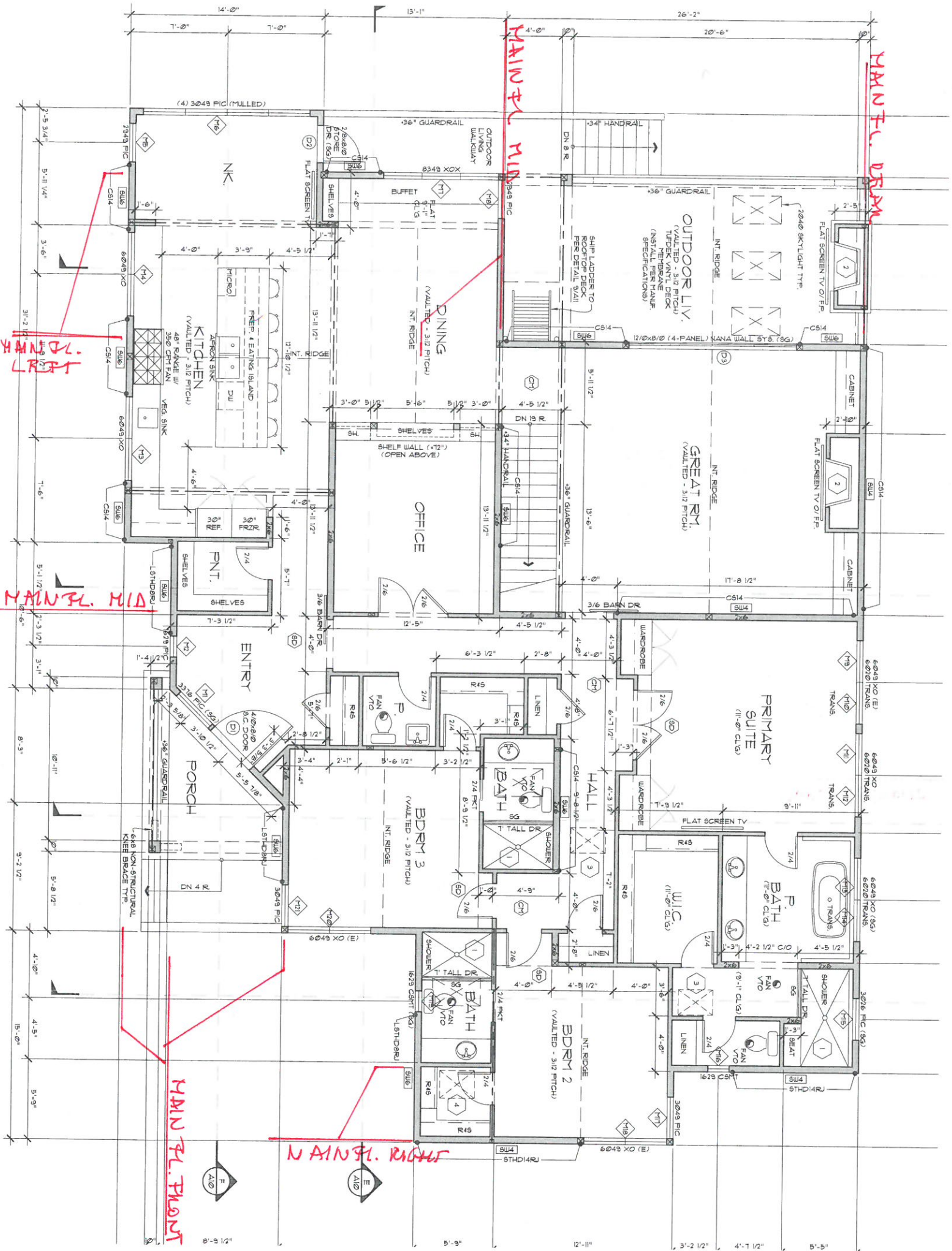


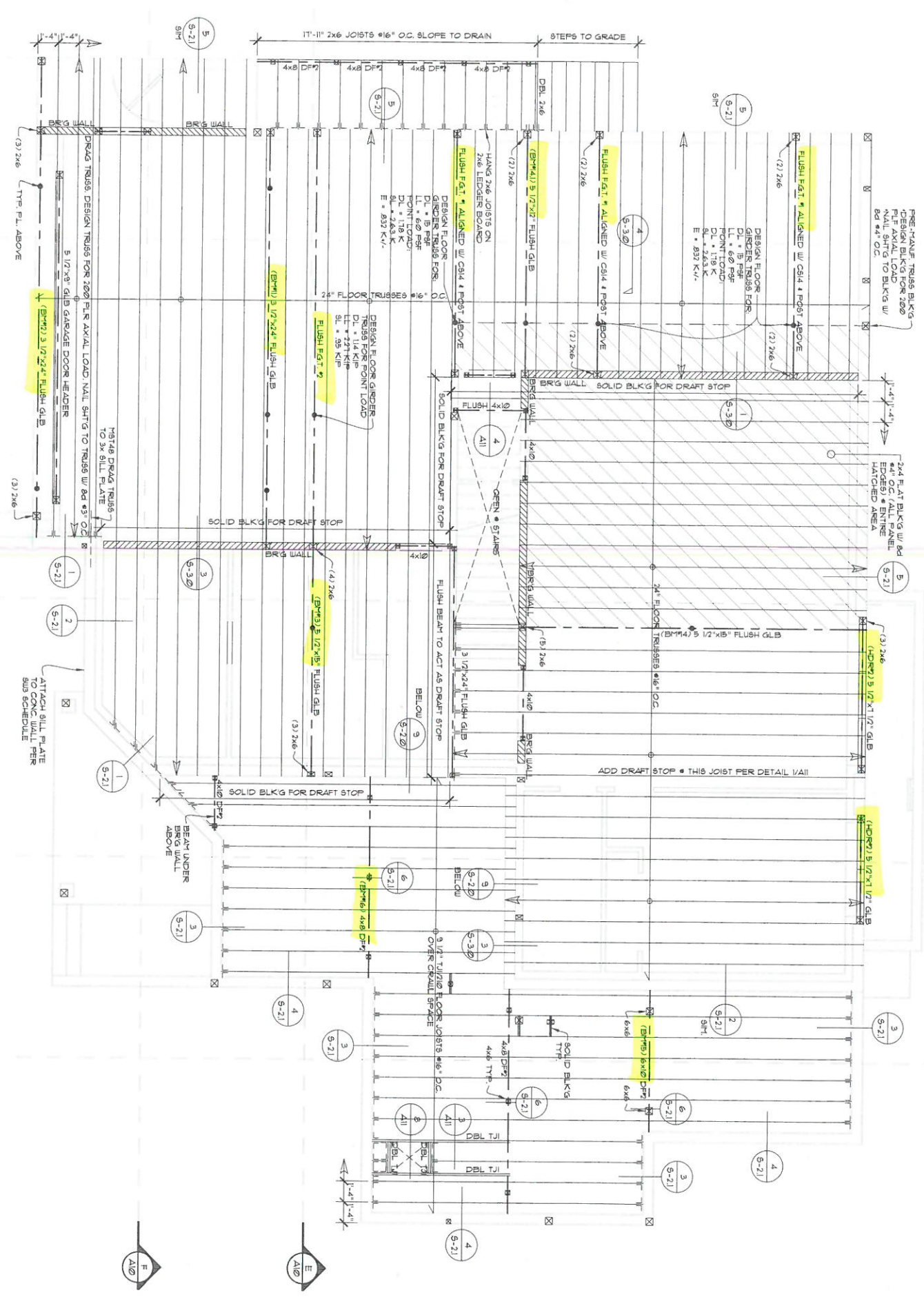
DECK TRUSS DESIGN TRUSS
FOR 200 PLE AXIAL LOAD
NAIL ROOF SHEATING TO
TRUSS W/ 8d @ 24" O.C.

ROOF VENTILATION CALCULATIONS 'B'

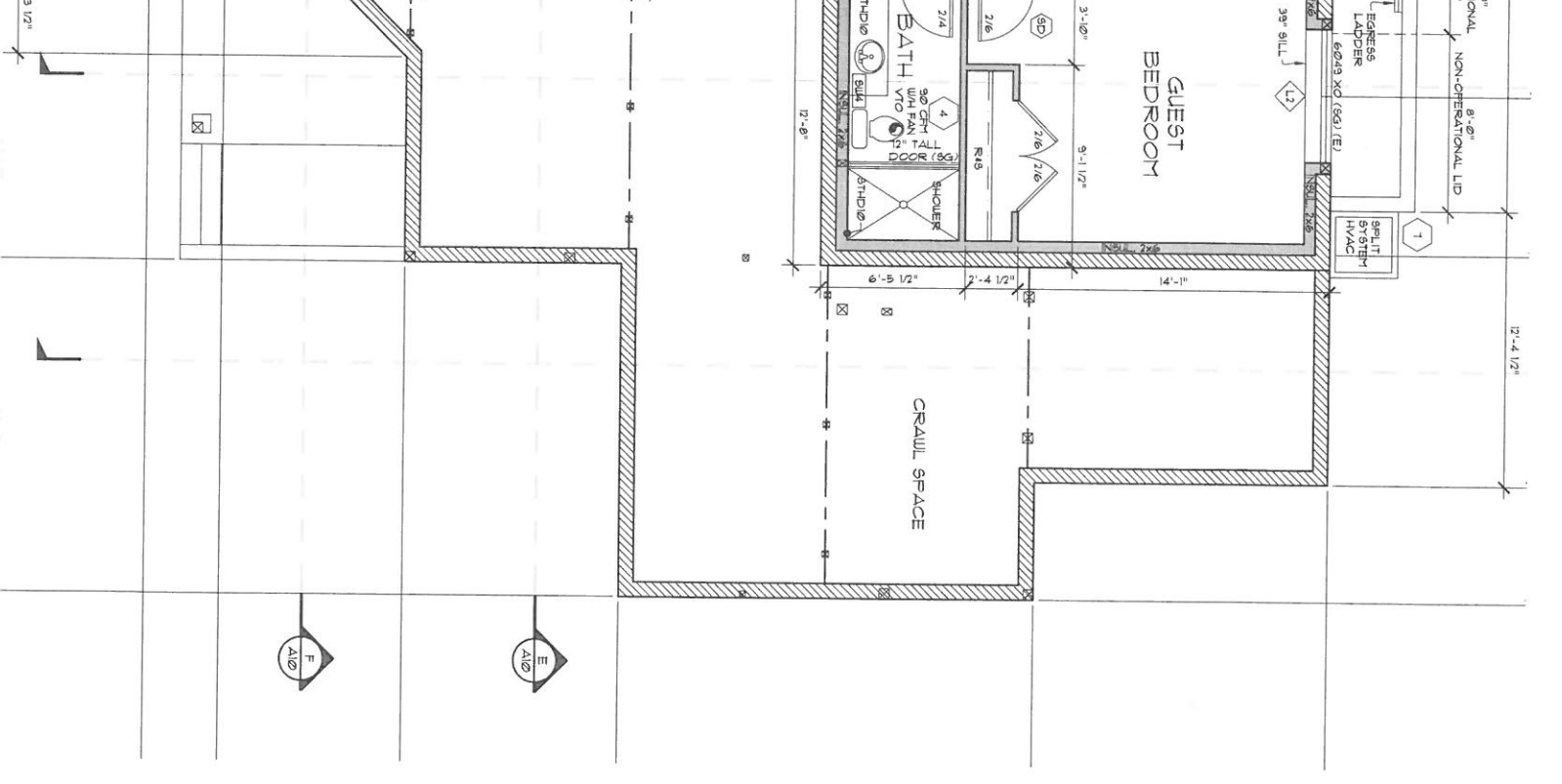
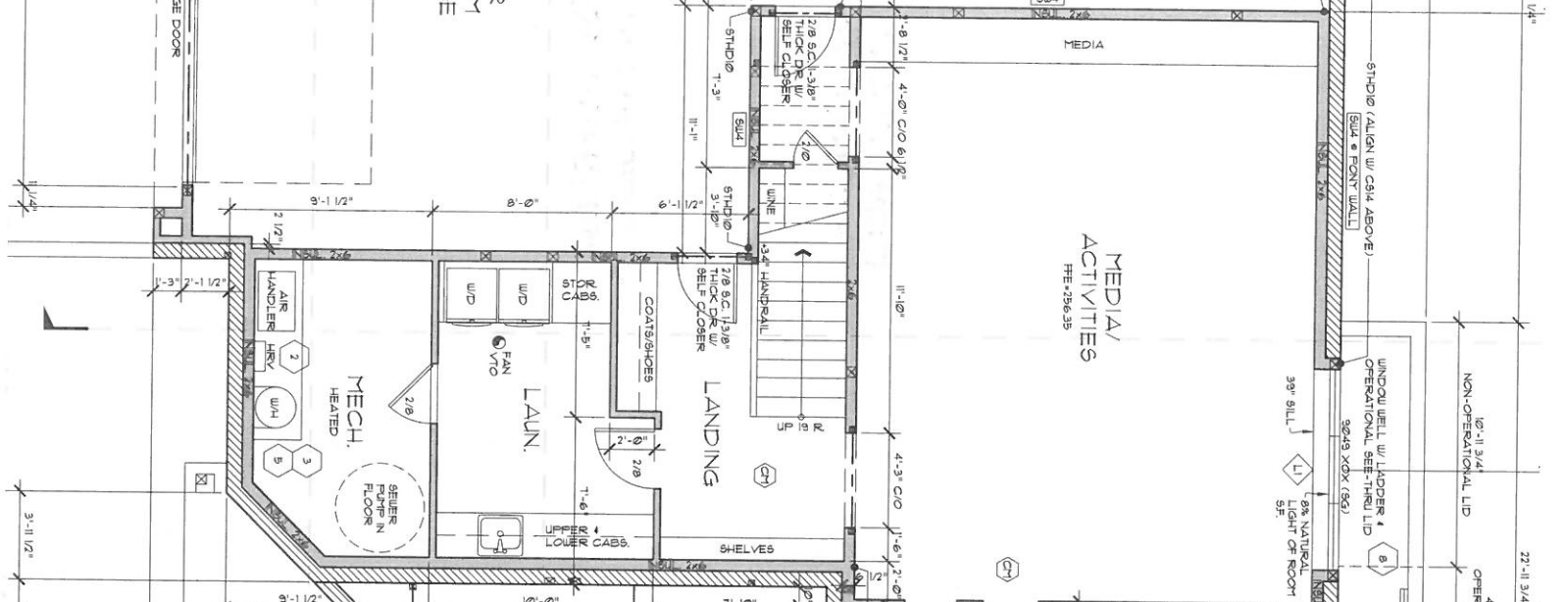
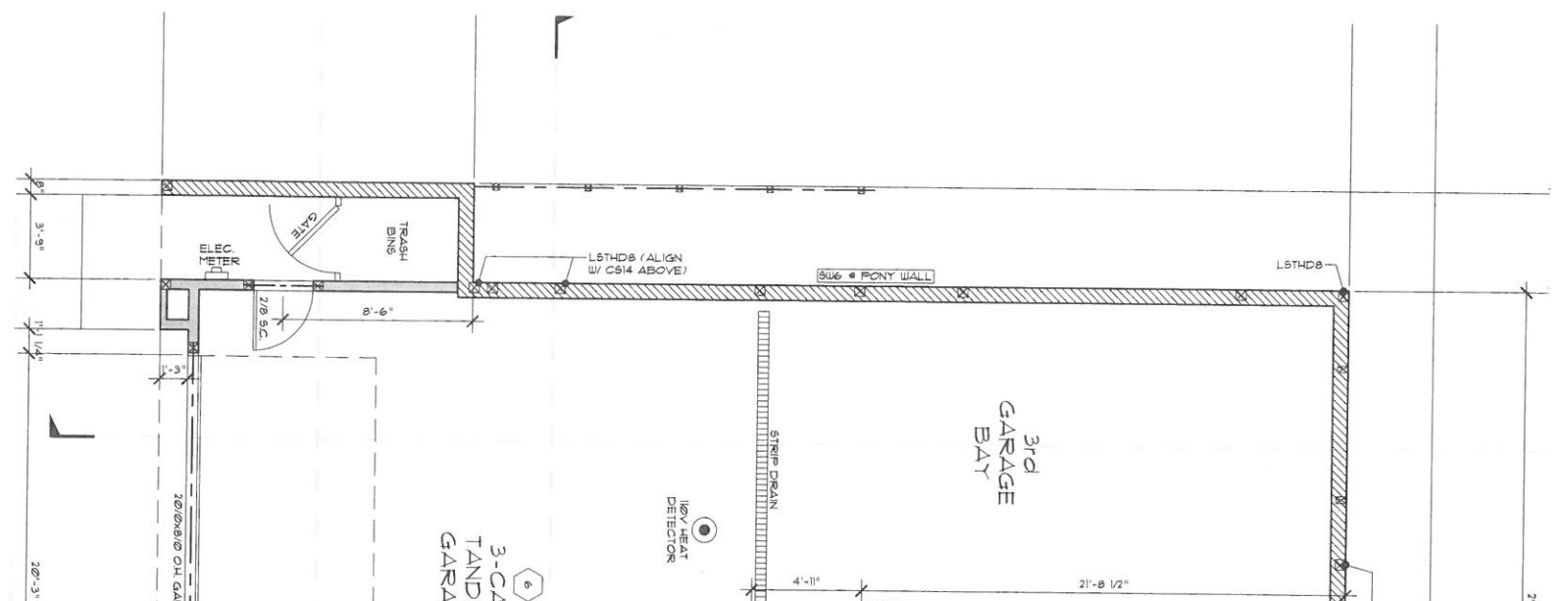
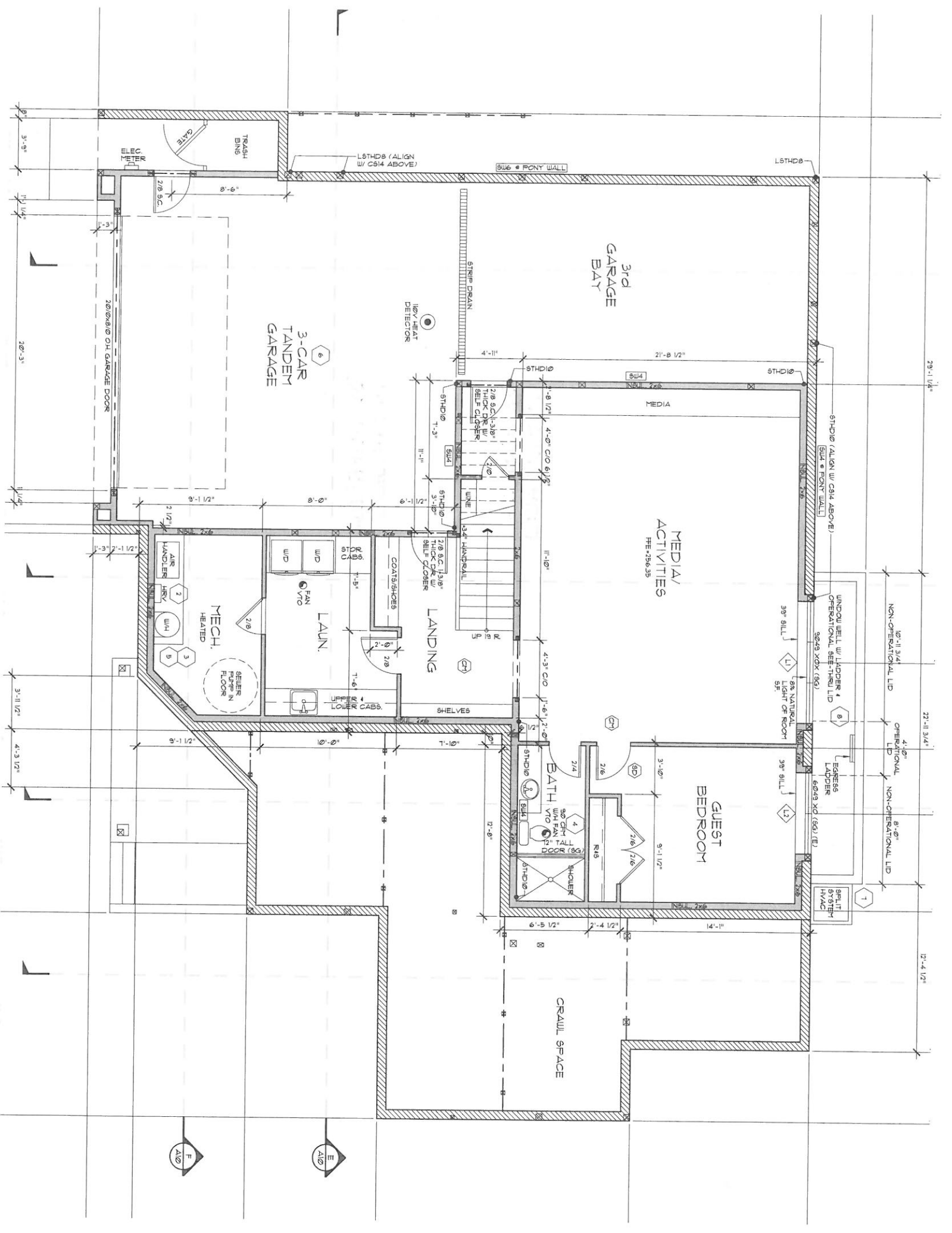
25'-6" (11'-0" PLATE)

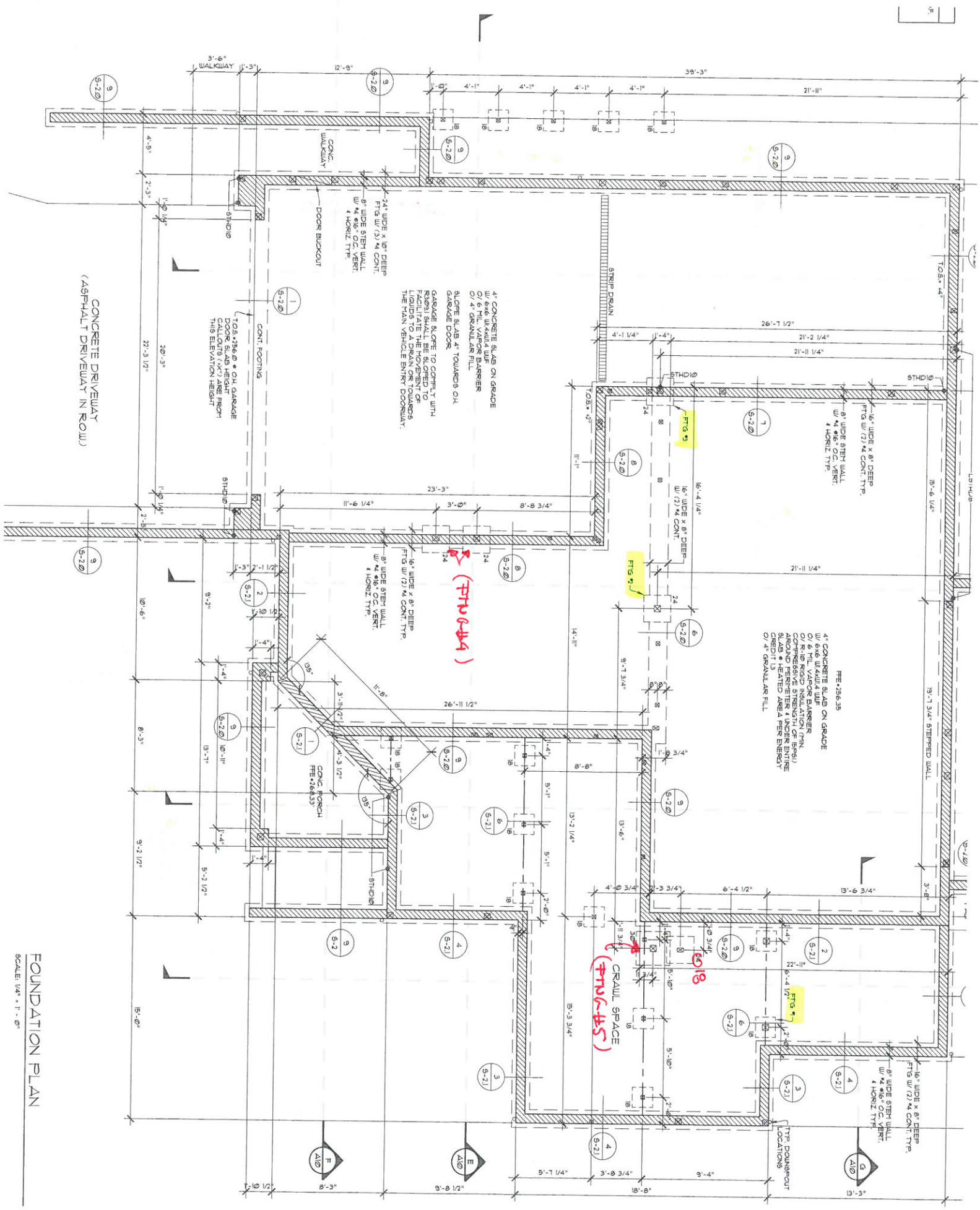
USE CLOSED CELL
FOAM INSUL. TO R-38
• THIS SINGLE
RAFTER AREA NO
VENTING REQUIRED





Architectural floor plan showing structural details for a garage area. The drawing includes various beams, joists, girders, and trusses. Key components include: 17'-11\"/>





CONCRETE DRIVEWAY
(ASPHALT DRIVEWAY IN ROW)

4" CONCRETE SLAB ON GRADE
w/ 6#6 WALKWAY
C/6 TYP. VAPOR BARRIER
C/4" GRANULAR FILL
SLOPE SLAB 4" TOWARDS OH
GARAGE DOOR
GARAGE DOOR TO COMPLETE WITH
CONCRETE SLAB ON GRADE
FACILITATE THE MOVEMENT OF
LIQUIDS TO A DRAIN OR TOWARDS
THE MAIN VEHICLE ENTRY DOORWAY.

4" CONCRETE SLAB ON GRADE
w/ 6#6 WALKWAY
C/6 TYP. VAPOR BARRIER
C/4" GRANULAR FILL
SLOPE SLAB 4" TOWARDS OH
GARAGE DOOR

4" CONCRETE SLAB ON GRADE
w/ 6#6 WALKWAY
C/6 TYP. VAPOR BARRIER
C/4" GRANULAR FILL
SLOPE SLAB 4" TOWARDS OH
GARAGE DOOR
GARAGE DOOR TO COMPLETE WITH
CONCRETE SLAB ON GRADE
FACILITATE THE MOVEMENT OF
LIQUIDS TO A DRAIN OR TOWARDS
THE MAIN VEHICLE ENTRY DOORWAY.

(FTW 0-44)

(FTW 0-18)

(FTW 0-15)

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

Type of construction: **NEW**
 Applicable Building Codes: **IBC 2018, ASCE 7/SEI 7-16**

Location: **6922 SE 33rd ST.**
Mercer Island, WA 98040

Work performed :

Lateral & Gravity Design

WIND DESIGN:

$$P_s = \lambda_w P_{s30} K_{zt}$$

- Exposure : **C** Wind Exposure Category as set forth in Section 26.7 of ASCE 7-16
- Wind Speed = **85 MPH** Basic Wind Speed (LRFD) as used in Figure 28.5 of ASCE 7-16 and converted to (ASD)
- $P_{s30} =$ Simplified design wind pressure for Exposure B, at $h = 30$ feet and for $I = 1.0$, from Figure 28.5-1
- $I_w =$ **1** Importance factor as defined in Table 1.5-2 of ASCE 7-16
- $\lambda =$ **1.29** Adjustment factor for building height and exposure from Figure 28.5-1 of ASCE 7-16
- $K_{zt} =$ **1.60** Adjustment factor for increased wind speed due to a hill or escarpment from Section 26.8 of ASCE 7-16

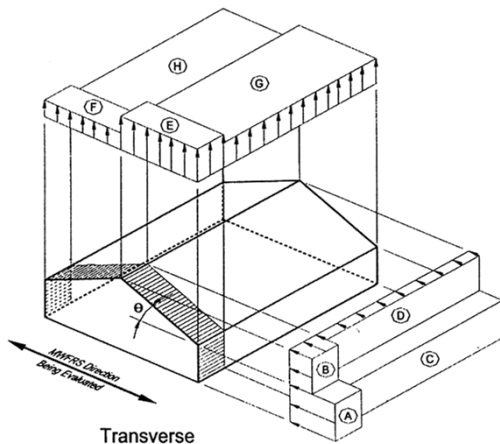
Roof slope :
 Front/Rear $\tan^{-1} \left(\frac{\text{rise}}{\text{run}} \right) = \tan^{-1} \left(\frac{7}{12} \right) = 30.3 \text{ degrees}$
 Left/Right $\tan^{-1} \left(\frac{7}{12} \right) = 30.3 \text{ degrees}$
 Mean Elevation **20 ft**

Number of floors: **1**

Average uplift (F/R) = **-2.5 psf** Based on wind zones 'G' and 'H'
 Average uplift (R/L) = **-2.5 psf** Based on wind zones 'G' and 'H'

	End zone of wall		End zone of roof	
	Front/Rear	Left/Right	Front/Rear	Left/Right
$P_{s30} =$	A = 12.9 psf	12.9 psf	B = 8.8 psf	8.8 psf
$P_s =$	26.6 psf	26.6 psf	18.1 psf	18.1 psf

	Interior zone of wall		Interior zone of roof	
	Front/Rear	Left/Right	Front/Rear	Left/Right
$P_{s30} =$	C = 10.2 psf	10.2 psf	D = 7.0 psf	7.0 psf
$P_s =$	21.0 psf	21.0 psf	14.4 psf	14.4 psf



WIND LOAD CALCULATIONS
FRONT → REAR

1V MAIN FLOOR =

WIND ZONE	B	D	D	D	A	C						
AVE. HEIGHT	6.5	6.5	4	3	4.5	4.5						
AVE. WIDTH	12	59	6	5	12	62						
P_s	18.13	14.42	14.42	14.42	26.58	21.01	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	1414	5531	346	216	1435	5863	0	0	0	0	0	0
TOTAL	14,805 lbs											

NOT USED

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

NOT USED

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

WIND LOAD CALCULATIONS
LEFT → RIGHT

ΣV MAIN FLOOR =

WIND ZONE	B	D	C	C	A	C						
AVE. HEIGHT	12.5	12.5	4	3	4.5	4.5						
AVE. WIDTH	9	21	9	14	9	44						
Ps	18.13	14.42	21.01	21.01	26.58	21.01	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	2040	3786	757	883	1076	4161	0	0	0	0	0	0
TOTAL	12,701 lbs											

NOT USED

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

NOT USED

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

ρ CALCS:

MAIN 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

NOT USED:

Plate Height:	10.00 ft
Total length of Shearwall in Shortest Line:	16.00 ft
Length of Shortest Shearwall within Shear Line:	8.00 ft
Length of Longest Wall in Shear Line:	8.00 ft

Tributary Area:	1.0
Total Area:	2.0

$\rho = NA$

NOT USED:

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

Tributary Area:	1.0
Total Area:	2.0

$\rho = NA$

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 =	10 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. =	4.8 psf
FLOOR LIVE LOAD =	40.0 psf

$\rho =$	1.00	Site Class =	D	Geotech Report	Yes
$I_E =$	1		Importance factor as defined in Table 11.5-1		
$R =$	6.5	$h_n =$	26	Total height of structure	
$h_n =$	26				

$V = 0.7S_{DS}I_E W / R$	$S_{DS} = 2/3 S_{MS}$	$S_s =$	140.9%	$S_{MS} = 169.1\%$	$V =$	0.121	W
$V_{max} = S_{D1}I_E W / T_g R$	$S_{MS} = (F_a)(S_s)$	$F_a =$	1.20	$S_{DS} = 112.7\%$	$E =$	0.121	W
$T_g = 0.02h_n^{0.75}$	$S_{D1} = 2/3 S_{M1}$	$S_1 =$	49.0%	$S_{M1} = 73.5\%$	$C_s =$	0.121	
$T_g = 0.23 s$	$S_{M1} = (F_v)(S_1)$	$F_v =$	1.50	$S_{D1} = 49.0\%$			

MAIN FLOOR DIAPHRAGM LOADING:

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
66	33	15.0	32670
54	21	15.0	17010
20	5	15.0	1500
		15.0	0
		15.0	0

Area = 3412 Sub-Total= 51180

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
23	13	15.0	4485
6	4	15.0	360
		15.0	0
		15.0	0
		15.0	0

Area = 323 Sub-Total= 4845

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
200	4.5	10.0	9000
150	4.5	10.0	6750
		10.0	0
		10.0	0
		10.0	0

Area = 1575 Sub-Total= 15750

TOTAL = 71775 lb

NOT APPLICABLE

W (ROOF) =

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

Area = 0 Sub-Total= 0

W (FLOOR) =

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

Area = 0 Sub-Total= 0

W (WALL) =

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

Area = 0 Sub-Total= 0

TOTAL = lb

NOT APPLICABLE

W (ROOF) =

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

Area = 0 Sub-Total= 0

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
		4.8	0
		4.8	0
		4.8	0
		4.8	0
		4.8	0

Area = 0 Sub-Total= 0

W (WALL) =

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

Area = 0 Sub-Total= 0

TOTAL = lb

V (MAIN FLOOR) = .121 x 71775 lb = 8713 lbs
 V () = .121 x lb = lbs
 V () = .121 x lb = lbs

REDISTRIBUTE:

$\Sigma V \times \rho$	height	$\Sigma V \times \text{height}$
8713 lb	9	78415
lb		0
lb		0

TOTAL = 8713 lb TOTAL = 78415

E (MAIN) = $\frac{\Sigma V \times \text{height} \times \Sigma V \text{ TOTAL}}{\Sigma V \times \text{height TOTAL}}$ = 8713 lbs

E () = NOT USED = 0 lbs

E () = NOT USED = 0 lbs

SUMMARY:

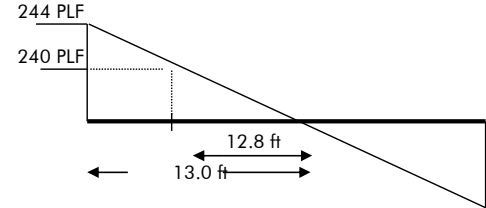
	WIND (front-rear)	WIND (left-right)	SEISMIC
ΣV (MAIN) =	14805 lbs	12701 lbs	8713 lbs
NOT APPLICABLE	0 lbs	0 lbs	0 lbs
NOT APPLICABLE	0 lbs	0 lbs	0 lbs
TOTAL =	14805 lbs	12701 lbs	8713 lbs

DIAPHRAGM SHEAR:

Total diaphragm length =	64.0 ft	Sub-diaphragm length =	64.0 ft
Diaphragm width =	26.0 ft	ΣV (MAIN) =	12,701 lbs

$$v = \frac{\Sigma V(\text{roof})}{(2)(\text{width})} = \frac{12701 \text{ lb}}{52 \text{ ft}} = 244 \text{ PLF}$$

IBC Table 2306.3.1 → 270 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 =	64.0 ft	Total-diaphragm length =	64.0 ft
Sub-diaphragm width =	26.0 ft		
$T = \frac{M}{B} = \frac{\Sigma V \times (\text{diaphragm length})}{8 \times (\text{diaphragm width})} = \frac{12701 \times 64 \text{ ft}}{8 \times 26 \text{ ft}} = 3908 \text{ lbs}$			

Top Plate Size:	2x6	Species/Grade:	HF #2
Area =	8.25 in ²	F _t =	525 psi
Load duration (C _D) =	1.33	T _{allowable} = Area x C _D x F _t =	5,761 lbs

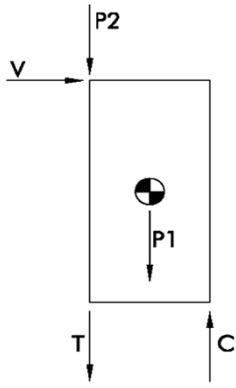
Since T allowable is greater than T applied, OK.

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

OF NAILS PER 4 FT SPLICE = $\frac{3908 \text{ lbs}}{136 \text{ lbs}} = 29$

USE 2x6 HF #2 TOP PLATE W/ (2) 10d NAILS @ 3 in O/C.

Lateral Calculation Key



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

$T = V \times H - 0.5P1 - P2 =$ 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.

MAIN FL. REAR (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

Roof Resisting Dead Load
 (e.g. Roof, Upper Floor, Main Floor)

19.00 ft Total Length of Shearwalls

V(from upper)= 12701 lb 8713 lb
 V(from main)= 0 lb 0 lb
 V(from lower)= 0 lb 0 lb
 Σ (Wind) = 12,701 lb Σ (Smc) = 8,713 lb
 v = 334 PLF v = 229 PLF

Tributary Width (Main Floor)
 1.0 tributary width
 2.0 total width
 Not Used
 1.0 tributary width
 2.0 total width
 Not Used
 1.0 tributary width
 2.0 total width

Tributary Area (Main Floor)
 1.0 tributary area
 2.0 total area
 Not Used
 1.0 tributary area
 2.0 total area
 Not Used
 1.0 tributary area
 2.0 total area

Height of Shearwall = 9.0 ft
 Length of Shearwall = 19.0 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 → 1.4 x 0.93 x 353 = 460 PLF

USE SW4

Wind controls shearwall design

C_{TOTAL} = (floor above) + (this floor) = + 3008 lbs = 3008 lbs Wind controls
 T_{TOTAL} = (floor above) + (this floor) = + 2362 lbs = 2362 lbs Load case 8 controls - Wind

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 2064 lbs

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

MAIN FL. FRONT (KITCHEN, BDRM 3)

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

Roof Resisting Dead Load
 (e.g. Roof, Upper Floor, Main Floor)

25.00 ft Total Length of Shearwalls

V(from upper)= 12701 lb 8713 lb
 V(from main)= 0 lb 0 lb
 V(from lower)= 0 lb 0 lb
 Σ (Wind) = 12,701 lb Σ (Smc) = 8,713 lb
 v = 153 PLF v = 105 PLF

Tributary Width (Main Floor)
 16.0 tributary width
 53.0 total width
 Not Used
 1.0 tributary width
 2.0 total width
 Not Used
 1.0 tributary width
 2.0 total width

Tributary Area (Main Floor)
 16.0 tributary area
 53.0 total area
 Not Used
 1.0 tributary area
 2.0 total area
 Not Used
 1.0 tributary area
 2.0 total area

Height of Shearwall = 9.0 ft
 Length of Shearwall = 5.0 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 → 1.4 x 0.93 x 242 = 315 PLF

USE SW6

Wind controls shearwall design

C_{TOTAL} = (floor above) + (this floor) = + 1380 lbs = 1380 lbs Wind controls
 T_{TOTAL} = (floor above) + (this floor) = + 1165 lbs = 1165 lbs Load case 8 controls - Wind

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 947 lbs

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

MAIN FL. LEFT (DINING, 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

Roof Resisting Dead Load
 (e.g. Roof, Upper Floor, Main Floor)

18.50 ft Total Length of Shearwalls

V(from upper)= 14805 lb 8713 lb
 V(from main)= 0 lb 0 lb
 V(from lower)= 0 lb 0 lb
 Σ (Wind) = 14,805 lb Σ (Smc) = 8,713 lb
 v = 168 PLF v = 99 PLF

Tributary Width (Main Floor)
 15.5 tributary width
 74.0 total width
 Not Used
 1.0 tributary width
 2.0 total width
 Not Used
 1.0 tributary width
 2.0 total width

Tributary Area (Main Floor)
 15.5 tributary area
 74.0 total area
 Not Used
 1.0 tributary area
 2.0 total area
 Not Used
 1.0 tributary area
 2.0 total area

Height of Shearwall = 9.0 ft
 Length of Shearwall = 4.5 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 → 1.4 x 0.93 x 242 = 315 PLF

USE SW6

Wind controls shearwall design

C_{TOTAL} = (floor above) + (this floor) = + 1509 lbs = 1509 lbs Wind controls
 T_{TOTAL} = (floor above) + (this floor) = + 1309 lbs = 1309 lbs Load case 8 controls - Wind

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 888 lbs

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

MAIN FL. MID 1 (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

Roof Resisting Dead Load
 (e.g. Roof, Upper Floor, Main Floor)

17.00 ft Total Length of Shearwalls

V(from upper)= 14805 lb 8713 lb
 V(from main)= 0 lb 0 lb
 V(from lower)= 0 lb 0 lb
 Σ (Wind) = 14,805 lb Σ (Smc) = 8,713 lb
 $v = 318$ PLF $v = 187$ PLF

Tributary Width (Main Floor)

27.0 tributary width
 74.0 total width
 Not Used
 1.0 tributary width
 2.0 total width
 Not Used
 1.0 tributary width
 2.0 total width

Height of Shearwall = 9.0 ft
 Length of Shearwall = 17.0 ft

Aspect Ratio OK

Use alternate R factor for seismic? No

Tributary Area (Main Floor)

27.0 tributary area
 74.0 total area
 Not Used
 1.0 tributary area
 2.0 total area
 Not Used
 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 \rightarrow 1.4 x 0.93 x 353 = 460 PLF

USE **SW4**

Wind controls shearwall design

$C_{TOTAL} =$ (floor above) + (this floor) = + 2860 lbs = 2860 lbs Wind controls
 $T_{TOTAL} =$ (floor above) + (this floor) = + 2275 lbs = 2275 lbs Load case 8 controls - Wind

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1683 lbs

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

NOT USED

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

Roof Resisting Dead Load
 (e.g. Roof, Upper Floor, Main Floor)

15.00 ft Total Length of Shearwalls

V(from upper)= 14805 lb 8713 lb
 V(from main)= 0 lb 0 lb
 V(from lower)= 0 lb 0 lb
 Σ (Wind) = 14,805 lb Σ (Smc) = 8,713 lb
 $v = 293$ PLF $v = 173$ PLF

Tributary Width (Main Floor)

22.0 tributary width
 74.0 total width
 Not Used
 1.0 tributary width
 2.0 total width
 Not Used
 1.0 tributary width
 2.0 total width

Height of Shearwall = 9.0 ft
 Length of Shearwall = 15.0 ft

Aspect Ratio OK

Use alternate R factor for seismic? No

Tributary Area (Main Floor)

22.0 tributary area
 74.0 total area
 Not Used
 1.0 tributary area
 2.0 total area
 Not Used
 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 \rightarrow 1.4 x 0.93 x 242 = 315 PLF

USE **SW6**

Wind controls shearwall design

$C_{TOTAL} =$ (floor above) + (this floor) = + 2641 lbs = 2641 lbs Wind controls
 $T_{TOTAL} =$ (floor above) + (this floor) = + 2118 lbs = 2118 lbs Load case 8 controls - Wind

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1554 lbs

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

MAIN FL. RIGHT (BD RM 2, BATH.)

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

Roof Resisting Dead Load
 (e.g. Roof, Upper Floor, Main Floor)

21.00 ft Total Length of Shearwalls

V(from upper)= 14805 lb 8713 lb
 V(from main)= 0 lb 0 lb
 V(from lower)= 0 lb 0 lb
 Σ (Wind) = 14,805 lb Σ (Smc) = 8,713 lb
 $v = 353$ PLF $v = 207$ PLF

Tributary Width (Main Floor)

1.0 tributary width
 2.0 total width
 Not Used
 1.0 tributary width
 2.0 total width
 Not Used
 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 (Main Floor)

1.0 tributary area
 2.0 total area
 Not Used
 1.0 tributary area
 2.0 total area
 Not Used
 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 \rightarrow 1.4 x 0.93 x 353 = 460 PLF

USE **SW4**

Wind controls shearwall design

$C_{TOTAL} =$ (floor above) + (this floor) = + 3173 lbs = 3173 lbs Wind controls
 $T_{TOTAL} =$ (floor above) + (this floor) = + 2834 lbs = 2834 lbs Load case 8 controls - Wind

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1867 lbs

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

3x framing required per IBC

MAIN FL. MID (STAIRS, HALL, BATH)

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)
27.00 ft	Total Length of Shearwalls
V(from upper) = 12701 lb	8713 lb
V(from main) = 0 lb	0 lb
V(from lower) = 0 lb	0 lb
Σ (Wind) = 12,701 lb	Σ (Smc) = 8,713 lb
v = 235 PLF	v = 161 PLF

Tributary Width (Main Floor)	
1.0	tributary width
2.0	total width
Not Used	
1.0	tributary width
2.0	total width
Not Used	
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 (Main Floor)	
1.0	tributary area
2.0	total area
Not Used	
1.0	tributary area
2.0	total area
Not Used	
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 → 1.4 x 0.93 x 242 = 315 PLF

USE **SW6**

Wind controls shearwall design

$C_{TOTAL} =$	(floor above) + (this floor) =		+	2117 lbs	=	2117 lbs	Wind controls
$T_{TOTAL} =$	(floor above) + (this floor) =		+	1770 lbs	=	1770 lbs	Load case 8 controls - Wind

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1452 lbs

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

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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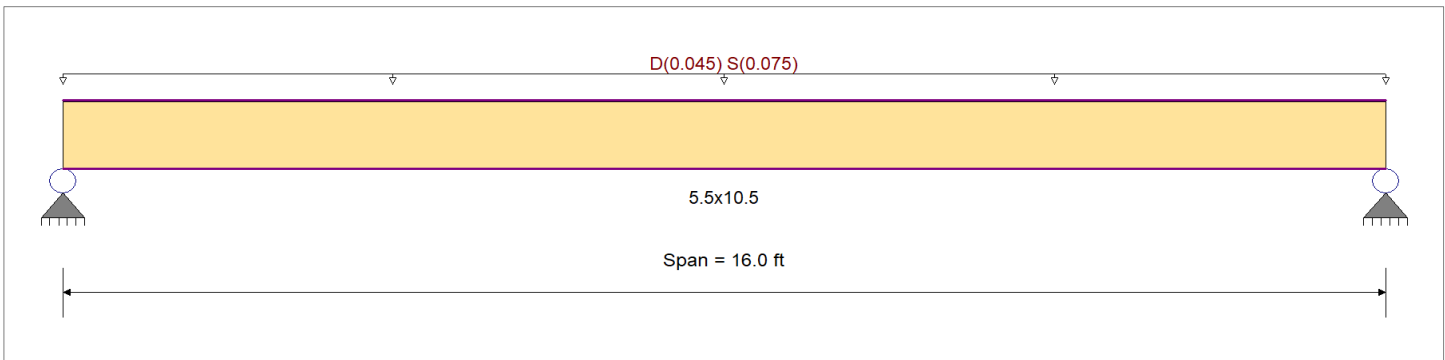
DESCRIPTION: MONO GIRDER TRUSS (Reactions ONLY)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	F _b +	2,400.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	F _b -	1,850.0 psi	E _{bend- xx}	1,800.0ksi
	F _c - Prll	1,650.0 psi	E _{minbend - xx}	950.0ksi
Wood Species : DF/DF	F _c - Perp	650.0 psi	E _{bend- yy}	1,600.0ksi
Wood Grade : 24F-V4	F _v	265.0 psi	E _{minbend - yy}	850.0ksi
	F _t	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 NOT internally calculated and added
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 3.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.165 : 1	Maximum Shear Stress Ratio =	0.073 : 1
Section used for this span	5.5x10.5	Section used for this span	5.5x10.5
fb: Actual =	455.96psi	fv: Actual =	22.39 psi
F ['] _b =	2,760.00psi	F ['] _v =	304.75 psi
Load Combination	+D+S	Load Combination	+D+S
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
Maximum Deflection			
Max Downward Transient Deflection	0.116 in Ratio = 1648 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in Ratio = 0 <360	n/a	
Max Downward Total Deflection	0.186 in Ratio = 1030 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in Ratio = 0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CL _x	C _v	C _{fu}	C _i	C _r	M	fb	F ['] _b	V	fv	F ['] _v		
D Only																				
Length = 16.0 ft	1	0.079	0.035	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.44	171.0	2,160.0	0.32	8.4	238.5			
+D+S																				
Length = 16.0 ft	1	0.165	0.073	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.84	456.0	2,760.0	0.86	22.4	304.8			
+D+0.750S																				
Length = 16.0 ft	1	0.139	0.062	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.24	384.7	2,760.0	0.73	18.9	304.8			
+0.60D																				
Length = 16.0 ft	1	0.027	0.012	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.86	102.6	3,840.0	0.19	5.0	424.0			

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: MONO GIRDER TRUSS (Reactions ONLY)

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1864	8.058		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	0.960	0.960
Max Upward from Load Combinations	0.960	0.960
Max Upward from Load Cases	0.600	0.600
D Only	0.360	0.360
+D+S	0.960	0.960
+D+0.750S	0.810	0.810
+0.60D	0.216	0.216
S Only	0.600	0.600

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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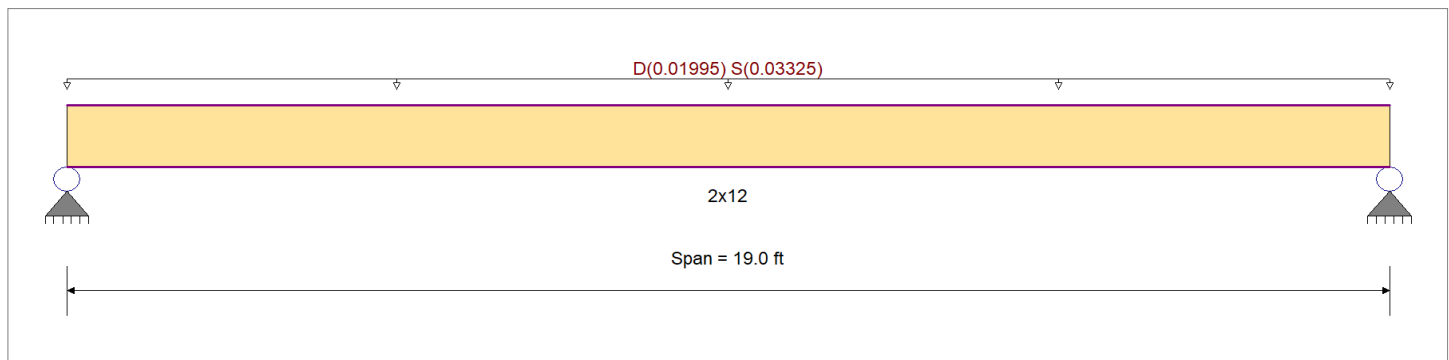
DESCRIPTION: RAFTERS 1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	850.0 psi	<i>E : Modulus of Elasticity</i>
Load Combination : IBC 2018	Fb -	850.0 psi	Ebend- xx 1,300.0ksi
	Fc - Prll	1,300.0 psi	Eminbend - xx 470.0ksi
Wood Species : Hem-Fir	Fc - Perp	405.0 psi	
Wood Grade : No.2	Fv	150.0 psi	
	Ft	525.0 psi	Density 26.840pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase



Applied Loads

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

Beam self weight calculated and added to loading
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 1.330 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.858 < 1	Maximum Shear Stress Ratio	=	0.250 < 1
Section used for this span		2x12	Section used for this span		2x12
fb: Actual	=	964.30psi	fv: Actual	=	43.07 psi
F'b	=	1,124.13psi	F'v	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	9.500ft	Location of maximum on span	=	18.099 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.424 in	Ratio = 537 >=360	Span: 1 : S Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.718 in	Ratio = 317 >=240	Span: 1 : +D+S		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 19.0 ft	1	0.449	0.131	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.04	395.3	879.8	0.0	0.00	0.0	0.0
+D+S	Length = 19.0 ft	1	0.858	0.250	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.15	2.54	964.3	1,124.1	0.48	43.1	172.5	0.0
+D+0.750S	Length = 19.0 ft	1	0.731	0.213	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.15	2.17	822.0	1,124.1	0.41	36.7	172.5	0.0
+0.60D	Length = 19.0 ft	1	0.152	0.044	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.63	237.2	1,564.0	0.12	10.6	240.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: RAFTERS 1

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.7182	9.569		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	0.535	0.535
Max Upward from Load Combinations	0.535	0.535
Max Upward from Load Cases	0.316	0.316
D Only	0.219	0.219
+D+S	0.535	0.535
+D+0.750S	0.456	0.456
+0.60D	0.132	0.132
S Only	0.316	0.316

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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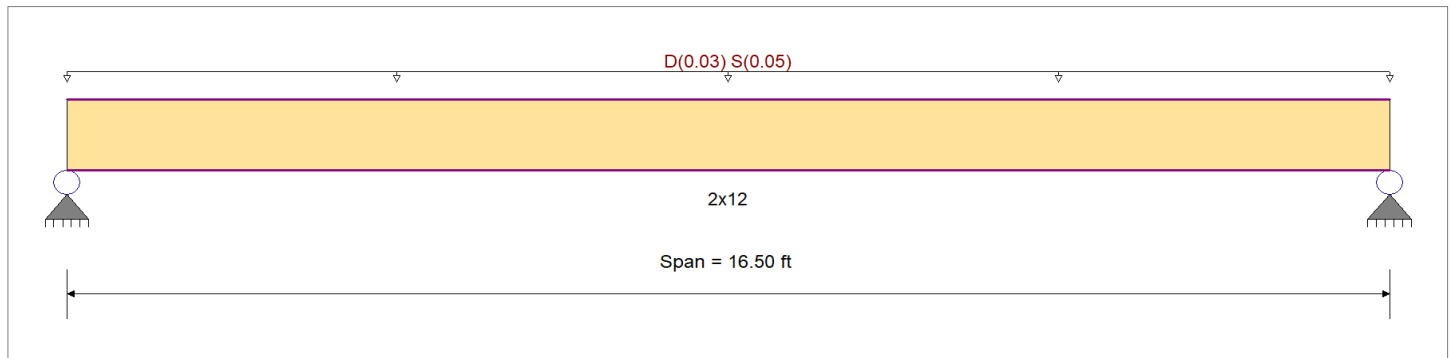
DESCRIPTION: RAFTERS 2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	850.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	850.0 psi	Ebend- xx	1,300.0ksi
	Fc - Prll	1,300.0 psi	Eminbend - xx	470.0ksi
Wood Species : Hem-Fir	Fc - Perp	405.0 psi		
Wood Grade : No.2	Fv	150.0 psi		
	Ft	525.0 psi	Density	26.840pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	



Applied Loads

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

Beam self weight calculated and added to loading
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 2.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.955 : 1	Maximum Shear Stress Ratio	=	0.315 : 1
Section used for this span		2x12	Section used for this span		2x12
fb: Actual	=	1,073.13psi	fv: Actual	=	54.30 psi
F'b	=	1,124.13psi	F'v	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	8.250ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.362 in	Ratio =	546	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.603 in	Ratio =	328	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 16.50 ft	1	0.486	0.160	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.13	427.8	879.8	0.0	0.00	0.0	0.0
+D+S	Length = 16.50 ft	1	0.955	0.315	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.15	2.83	1,073.1	1,124.1	0.61	54.3	172.5	0.0
+D+0.750S	Length = 16.50 ft	1	0.811	0.267	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.15	2.40	911.8	1,124.1	0.52	46.1	172.5	0.0
+0.60D	Length = 16.50 ft	1	0.164	0.054	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.68	256.7	1,564.0	0.15	13.0	240.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: RAFTERS 2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.6028	8.310		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	0.686	0.686
Max Upward from Load Combinations	0.686	0.686
Max Upward from Load Cases	0.413	0.413
D Only	0.273	0.273
+D+S	0.686	0.686
+D+0.750S	0.583	0.583
+0.60D	0.164	0.164
S Only	0.413	0.413

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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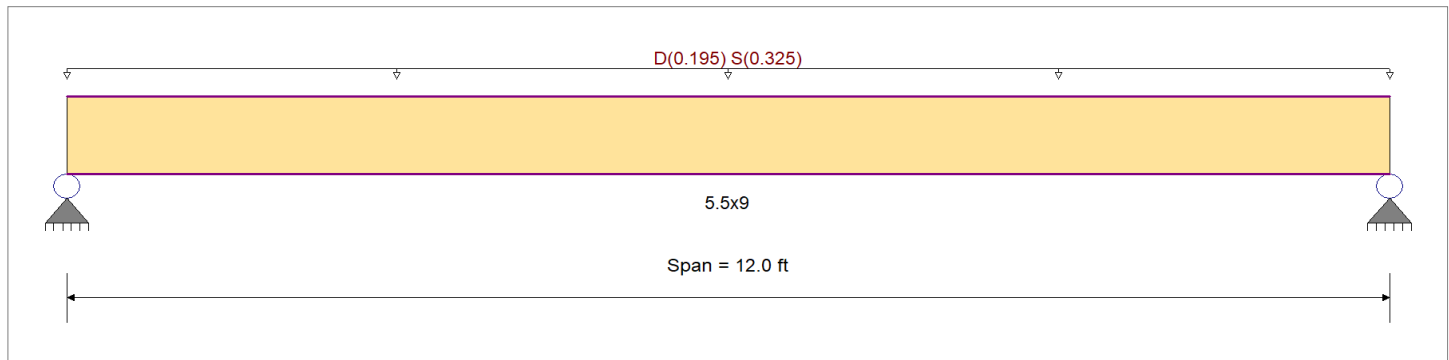
DESCRIPTION: BM#1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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 NOT internally calculated and added
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 13.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.548 : 1	Maximum Shear Stress Ratio	=	0.272 : 1
Section used for this span		5.5x9	Section used for this span		5.5x9
fb: Actual	=	1,512.73psi	fv: Actual	=	82.81 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.254 in	Ratio =	567 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.406 in	Ratio =	354 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
	Length = 12.0 ft	1	0.263	0.130	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.51	567.3	2,160.0	0.0	0.00	0.0	0.0	238.5
+D+S																				
	Length = 12.0 ft	1	0.548	0.272	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.36	1,512.7	2,760.0	0.0	0.00	0.0	0.0	304.8
+D+0.750S																				
	Length = 12.0 ft	1	0.462	0.229	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.90	1,276.4	2,760.0	0.0	0.00	0.0	0.0	304.8
+0.60D																				
	Length = 12.0 ft	1	0.089	0.044	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.11	340.4	3,840.0	0.0	0.00	0.0	0.0	424.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#1

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4057	6.044		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	3.120	3.120
Max Upward from Load Combinations	3.120	3.120
Max Upward from Load Cases	1.950	1.950
D Only	1.170	1.170
+D+S	3.120	3.120
+D+0.750S	2.633	2.633
+0.60D	0.702	0.702
S Only	1.950	1.950

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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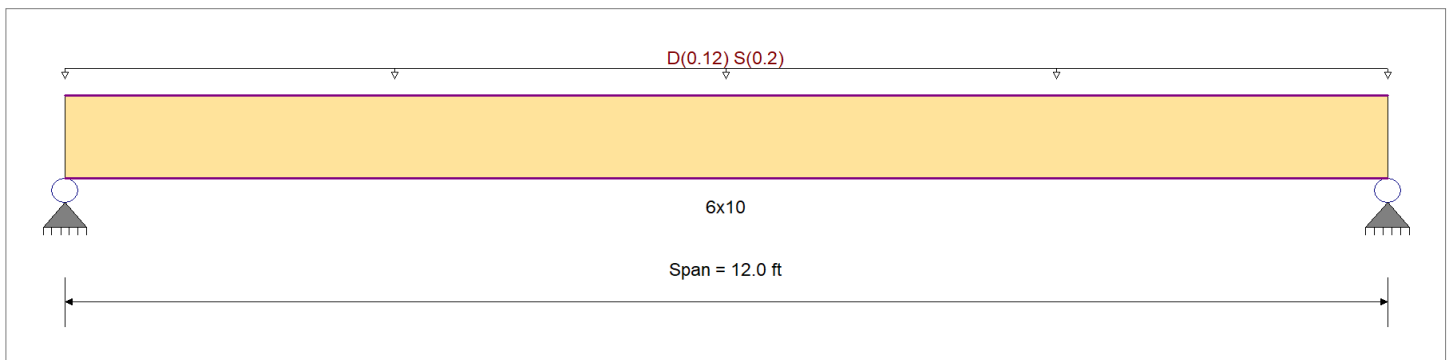
DESCRIPTION: BM#2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	875.0 psi	Ebend- xx	1,300.0ksi
	Fc - Prll	600.0 psi	Eminbend - xx	470.0ksi
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	625.0 psi		
Wood Grade : No.2	Fv	170.0 psi		
	Ft	425.0 psi	Density	30.590pcf
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 NOT internally calculated and added
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 8.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.830 : 1	Maximum Shear Stress Ratio	=	0.245 : 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	835.50psi	fv: Actual	=	47.88 psi
F'b	=	1,006.25psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.184 in	Ratio =	783 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.294 in	Ratio =	489 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 12.0 ft	1	0.398	0.117	0.90	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
+D+S																				
Length = 12.0 ft	1	0.830	0.245	1.15	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
+D+0.750S																				
Length = 12.0 ft	1	0.701	0.207	1.15	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
+0.60D																				
Length = 12.0 ft	1	0.134	0.040	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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2940	6.044		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	1.920	1.920
Max Upward from Load Combinations	1.920	1.920
Max Upward from Load Cases	1.200	1.200
D Only	0.720	0.720
+D+S	1.920	1.920
+D+0.750S	1.620	1.620
+0.60D	0.432	0.432
S Only	1.200	1.200

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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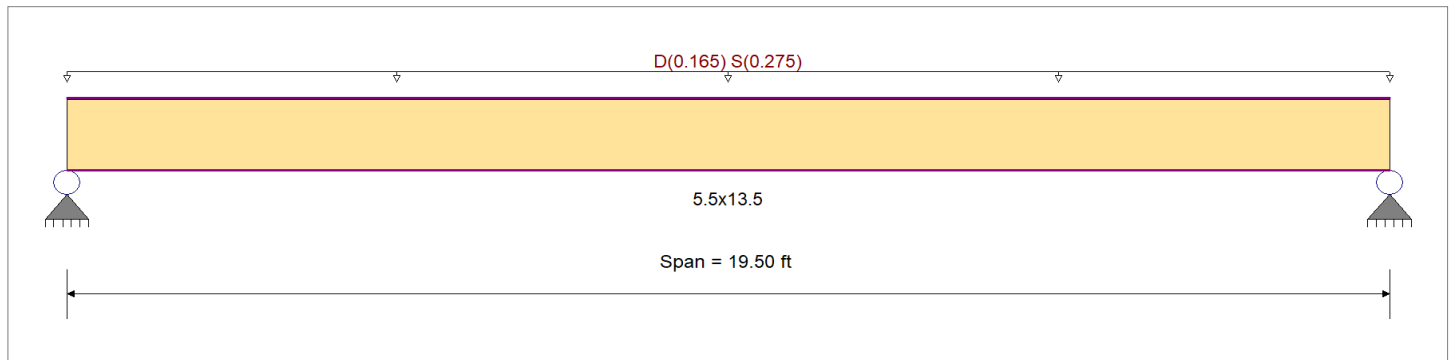
DESCRIPTION: **BM#3**

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 11.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.571 : 1	Maximum Shear Stress Ratio	=	0.263 : 1
Section used for this span	=	5.5x13.5	Section used for this span	=	5.5x13.5
fb: Actual	=	1,557.16psi	fv: Actual	=	80.00 psi
F'b	=	2,728.63psi	F'v	=	304.75 psi
Load Combination	=	+D+S	Load Combination	=	+D+S
Location of maximum on span	=	9.750ft	Location of maximum on span	=	18.432 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.443 in	Ratio =	527 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.735 in	Ratio =	318 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 19.50 ft	1		0.290	0.133	0.90	1.00	1.00	1.00	0.989	1.00	1.00	1.00	8.61	618.3	2,135.5	0.0	0.00	0.0	0.0	0.0
+D+S																				
Length = 19.50 ft	1		0.571	0.263	1.15	1.00	1.00	1.00	0.989	1.00	1.00	1.00	21.68	1,557.2	2,728.6	0.0	0.00	0.0	0.0	0.0
+D+0.750S																				
Length = 19.50 ft	1		0.485	0.223	1.15	1.00	1.00	1.00	0.989	1.00	1.00	1.00	18.41	1,322.4	2,728.6	0.0	0.00	0.0	0.0	0.0
+0.60D																				
Length = 19.50 ft	1		0.098	0.045	1.60	1.00	1.00	1.00	0.989	1.00	1.00	1.00	5.16	371.0	3,796.4	0.0	0.00	0.0	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: BM#3

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.7353	9.821		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	4.447	4.447
Max Upward from Load Combinations	4.447	4.447
Max Upward from Load Cases	2.681	2.681
D Only	1.766	1.766
+D+S	4.447	4.447
+D+0.750S	3.777	3.777
+0.60D	1.059	1.059
S Only	2.681	2.681

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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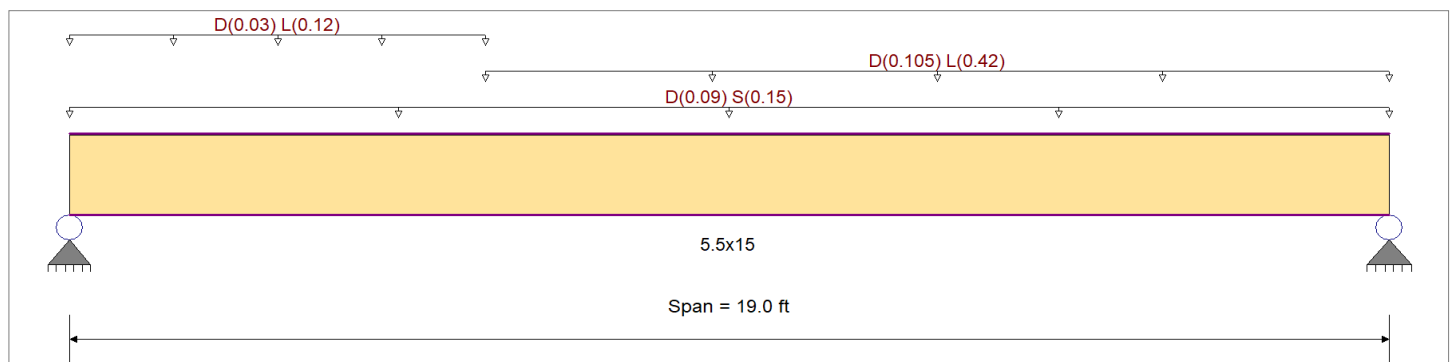
DESCRIPTION: BM#4

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 6.0 ft, (ROOF)
- Uniform Load : D = 0.0150, L = 0.060 ksf, Extent = 6.0 --> 19.0 ft, Tributary Width = 7.0 ft, (DECK)
- Uniform Load : D = 0.0150, L = 0.060 ksf, Extent = 0.0 --> 6.0 ft, Tributary Width = 2.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.625 1	Maximum Shear Stress Ratio =	0.334 : 1
Section used for this span	5.5x15	Section used for this span	5.5x15
fb: Actual =	1,471.04psi	fv: Actual =	88.49 psi
F'b =	2,353.96psi	F'v =	265.00 psi
Load Combination	+D+L	Load Combination	+D+L
Location of maximum on span =	10.055ft	Location of maximum on span =	17.752 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.374 in Ratio =	609 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in Ratio =	0 <360	n/a
Max Downward Total Deflection	0.607 in Ratio =	375 >=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 19.0 ft	1	0.246	0.129	0.90	1.00	1.00	1.00	0.981	1.00	1.00	1.00	8.94	520.3	2,118.6	0.0	0.00	0.0	0.0
+D+L	Length = 19.0 ft	1	0.625	0.334	1.00	1.00	1.00	1.00	0.981	1.00	1.00	1.00	25.28	1,471.0	2,354.0	4.87	88.5	265.0	0.0
+D+S	Length = 19.0 ft	1	0.338	0.174	1.15	1.00	1.00	1.00	0.981	1.00	1.00	1.00	15.71	913.9	2,707.1	2.92	53.2	304.8	0.0
+D+0.750L	Length = 19.0 ft	1	0.419	0.223	1.25	1.00	1.00	1.00	0.981	1.00	1.00	1.00	21.20	1,233.3	2,942.5	4.07	74.0	331.3	0.0
+D+0.750L+0.750S	Length = 19.0 ft	1	0.419	0.223	1.25	1.00	1.00	1.00	0.981	1.00	1.00	1.00	21.20	1,233.3	2,942.5	4.07	74.0	331.3	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: BM#4

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 19.0 ft	1		0.564	0.298	1.15	1.00	1.00	1.00	0.981	1.00	1.00	1.00	26.26	1,527.9	2,707.1	5.00	90.9	304.8
+0.60D						1.00	1.00	1.00	0.981	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 19.0 ft	1		0.083	0.043	1.60	1.00	1.00	1.00	0.981	1.00	1.00	1.00	5.37	312.2	3,766.3	1.01	18.4	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.6074	9.639		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	4.568	5.799
Max Upward from Load Combinations	4.568	5.799
Max Upward from Load Cases	2.474	3.706
D Only	1.643	1.951
+D+L	4.118	5.657
+D+S	3.068	3.376
+D+0.750L	3.499	4.731
+D+0.750L+0.750S	4.568	5.799
+0.60D	0.986	1.171
L Only	2.474	3.706
S Only	1.425	1.425

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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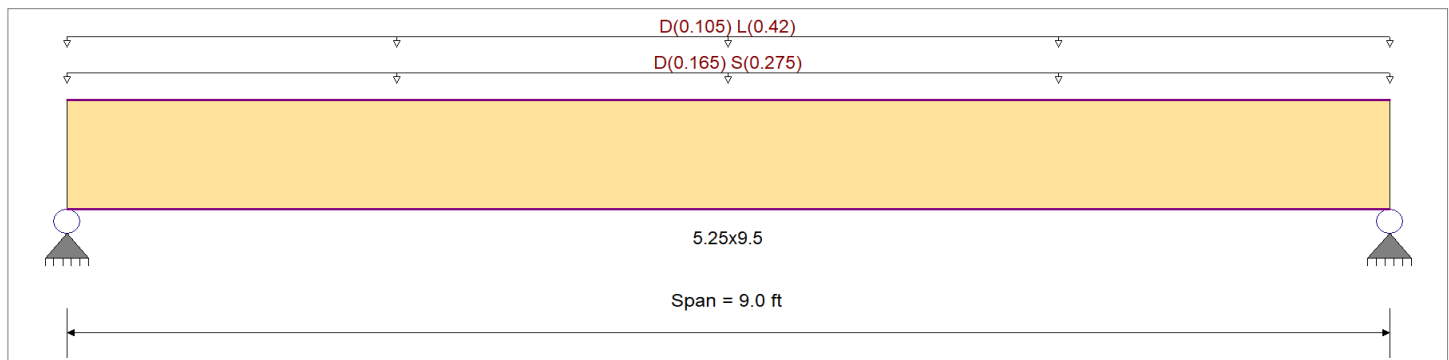
DESCRIPTION: **BM#4.1**

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 11.0 ft, (ROOF)

Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 7.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.365 : 1	Maximum Shear Stress Ratio	=	0.272 : 1
Section used for this span		5.25x9.5	Section used for this span		5.25x9.5
fb: Actual	=	1,085.64psi	fv: Actual	=	78.77 psi
F'b	=	2,976.18psi	F'v	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.500ft	Location of maximum on span	=	8.212 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.083 in	Ratio = 1299 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.160 in	Ratio = 676 >=240	Span: 1 : +D+0.750L+0.750S		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 9.0 ft	1	0.164	0.122	0.90	1.00	1.00	1.00	1.026	1.00	1.00	1.00	2.89	439.4	2,678.6	0.0	0.00	0.0	0.0	0.0	261.0
+D+L																				
Length = 9.0 ft	1	0.365	0.272	1.00	1.00	1.00	1.00	1.026	1.00	1.00	1.00	7.14	1,085.6	2,976.2	0.0	0.00	0.0	0.0	0.0	290.0
+D+S																				
Length = 9.0 ft	1	0.252	0.188	1.15	1.00	1.00	1.00	1.026	1.00	1.00	1.00	5.68	862.5	3,422.6	0.0	0.00	0.0	0.0	0.0	333.5
+D+0.750L																				
Length = 9.0 ft	1	0.248	0.185	1.25	1.00	1.00	1.00	1.026	1.00	1.00	1.00	6.08	924.1	3,720.2	0.0	0.00	0.0	0.0	0.0	362.5
+D+0.750L+0.750S																				
Length = 9.0 ft	1				1.00	1.00	1.00	1.026	1.00	1.00	1.00			0.0	0.00	0.0	0.0	0.0	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#4.1

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
Length = 9.0 ft	1	0.363	0.270	1.15	1.00	1.00	1.00	1.026	1.00	1.00	1.00	8.17	1,241.4	3,422.6	2.99	90.1	333.5	
+0.60D							1.00	1.00	1.00	1.026	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1	0.055	0.041	1.60	1.00	1.00	1.00	1.026	1.00	1.00	1.00	1.74	263.7	4,761.9	0.64	19.1	464.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1597	4.533		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	3.631	3.631
Max Upward from Load Combinations	3.631	3.631
Max Upward from Load Cases	1.890	1.890
D Only	1.285	1.285
+D+L	3.175	3.175
+D+S	2.523	2.523
+D+0.750L	2.703	2.703
+D+0.750L+0.750S	3.631	3.631
+0.60D	0.771	0.771
L Only	1.890	1.890
S Only	1.238	1.238

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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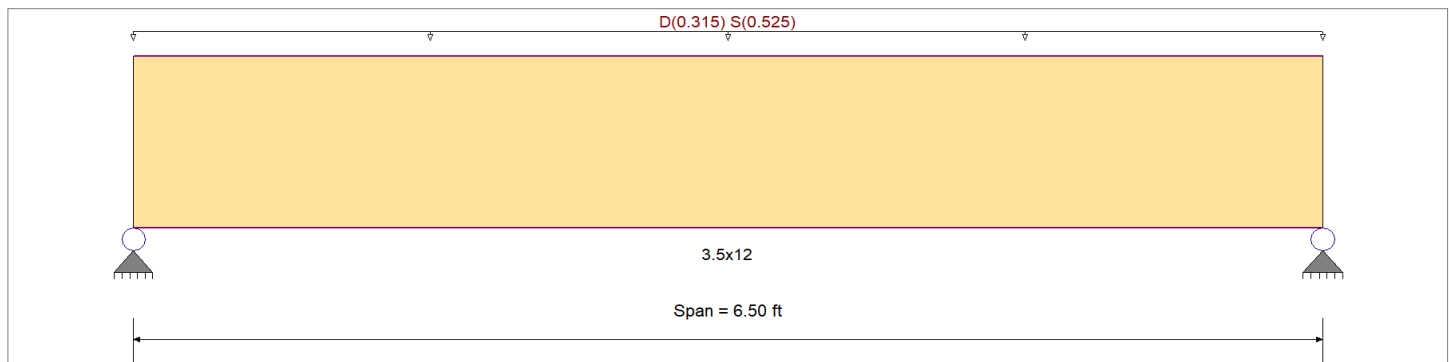
DESCRIPTION: BM#4.2

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2400 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	1850 psi	Ebend- xx	1800ksi
	Fc - Prll	1650 psi	Eminbend - xx	950ksi
Wood Species : DF/DF	Fc - Perp	650 psi	Ebend- yy	1600ksi
Wood Grade : 24F-V4	Fv	265 psi	Eminbend - yy	850ksi
	Ft	1100 psi	Density	31.21 pcf
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, S = 0.0250 ksf, Tributary Width = 21.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.232	1	Maximum Shear Stress Ratio	=	0.224	: 1
Section used for this span		3.5x12		Section used for this span		3.5x12	
fb: Actual	=	640.62psi		fv: Actual	=	68.34 psi	
F'b	=	2,760.00psi		F'v	=	304.75 psi	
Load Combination		+D+S		Load Combination		+D+S	
Location of maximum on span	=	3.250ft		Location of maximum on span	=	5.504 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.023 in	Ratio =	3336	>=360	Span: 1 : S Only		
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a		
Max Downward Total Deflection	0.038 in	Ratio =	2062	>=240	Span: 1 : +D+S		
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 6.50 ft	1	0.113	0.109	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.71	244.5	2,160.0	0.0	0.00	0.0	0.0
+D+S	Length = 6.50 ft	1	0.232	0.224	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.48	640.6	2,760.0	0.0	0.00	0.0	0.0
+D+0.750S	Length = 6.50 ft	1	0.196	0.190	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.79	541.6	2,760.0	0.0	0.00	0.0	0.0
+0.60D	Length = 6.50 ft	1	0.038	0.037	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.03	146.7	3,840.0	0.0	0.00	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#4.2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0378	3.274		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	2.760	2.760
Max Upward from Load Combinations	2.760	2.760
Max Upward from Load Cases	1.706	1.706
D Only	1.053	1.053
+D+S	2.760	2.760
+D+0.750S	2.333	2.333
+0.60D	0.632	0.632
S Only	1.706	1.706

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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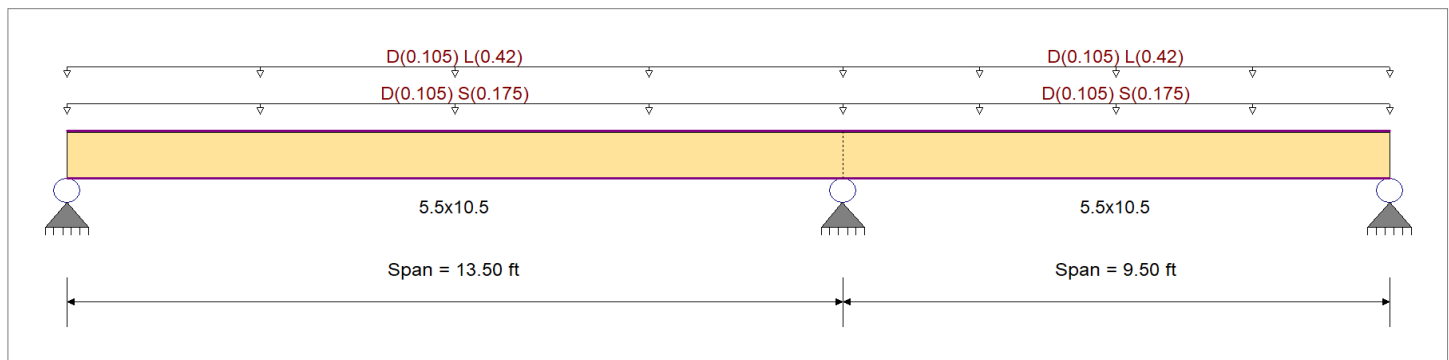
DESCRIPTION: BM#5

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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 NOT internally calculated and added

Load for Span Number 1

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 7.0 ft, (ROOF)

Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 7.0 ft, (DECK)

Load for Span Number 2

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 7.0 ft, (ROOF)

Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 7.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.729	:	1	Maximum Shear Stress Ratio	=	0.448	:	1
Section used for this span		5.5x10.5			Section used for this span		5.5x10.5		
fb: Actual	=	1,348.83psi			fv: Actual	=	118.74 psi		
F'b	=	1,850.00psi			F'v	=	265.00 psi		
Load Combination		+D+L			Load Combination		+D+L		
Location of maximum on span	=	13.500ft			Location of maximum on span	=	12.670 ft		
Span # where maximum occurs	=	Span # 1			Span # where maximum occurs	=	Span # 1		
Maximum Deflection									
Max Downward Transient Deflection		0.177 in	Ratio =	914	>=360	Span: 2 : L Only			
Max Upward Transient Deflection		-0.012 in	Ratio =	9397	>=360	Span: 2 : L Only			
Max Downward Total Deflection		0.277 in	Ratio =	585	>=240	Span: 2 : +D+0.750L+0.750S			
Max Upward Total Deflection		-0.019 in	Ratio =	6014	>=240	Span: 2 : +D+0.750L+0.750S			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CL _x	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																			
	Length = 13.50 ft	1	0.270	0.166	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.79	449.6	1,665.0	0.0	0.00	0.0	0.0
	Length = 9.50 ft	2	0.270	0.166	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.79	449.6	1,665.0	1.22	39.6	238.5	238.5
+D+L																			
	Length = 13.50 ft	1	0.729	0.448	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.36	1,348.8	1,850.0	0.0	4.57	118.7	265.0
	Length = 9.50 ft	2	0.729	0.448	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.36	1,348.8	1,850.0	3.65	118.7	265.0	265.0

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: BM#5

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
+D+S						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.50 ft	1		0.387	0.238	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.94	824.3	2,127.5	2.79	72.6	304.8
Length = 9.50 ft	2		0.387	0.238	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.94	824.3	2,127.5	2.23	72.6	304.8
+D+0.750L						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.50 ft	1		0.486	0.299	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.47	1,124.0	2,312.5	3.81	98.9	331.3
Length = 9.50 ft	2		0.486	0.299	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.47	1,124.0	2,312.5	3.04	98.9	331.3
+D+0.750L+0.750S						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.50 ft	1		0.660	0.406	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.83	1,405.0	2,127.5	4.76	123.7	304.8
Length = 9.50 ft	2		0.660	0.406	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.83	1,405.0	2,127.5	3.81	123.7	304.8
+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 = 13.50 ft	1		0.091	0.056	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.27	269.8	2,960.0	0.91	23.7	424.0
Length = 9.50 ft	2		0.091	0.056	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.27	269.8	2,960.0	0.73	23.7	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.2768	6.109		0.0000	0.000
+D+0.750L+0.750S	2	0.0138	6.793	+D+0.750L+0.750S	-0.0190	1.645

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	3.553	9.669	1.872
Max Upward from Load Combinations	3.553	9.669	1.872
Max Upward from Load Cases	2.274	6.188	1.198
D Only	1.137	3.094	0.599
+D+L	3.411	9.282	1.797
+D+S	2.085	5.672	1.098
+D+0.750L	2.843	7.735	1.497
+D+0.750L+0.750S	3.553	9.669	1.872
+0.60D	0.682	1.856	0.359
L Only	2.274	6.188	1.198
S Only	0.948	2.578	0.499

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.8.17

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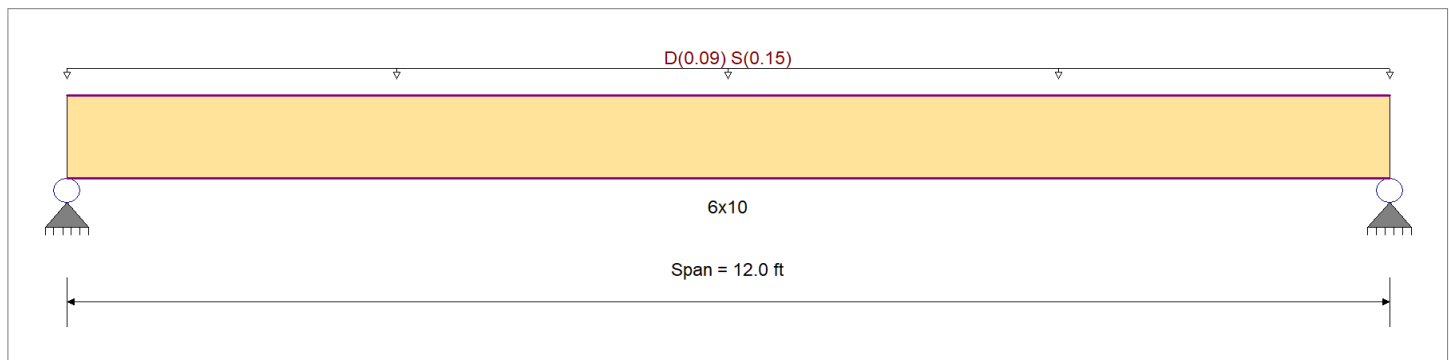
DESCRIPTION: BM#6

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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 NOT internally calculated and added
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 6.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.623 < 1	Maximum Shear Stress Ratio	=	0.184 < 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	626.62psi	fv: Actual	=	35.91 psi
Fb: Allowable	=	1,006.25psi	Fv: Allowable	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.138 in	Ratio =	1045	>=360
Max Upward Transient Deflection		0 in	Ratio =	0	<360
Max Downward Total Deflection		0.220 in	Ratio =	653	>=240
Max Upward Total Deflection		0 in	Ratio =	0	<240
				Span: 1 : S Only	n/a
				Span: 1 : +D+S	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values					
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v			
D Only	Length = 12.0 ft	1	0.298	0.088	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.62	234.98	787.50	0.00	0.00	0.00	0.00	153.00
+D+S	Length = 12.0 ft	1	0.623	0.184	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	4.32	626.62	1006.25	0.00	0.00	0.00	0.00	195.50
+D+0.750S	Length = 12.0 ft	1	0.525	0.155	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	3.65	528.71	1006.25	0.00	0.00	0.00	0.00	195.50
+0.60D	Length = 12.0 ft	1	0.101	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	0.97	140.99	1400.00	0.00	0.00	0.00	0.00	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2205	6.044		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.8.17

CK Engineering LLC

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DESCRIPTION: BM#6

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.440	1.440
Overall MINimum	0.900	0.900
D Only	0.540	0.540
+D+S	1.440	1.440
+D+0.750S	1.215	1.215
+0.60D	0.324	0.324
S Only	0.900	0.900

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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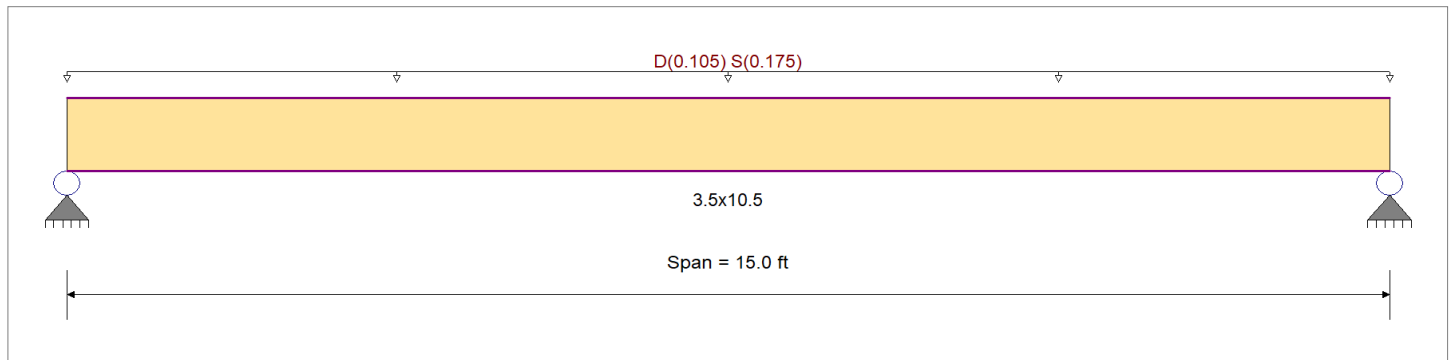
DESCRIPTION: BM#7

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 7.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.548 < 1	Maximum Shear Stress Ratio	=	0.258 < 1
Section used for this span		3.5x10.5	Section used for this span		3.5x10.5
fb: Actual	=	1,511.19psi	fv: Actual	=	78.50 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.500ft	Location of maximum on span	=	14.179 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.330 in	Ratio = 545 >=360	Span: 1 : S Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.543 in	Ratio = 331 >=240	Span: 1 : +D+S		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 15.0 ft	1		0.274	0.129	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.18	592.8	2,160.0	0.0	0.00	0.0	0.0	238.5
+D+S																				
Length = 15.0 ft	1		0.548	0.258	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.10	1,511.2	2,760.0	0.0	0.00	0.0	0.0	304.8
+D+0.750S																				
Length = 15.0 ft	1		0.464	0.218	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.87	1,281.6	2,760.0	0.0	0.00	0.0	0.0	304.8
+1.197D																				
Length = 15.0 ft	1		0.185	0.087	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.80	709.8	3,840.0	0.0	0.00	0.0	0.0	424.0
+1.148D+0.750S																				
Length = 15.0 ft	1		0.357	0.168	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.34	1,369.3	3,840.0	0.0	0.00	0.0	0.0	424.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#7

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
+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 = 15.0 ft	1		0.093	0.044	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.91	355.7	3,840.0	0.45	18.5	424.0
+0.4027D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.0 ft	1		0.062	0.029	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.28	238.8	3,840.0	0.30	12.4	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.5429	7.555		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	2.160	2.160
Max Upward from Load Combinations	2.160	2.160
Max Upward from Load Cases	1.313	1.313
D Only	0.847	0.847
+D+S	2.160	2.160
+D+0.750S	1.832	1.832
+0.60D	0.508	0.508
S Only	1.313	1.313

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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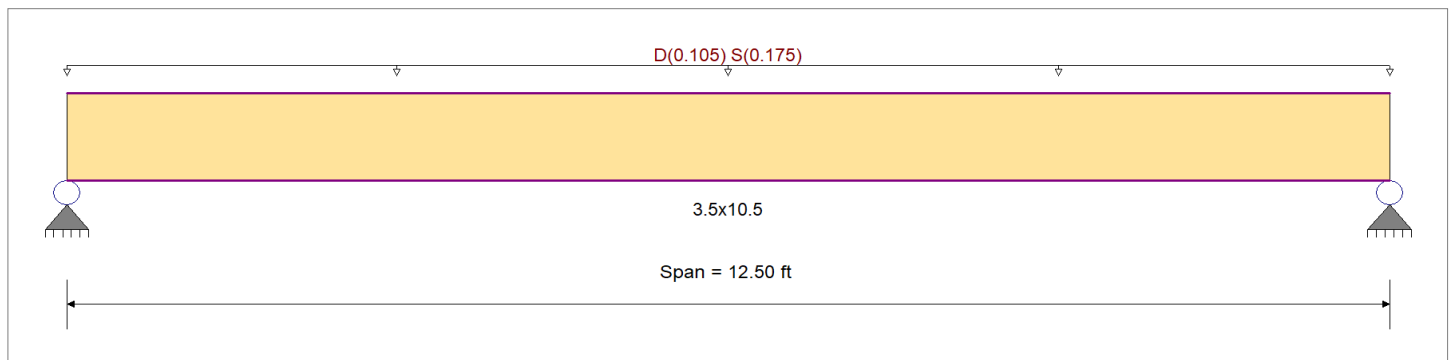
DESCRIPTION: BM#7.1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 7.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.380 : 1	Maximum Shear Stress Ratio =	0.208 : 1
Section used for this span	3.5x10.5	Section used for this span	3.5x10.5
fb: Actual =	1,049.44psi	fv: Actual =	63.27 psi
F'b =	2,760.00psi	F'v =	304.75 psi
Load Combination	+D+S	Load Combination	+D+S
Location of maximum on span	6.250ft	Location of maximum on span	11.633ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.159 in Ratio =	942 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in Ratio =	0 <360	n/a
Max Downward Total Deflection	0.262 in Ratio =	572 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 12.50 ft	1		0.191	0.104	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.21	411.7	2,160.0	0.0	0.00	0.0	0.0	0.0
+D+S																				
Length = 12.50 ft	1		0.380	0.208	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.62	1,049.4	2,760.0	0.0	0.00	0.0	0.0	0.0
+D+0.750S																				
Length = 12.50 ft	1		0.322	0.176	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.77	890.0	2,760.0	0.0	0.00	0.0	0.0	0.0
+1.197D																				
Length = 12.50 ft	1		0.128	0.070	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.64	492.9	3,840.0	0.0	0.00	0.0	0.0	0.0
+1.148D+0.750S																				
Length = 12.50 ft	1		0.248	0.135	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.10	950.9	3,840.0	0.0	0.00	0.0	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#7.1

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
+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		0.064	0.035	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.32	247.0	3,840.0	0.36	14.9	424.0
+0.4027D						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		0.043	0.024	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.89	165.8	3,840.0	0.24	10.0	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2618	6.296		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	1.800	1.800
Max Upward from Load Combinations	1.800	1.800
Max Upward from Load Cases	1.094	1.094
D Only	0.706	0.706
+D+S	1.800	1.800
+D+0.750S	1.526	1.526
+0.60D	0.424	0.424
S Only	1.094	1.094

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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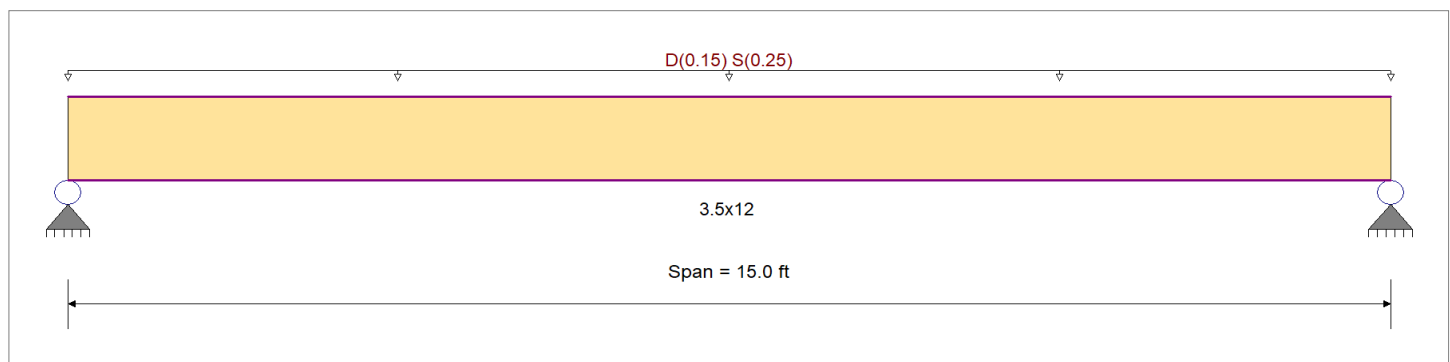
DESCRIPTION: BM#8

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 10.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.596 < 1	Maximum Shear Stress Ratio	=	0.312 < 1
Section used for this span		3.5x12	Section used for this span		3.5x12
fb: Actual	=	1,643.72psi	fv: Actual	=	95.18 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.500ft	Location of maximum on span	=	14.015 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.316 in	Ratio =	570 >= 360	Span: 1 : S Only
Max Upward Transient Deflection		0 in	Ratio =	0 < 360	n/a
Max Downward Total Deflection		0.517 in	Ratio =	348 >= 240	Span: 1 : +D+S
Max Upward Total Deflection		0 in	Ratio =	0 < 240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																0.0	0.00	0.0	0.0
Length = 15.0 ft	1		0.296	0.155	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.47	639.3	2,160.0	1.04	37.0	238.5	
+D+S																0.0	0.00	0.0	0.0
Length = 15.0 ft	1		0.596	0.312	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.51	1,643.7	2,760.0	2.67	95.2	304.8	
+D+0.750S																0.0	0.00	0.0	0.0
Length = 15.0 ft	1		0.505	0.265	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	9.75	1,392.6	2,760.0	2.26	80.6	304.8	
+1.197D																0.0	0.00	0.0	0.0
Length = 15.0 ft	1		0.199	0.105	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.36	765.4	3,840.0	1.24	44.3	424.0	
+1.148D+0.750S																0.0	0.00	0.0	0.0
Length = 15.0 ft	1		0.387	0.203	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	10.41	1,487.2	3,840.0	2.41	86.1	424.0	

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#8

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
+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 = 15.0 ft	1		0.100	0.052	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.68	383.6	3,840.0	0.62	22.2	424.0
+0.4027D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 15.0 ft	1		0.067	0.035	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.80	257.5	3,840.0	0.42	14.9	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.5167	7.555		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	3.068	3.068
Max Upward from Load Combinations	3.068	3.068
Max Upward from Load Cases	1.875	1.875
D Only	1.193	1.193
+D+S	3.068	3.068
+D+0.750S	2.600	2.600
+0.60D	0.716	0.716
S Only	1.875	1.875

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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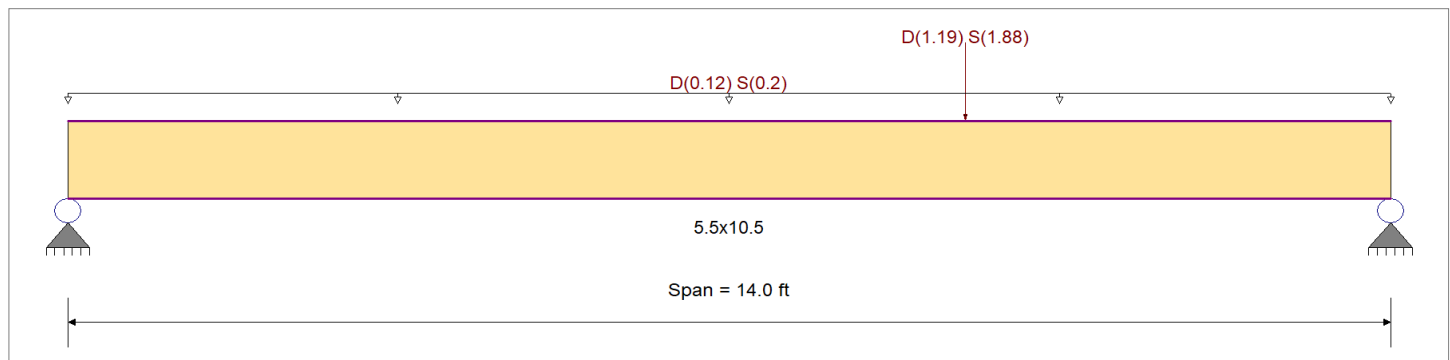
DESCRIPTION: BM#9

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 8.0 ft, (ROOF)
 Point Load : D = 1.190, S = 1.880 k @ 9.50 ft, (BM#8)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.709 : 1	Maximum Shear Stress Ratio	=	0.351 : 1
Section used for this span		5.5x10.5	Section used for this span		5.5x10.5
fb: Actual	=	1,956.13psi	fv: Actual	=	107.06 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	9.453ft	Location of maximum on span	=	13.131 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.345 in	Ratio =	486 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.569 in	Ratio =	295 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																			
Length = 14.0 ft	1	0.355	0.176	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.46	767.5	2,160.0	0.0	0.00	0.0	0.0	238.5
+D+S																			
Length = 14.0 ft	1	0.709	0.351	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	16.47	1,956.1	2,760.0	0.0	0.00	0.0	0.0	304.8
+D+0.750S																			
Length = 14.0 ft	1	0.601	0.298	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.97	1,659.0	2,760.0	0.0	0.00	0.0	0.0	304.8
+1.197D																			
Length = 14.0 ft	1	0.239	0.119	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.74	918.9	3,840.0	0.0	0.00	0.0	0.0	424.0
+1.148D+0.750S																			

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#9

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v		
Length = 14.0 ft	1	0.462	0.229	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	14.93	1,772.5	3,840.0	3.74	97.0	424.0
+0.60D																	0.0	0.00	0.0	0.0
Length = 14.0 ft	1	0.120	0.060	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.88	460.5	3,840.0	0.97	25.2	424.0
+0.4027D																	0.0	0.00	0.0	0.0
Length = 14.0 ft	1	0.080	0.040	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.60	309.1	3,840.0	0.65	16.9	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.5694	7.358		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	3.314	4.411
Max Upward from Load Combinations	3.314	4.411
Max Upward from Load Cases	2.004	2.676
D Only	1.310	1.735
+D+S	3.314	4.411
+D+0.750S	2.813	3.742
+0.60D	0.786	1.041
S Only	2.004	2.676

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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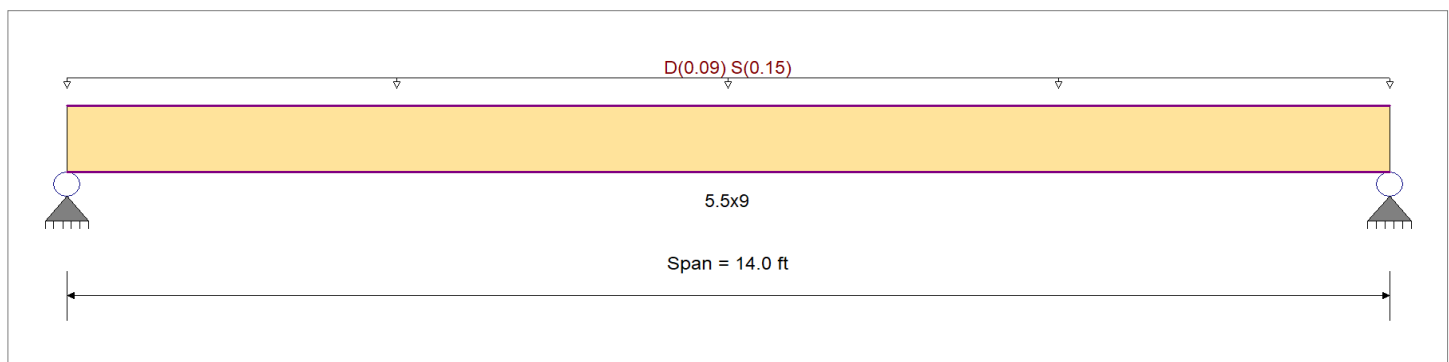
DESCRIPTION: BM#10

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 6.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.360 < 1	Maximum Shear Stress Ratio	=	0.157 < 1
Section used for this span		5.5x9	Section used for this span		5.5x9
fb: Actual	=	992.78psi	fv: Actual	=	47.75 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.000ft	Location of maximum on span	=	13.285 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.217 in	Ratio = 774	>=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.362 in	Ratio = 463	>=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio = 0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 14.0 ft	1	0.185	0.080	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.47	398.8	2,160.0	0.0	0.00	0.0	0.0
+D+S	Length = 14.0 ft	1	0.360	0.157	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.14	992.8	2,760.0	0.0	0.00	0.0	0.0
+D+0.750S	Length = 14.0 ft	1	0.306	0.133	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.22	844.3	2,760.0	0.0	0.00	0.0	0.0
+1.197D	Length = 14.0 ft	1	0.124	0.054	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.95	477.5	3,840.0	0.0	0.00	0.0	0.0
+1.148D+0.750S	Length = 14.0 ft	1	0.235	0.102	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.59	903.3	3,840.0	0.0	0.00	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#10

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
+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 = 14.0 ft	1		0.062	0.027	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.48	239.3	3,840.0	0.38	11.5	424.0
+0.4027D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 14.0 ft	1		0.042	0.018	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.99	160.6	3,840.0	0.25	7.7	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3624	7.051		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	1.755	1.755
Max Upward from Load Combinations	1.755	1.755
Max Upward from Load Cases	1.050	1.050
D Only	0.705	0.705
+D+S	1.755	1.755
+D+0.750S	1.493	1.493
+0.60D	0.423	0.423
S Only	1.050	1.050

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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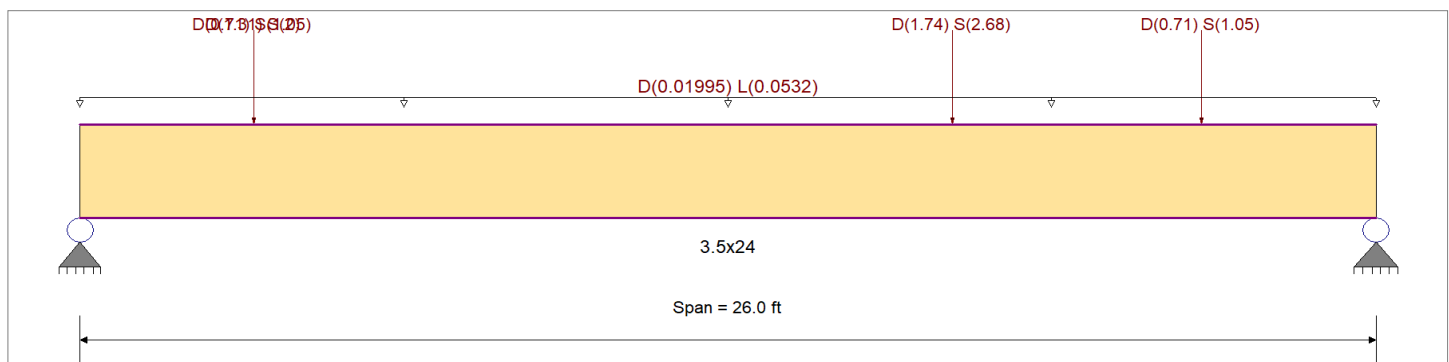
DESCRIPTION: BM#11

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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 = 0.040 ksf, Tributary Width = 1.330 ft, (FLOOR)

Point Load : D = 1.310, S = 2.0 k @ 3.50 ft, (BM#9)

Point Load : D = 0.710, S = 1.050 k @ 3.50 ft, (BM#10)

Point Load : D = 0.710, S = 1.050 k @ 22.50 ft, (BM#10)

Point Load : D = 1.740, S = 2.680 k @ 17.50 ft, (BM#9)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.519 < 1	Maximum Shear Stress Ratio	=	0.380 < 1
Section used for this span		3.5x24	Section used for this span		3.5x24
fb: Actual	=	1,358.55psi	fv: Actual	=	115.88 psi
F'b	=	2,618.75psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	17.460ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.340 in	Ratio =	918 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.617 in	Ratio =	505 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 26.0 ft	1	0.292	0.212	0.90	1.00	1.00	1.00	0.949	1.00	1.00	1.00	16.77	598.8	2,049.5	0.0	0.00	0.0	0.0
+D+L	Length = 26.0 ft	1				1.00	1.00	1.00	0.949	1.00	1.00	1.00	20.74	740.5	2,277.2	0.0	0.00	0.0	0.0
+D+S	Length = 26.0 ft	1				1.00	1.00	1.00	0.949	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
+D+S	Length = 26.0 ft	1	0.519	0.380	1.15	1.00	1.00	1.00	0.949	1.00	1.00	1.00	38.04	1,358.6	2,618.7	6.49	115.9	304.8	
+D+0.750L						1.00	1.00	1.00	0.949	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: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#11

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 26.0 ft	1	1	0.248	0.176	1.25	1.00	1.00	1.00	0.949	1.00	1.00	1.00	19.74	705.1	2,846.5	3.27	58.4	331.3
+D+0.750L+0.750S																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.487	0.352	1.15	1.00	1.00	1.00	0.949	1.00	1.00	1.00	35.70	1,274.9	2,618.7	6.01	107.4	304.8
+1.197D																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.197	0.143	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	20.08	717.0	3,643.5	3.39	60.6	424.0
+1.148D+0.750L+0.750S																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.374	0.271	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	38.18	1,363.5	3,643.5	6.43	114.9	424.0
+0.60D																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.099	0.072	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	10.06	359.3	3,643.5	1.70	30.3	424.0
+0.4027D																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.066	0.048	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	6.75	241.2	3,643.5	1.14	20.4	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.6169	13.380		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	6.565	5.677
Max Upward from Load Combinations	6.565	5.677
Max Upward from Load Cases	3.657	3.123
D Only	2.909	2.554
+D+L	3.600	3.245
+D+S	6.565	5.677
+D+0.750L	3.427	3.072
+D+0.750L+0.750S	6.170	5.415
+0.60D	1.745	1.532
L Only	0.692	0.692
S Only	3.657	3.123

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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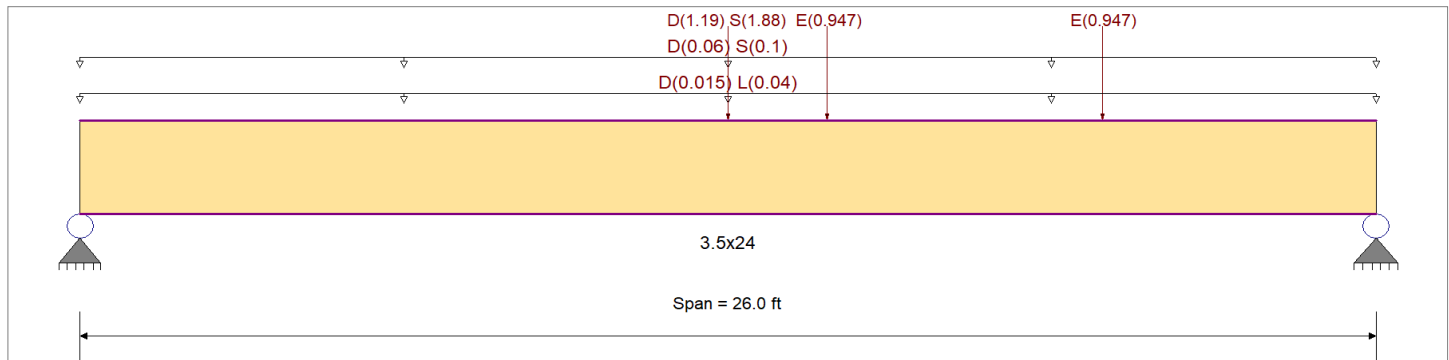
DESCRIPTION: BM#12

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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 = 0.040 ksf, Tributary Width = 1.0 ft, (FLOOR)
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 4.0 ft, (ROOF)
 Point Load : E = 0.9470 k @ 15.0 ft, (SW6)
 Point Load : E = 0.9470 k @ 20.5 ft, (SW6)
 Point Load : D = 1.190, S = 1.880 k @ 13.0 ft, (BM#8)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = 0.623 < 1	Maximum Shear Stress Ratio = 0.343 < 1
Section used for this span = 3.5x24	Section used for this span = 3.5x24
fb: Actual = 2,268.53psi	fv: Actual = 145.25 psi
F'b = 3,643.47psi	F'v = 424.00 psi
Load Combination +1.148D+0.750L+0.750S+3.413E	Load Combination +1.148D+0.750L+0.750S+3.413E
Location of maximum on span = 14.993ft	Location of maximum on span = 24.007 ft
Span # where maximum occurs = Span # 1	Span # where maximum occurs = Span # 1
Maximum Deflection	
Max Downward Transient Deflection 0.307 in Ratio = 1015 >=360	Span: 1 : S Only
Max Upward Transient Deflection 0 in Ratio = 0 <360	n/a
Max Downward Total Deflection 0.579 in Ratio = 539 >=240	Span: 1 : +D+0.750L+0.750S+0.5250E
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 _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 26.0 ft	1	0.272	0.121	0.90	1.00	1.00	1.00	0.949	1.00	1.00	1.00	15.61	557.5	2,049.5	0.0	0.00	0.0	0.0
+D+L	Length = 26.0 ft	1	0.298	0.139	1.00	1.00	1.00	1.00	0.949	1.00	1.00	1.00	18.99	678.2	2,277.2	2.06	36.8	265.0	0.0
+D+S	Length = 26.0 ft	1	0.495	0.215	1.15	1.00	1.00	1.00	0.949	1.00	1.00	1.00	36.28	1,295.7	2,618.7	3.66	65.4	304.8	0.0
+D+0.750L	Length = 26.0 ft	1	0.272	0.121	0.90	1.00	1.00	1.00	0.949	1.00	1.00	1.00	15.61	557.5	2,049.5	0.0	0.00	0.0	0.0

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#12

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 26.0 ft	1	1	0.228	0.105	1.25	1.00	1.00	1.00	0.949	1.00	1.00	1.00	18.15	648.1	2,846.5	1.95	34.8	331.3
+D+0.750L+0.750S																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.459	0.204	1.15	1.00	1.00	1.00	0.949	1.00	1.00	1.00	33.65	1,201.7	2,618.7	3.48	62.2	304.8
+1.197D+4.550E																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.569	0.330	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	58.05	2,073.1	3,643.5	7.82	139.7	424.0
+1.148D+0.750L+0.750S+3.4																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.623	0.343	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	63.52	2,268.5	3,643.5	8.13	145.2	424.0
+0.60D																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.092	0.041	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	9.37	334.5	3,643.5	0.97	17.4	424.0
+0.4027D+4.550E																0.0	0.00	0.0
Length = 26.0 ft	1	1	0.458	0.275	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	46.73	1,669.0	3,643.5	6.54	116.7	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E	1	0.5785	13.190		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	4.192	4.556
Max Upward from Load Combinations	4.192	4.556
Max Upward from Load Cases	2.240	2.240
D Only	1.807	1.807
+D+L	2.327	2.327
+D+S	4.047	4.047
+D+0.750L	2.197	2.197
+D+0.750L+0.750S	3.877	3.877
+D+0.70E	2.227	2.712
+D+0.750L+0.750S+0.5250E	4.192	4.556
+0.60D	1.084	1.084
+0.60D+0.70E	1.505	1.989
L Only	0.520	0.520
S Only	2.240	2.240
E Only	0.601	1.293

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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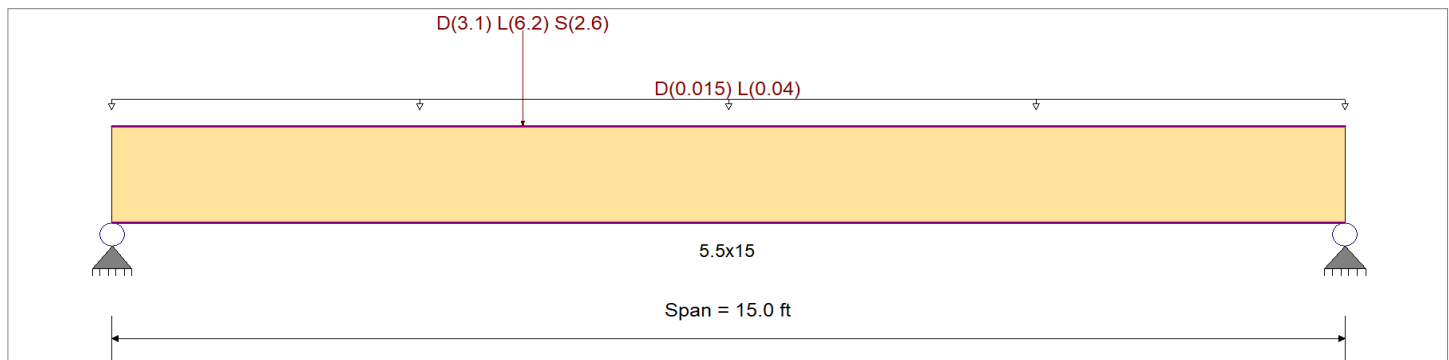
DESCRIPTION: BM#13

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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 = 0.040 ksf, Tributary Width = 1.0 ft, (FLOOR)
 Point Load : D = 3.10, L = 6.20, S = 2.60 k @ 5.0 ft, (BM#5)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.793 : 1	Maximum Shear Stress Ratio	=	0.457 : 1
Section used for this span		5.5x15	Section used for this span		5.5x15
fb: Actual	=	1,903.45psi	fv: Actual	=	121.07 psi
F'b	=	2,400.00psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.036ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.250 in	Ratio = 718 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.392 in	Ratio = 459 >=240	Span: 1 : +D+0.750L+0.750S		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 15.0 ft	1	0.300	0.173	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.12	647.0	2,160.0	0.0	0.00	0.0	0.0
+D+L	Length = 15.0 ft	1	0.793	0.457	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	32.72	1,903.4	2,400.0	6.66	121.1	265.0	0.0
+D+S	Length = 15.0 ft	1	0.416	0.239	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	19.76	1,149.4	2,760.0	4.01	72.9	304.8	0.0
+D+0.750L	Length = 15.0 ft	1	0.530	0.305	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	27.32	1,589.3	3,000.0	5.56	101.1	331.3	0.0
+D+0.750L+0.750S						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	0.0

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#13

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 15.0 ft	1	0.712	0.409	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	33.79	1,966.1	2,760.0	6.86	124.8	304.8	
+1.197D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 15.0 ft	1	0.202	0.117	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.31	774.6	3,840.0	2.72	49.5	424.0	
+1.148D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 15.0 ft	1	0.537	0.309	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	35.44	2,061.9	3,840.0	7.20	130.9	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 = 15.0 ft	1	0.101	0.058	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.67	388.2	3,840.0	1.36	24.8	424.0	
+0.4027D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 15.0 ft	1	0.068	0.039	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.48	260.6	3,840.0	0.92	16.6	424.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.3920	6.898		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	6.938	3.705
Max Upward from Load Combinations	6.938	3.705
Max Upward from Load Cases	4.433	2.367
D Only	2.313	1.280
+D+L	6.747	3.647
+D+S	4.047	2.147
+D+0.750L	5.638	3.055
+D+0.750L+0.750S	6.938	3.705
+0.60D	1.388	0.768
L Only	4.433	2.367
S Only	1.733	0.867

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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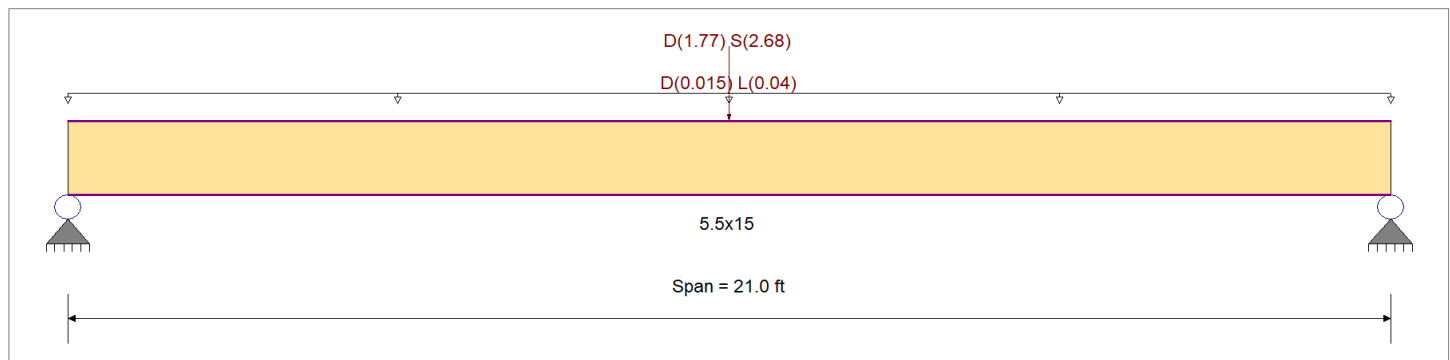
DESCRIPTION: BM#14

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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 = 0.040 ksf, Tributary Width = 1.0 ft, (FLOOR)
 Point Load : D = 1.770, S = 2.680 k @ 10.50 ft, (BM#3)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.547 : 1	Maximum Shear Stress Ratio	=	0.151 : 1
Section used for this span		5.5x15	Section used for this span		5.5x15
fb: Actual	=	1,464.73psi	fv: Actual	=	46.00 psi
F'b	=	2,680.10psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	10.500ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.323 in	Ratio =	781 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.588 in	Ratio =	428 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 21.0 ft	1	0.308	0.091	0.90	1.00	1.00	1.00	0.971	1.00	1.00	1.00	11.11	646.1	2,097.5	0.0	0.00	0.0	0.0	238.5	
+D+L																				
Length = 21.0 ft	1	0.332	0.107	1.00	1.00	1.00	1.00	0.971	1.00	1.00	1.00	13.31	774.4	2,330.5	0.0	0.00	0.0	0.0	265.0	
+D+S																				
Length = 21.0 ft	1	0.547	0.151	1.15	1.00	1.00	1.00	0.971	1.00	1.00	1.00	25.18	1,464.7	2,680.1	2.53	46.0	304.8			
+D+0.750L																				
Length = 21.0 ft	1	0.255	0.081	1.25	1.00	1.00	1.00	0.971	1.00	1.00	1.00	12.76	742.3	2,913.2	1.47	26.7	331.3			
+D+0.750L+0.750S																				
Length = 21.0 ft	1				1.00	1.00	1.00	0.971	1.00	1.00	1.00			0.0	0.00	0.0	0.0			

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: BM#14

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 21.0 ft	+1.197D	1	0.506	0.148	1.15	1.00	1.00	1.00	0.971	1.00	1.00	1.00	23.31	1,356.3	2,680.1	2.47	45.0	304.8
																0.0	0.00	0.0
Length = 21.0 ft	+1.148D+0.750L+0.750S	1	0.207	0.061	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	13.30	773.6	3,728.8	1.42	25.9	424.0
																0.0	0.00	0.0
Length = 21.0 ft	+0.60D	1	0.389	0.114	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	24.95	1,451.9	3,728.8	2.65	48.2	424.0
																0.0	0.00	0.0
Length = 21.0 ft	+0.4027D	1	0.104	0.031	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	6.66	387.7	3,728.8	0.71	13.0	424.0
																0.0	0.00	0.0
Length = 21.0 ft		1	0.070	0.021	1.60	1.00	1.00	1.00	0.971	1.00	1.00	1.00	4.47	260.2	3,728.8	0.48	8.7	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.5877	10.577		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	2.570	2.570
Max Upward from Load Combinations	2.570	2.570
Max Upward from Load Cases	1.340	1.340
D Only	1.230	1.230
+D+L	1.650	1.650
+D+S	2.570	2.570
+D+0.750L	1.545	1.545
+D+0.750L+0.750S	2.550	2.550
+0.60D	0.738	0.738
L Only	0.420	0.420
S Only	1.340	1.340

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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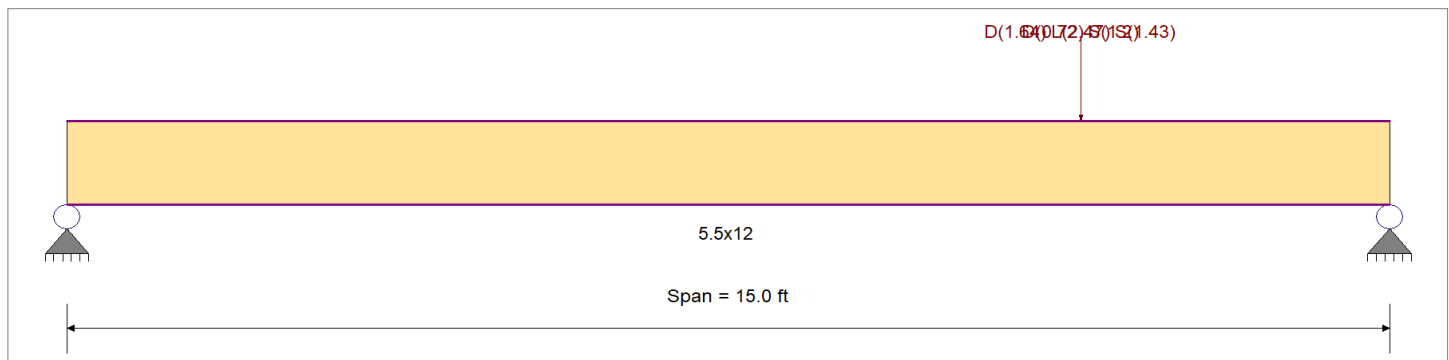
DESCRIPTION: BM#14.1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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
 Point Load : D = 1.640, L = 2.470, S = 1.430 k @ 11.50 ft, (BM#4)
 Point Load : D = 0.720, S = 1.20 k @ 11.50 ft, (BM#2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.556 : 1	Maximum Shear Stress Ratio	=	0.361 : 1
Section used for this span		5.5x12	Section used for this span		5.5x12
fb: Actual	=	1,534.48psi	fv: Actual	=	109.89 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination	=	+D+0.750L+0.750S	Load Combination	=	+D+0.750L+0.750S
Location of maximum on span	=	11.496ft	Location of maximum on span	=	14.015 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.149 in	Ratio = 1209	>=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.361 in	Ratio = 498	>=240	Span: 1 : +D+0.750L+0.750S	
Max Upward Total Deflection	0 in	Ratio = 0	<240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 15.0 ft	1	0.279	0.181	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.62	601.7	2,160.0	0.0	0.00	0.0	0.0
+D+L	Length = 15.0 ft	1	0.502	0.326	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.24	1,204.0	2,400.0	0.0	0.00	0.0	0.0
+D+S	Length = 15.0 ft	1	0.450	0.292	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	13.67	1,243.1	2,760.0	0.0	0.00	0.0	0.0
+D+0.750L	Length = 15.0 ft	1	0.351	0.228	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.59	1,053.5	3,000.0	0.0	0.00	0.0	0.0
+D+0.750L+0.750S	Length = 15.0 ft	1	0.351	0.228	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	11.59	1,053.5	3,000.0	0.0	0.00	0.0	0.0

Wood Beam

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: BM#14.1

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 15.0 ft	1	0.556	0.361	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	16.88	1,534.5	2,760.0	4.84	109.9	304.8	
+1.197D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 15.0 ft	1	0.188	0.122	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.92	720.4	3,840.0	2.28	51.8	424.0	
+1.148D+0.750L+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 15.0 ft	1	0.423	0.274	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	17.86	1,623.5	3,840.0	5.12	116.3	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 = 15.0 ft	1	0.094	0.061	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.97	361.0	3,840.0	1.14	25.9	424.0	
+0.4027D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 15.0 ft	1	0.063	0.041	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.67	242.3	3,840.0	0.77	17.4	424.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.3612	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	1.550	4.849
Max Upward from Load Combinations	1.550	4.849
Max Upward from Load Cases	0.658	2.016
D Only	0.658	1.917
+D+L	1.234	3.810
+D+S	1.272	3.933
+D+0.750L	1.090	3.337
+D+0.750L+0.750S	1.550	4.849
+0.60D	0.395	1.150
L Only	0.576	1.894
S Only	0.614	2.016

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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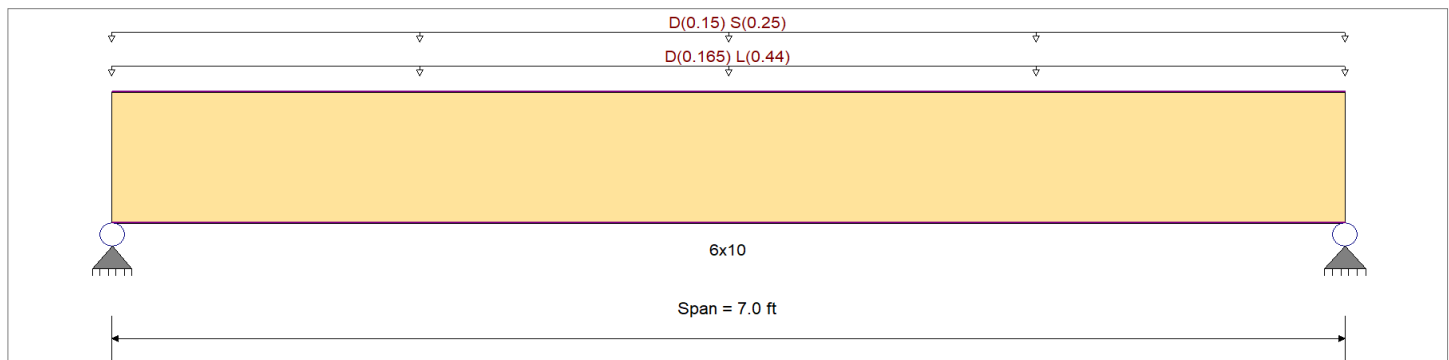
DESCRIPTION: BM#15

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	875.0 psi	Ebend- xx	1,300.0ksi
	Fc - Prll	600.0 psi	Eminbend - xx	470.0ksi
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	625.0 psi		
Wood Grade : No.2	Fv	170.0 psi		
	Ft	425.0 psi	Density	30.590pcf
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 NOT internally calculated and added
 Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 11.0 ft, (FLOOR)
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 10.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.767 : 1	Maximum Shear Stress Ratio	=	0.349 : 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	670.77 psi	fv: Actual	=	59.25 psi
F'b	=	875.00 psi	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	=	6.234 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.047 in	Ratio = 1794 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.089 in	Ratio = 948 >=240	Span: 1 : +D+0.750L+0.750S		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 7.0 ft	1	0.355	0.162	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.93	279.9	787.5	0.0	0.00	0.0	0.0
+D+L	Length = 7.0 ft	1	0.767	0.349	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.62	670.8	875.0	2.06	59.2	170.0	0.0
+D+S	Length = 7.0 ft	1	0.499	0.227	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.46	502.0	1,006.3	1.54	44.3	195.5	0.0
+D+0.750L	Length = 7.0 ft	1	0.524	0.238	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.95	573.0	1,093.8	1.76	50.6	212.5	0.0
+D+0.750L+0.750S	Length = 7.0 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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#15

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F _b	V	fv	F _v
Length = 7.0 ft	1	0.735	0.334	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.10	739.6	1,006.3	2.28	65.3	195.5	
+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 = 7.0 ft	1	0.120	0.055	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.16	167.9	1,400.0	0.52	14.8	272.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0886	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	2.914	2.914
Max Upward from Load Combinations	2.914	2.914
Max Upward from Load Cases	1.540	1.540
D Only	1.103	1.103
+D+L	2.643	2.643
+D+S	1.978	1.978
+D+0.750L	2.258	2.258
+D+0.750L+0.750S	2.914	2.914
+0.60D	0.662	0.662
L Only	1.540	1.540
S Only	0.875	0.875

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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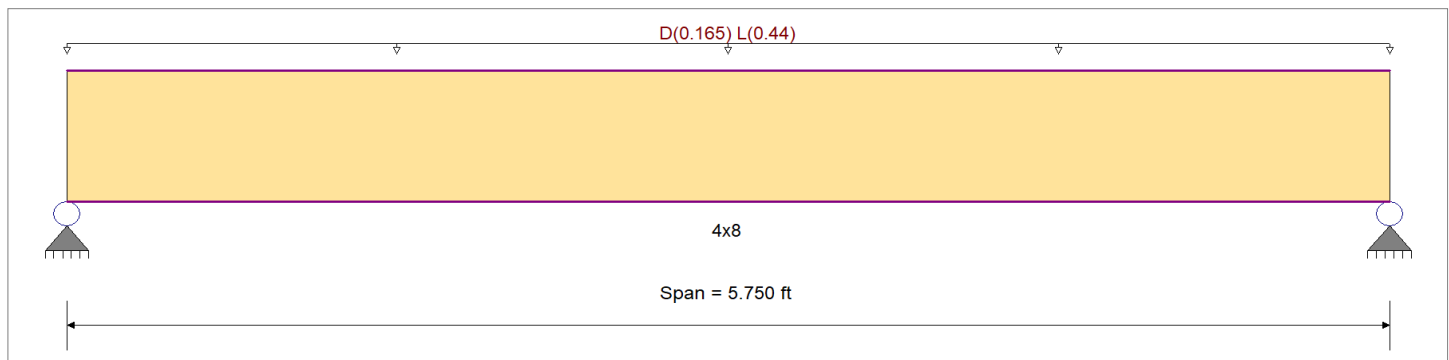
DESCRIPTION: BM#16

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	875.0 psi	Ebend- xx	1,300.0ksi
	Fc - Prll	600.0 psi	Eminbend - xx	470.0ksi
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	625.0 psi		
Wood Grade : No.2	Fv	170.0 psi		
	Ft	425.0 psi	Density	30.590pcf
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 NOT internally calculated and added
 Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 11.0 ft, (FLOOR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.860 : 1	Maximum Shear Stress Ratio	=	0.481 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	978.56psi	fv: Actual	=	81.81 psi
F'b	=	1,137.50psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.875ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0.075 in	Ratio =	915 >=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.104 in	Ratio =	666 >=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 _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only																0.0	0.00	0.0	0.0
Length = 5.750 ft	1		0.261	0.146	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.68	266.9	1,023.8	0.38	22.3	153.0	
+D+L																0.0	0.00	0.0	0.0
Length = 5.750 ft	1		0.860	0.481	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.50	978.6	1,137.5	1.38	81.8	170.0	
+D+0.750L																0.0	0.00	0.0	0.0
Length = 5.750 ft	1		0.563	0.315	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.05	800.6	1,421.9	1.13	66.9	212.5	
+0.60D																0.0	0.00	0.0	0.0
Length = 5.750 ft	1		0.088	0.049	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.41	160.1	1,820.0	0.23	13.4	272.0	

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: BM#16

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1036	2.896		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	1.739	1.739
Max Upward from Load Combinations	1.739	1.739
Max Upward from Load Cases	1.265	1.265
D Only	0.474	0.474
+D+L	1.739	1.739
+D+0.750L	1.423	1.423
+0.60D	0.285	0.285
L Only	1.265	1.265

Wood Beam

Project File: 22-021.ec6

LIC#: KW-06016495, Build:20.22.8.17

CK Engineering LLC

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DESCRIPTION: F.G.T.#1 (REACTIONS ONLY)

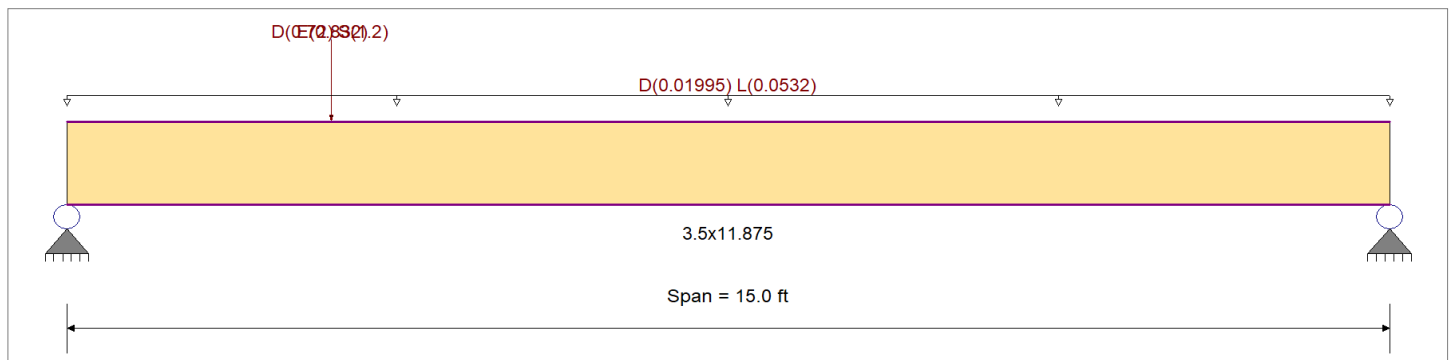
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

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 = 1.330 ft, (FLOOR)

Point Load : D = 0.720, S = 1.20 k @ 3.0 ft, (BM#2)

Point Load : E = 0.8320 k @ 3.0 ft, (SW6)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.388	1	Maximum Shear Stress Ratio	=	0.323	: 1
Section used for this span		3.5x11.875		Section used for this span		3.5x11.875	
fb: Actual	=	1,801.74psi		fv: Actual	=	150.10 psi	
Fb: Allowable	=	4,640.00psi		Fv: Allowable	=	464.00 psi	
Load Combination		+1.148D+0.750L+0.750S+3.413E		Load Combination		+1.148D+0.750L+0.750S+3.413E	
Location of maximum on span	=	3.011 ft		Location of maximum on span	=	0.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.087 in	Ratio =	2066	>=360	Span: 1 : S Only	
Max Upward Transient Deflection		0 in	Ratio =	0	<360	n/a	
Max Downward Total Deflection		0.234 in	Ratio =	770	>=240	Span: 1 : +D+0.750L+0.750S+0.5250E	
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	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v			
D Only	Length = 15.0 ft	1	0.130	0.109	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.32	338.67	2610.00	0.00	0.00	0.00	0.00	28.54	261.00
+D+L	Length = 15.0 ft	1	0.182	0.142	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.62	528.60	2900.00	0.00	0.00	0.00	0.00	41.04	290.00
+D+S	Length = 15.0 ft	1	0.227	0.189	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.20	758.38	3335.00	0.00	0.00	0.00	0.00	63.18	333.50
+D+0.750L	Length = 15.0 ft	1	0.132	0.105	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.27	477.24	3625.00	0.00	0.00	0.00	0.00	37.92	362.50
+D+0.750L+0.750S	Length = 15.0 ft	1	0.227	0.192	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.20	758.51	3335.00	0.00	0.00	0.00	0.00	63.90	333.50
+1.197D+4.550E						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.8.17

CK Engineering LLC

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DESCRIPTION: F.G.T.#1 (REACTIONS ONLY)

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	f _v	F _v
Length = 15.0 ft	1		0.373	0.309	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.86	1,729.61	4640.00	3.98	143.46	464.00
+1.148D+0.750L+0.750S+3.4						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.388	0.323	1.60	1.000	1.00	1.00	1.00	1.00	1.00	12.35	1,801.74	4640.00	4.16	150.10	464.00
+0.60D						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.044	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	203.20	4640.00	0.47	17.12	464.00
+0.4027D+4.550E						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1		0.315	0.260	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.01	1,460.56	4640.00	3.35	120.79	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E	1	0.2336	6.898		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.192	0.958
Overall MINimum	0.666	0.166
D Only	0.823	0.391
+D+L	1.222	0.790
+D+S	1.783	0.631
+D+0.750L	1.122	0.690
+D+0.750L+0.750S	1.842	0.870
+D+0.70E	1.289	0.508
+D+0.750L+0.750S+0.5250E	2.192	0.958
+0.60D	0.494	0.235
+0.60D+0.70E	0.960	0.351
L Only	0.399	0.399
S Only	0.960	0.240
E Only	0.666	0.166

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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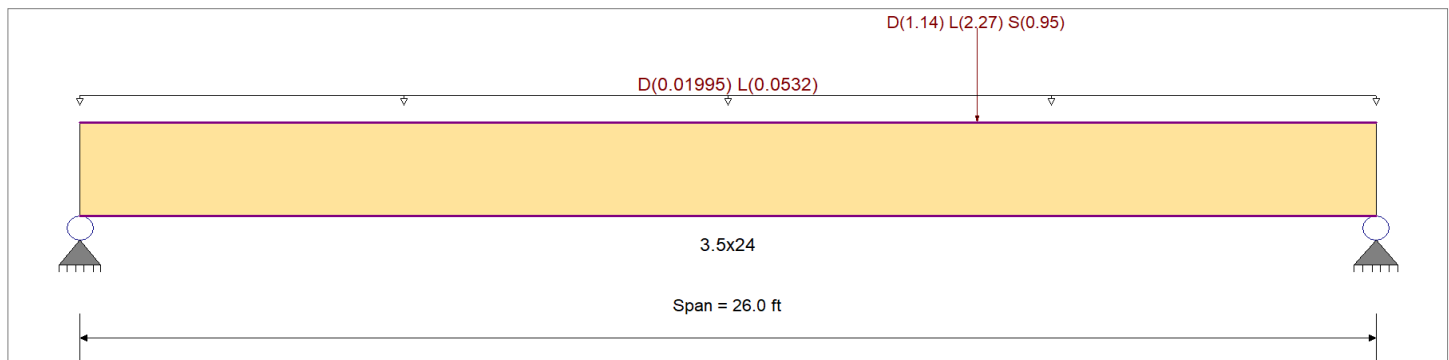
DESCRIPTION: F.G.T.#2 (REACTIONS ONLY)

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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 = 0.040 ksf, Tributary Width = 1.330 ft, (FLOOR)
 Point Load : D = 1.140, L = 2.270, S = 0.950 k @ 18.0 ft, (BM#5)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.399 : 1	Maximum Shear Stress Ratio	=	0.227 : 1
Section used for this span		3.5x24	Section used for this span		3.5x24
fb: Actual	=	908.02psi	fv: Actual	=	60.11 psi
F'b	=	2,277.17psi	F'v	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	17.934ft	Location of maximum on span	=	24.007ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.238 in	Ratio =	1313 >=360	Span: 1 : L Only
Max Upward Transient Deflection		0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection		0.373 in	Ratio =	836 >=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 _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 26.0 ft	1	0.158	0.091	0.90	1.00	1.00	1.00	0.949	1.00	1.00	1.00	9.05	323.2	2,049.5	0.0	0.00	0.0	0.0
+D+L	Length = 26.0 ft	1	0.399	0.227	1.00	1.00	1.00	1.00	0.949	1.00	1.00	1.00	25.42	908.0	2,277.2	3.37	60.1	265.0	0.0
+D+S	Length = 26.0 ft	1	0.195	0.109	1.15	1.00	1.00	1.00	0.949	1.00	1.00	1.00	14.29	510.5	2,618.7	1.87	33.3	304.8	0.0
+D+0.750L	Length = 26.0 ft	1	0.268	0.152	1.25	1.00	1.00	1.00	0.949	1.00	1.00	1.00	21.33	761.8	2,846.5	2.83	50.5	331.3	0.0
+D+0.750L+0.750S	Length = 26.0 ft	1				1.00	1.00	1.00	0.949	1.00	1.00	1.00				0.0	0.00	0.0	0.0

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: F.G.T.#2 (REACTIONS ONLY)

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 26.0 ft	1	1	0.345	0.195	1.15	1.00	1.00	1.00	0.949	1.00	1.00	1.00	25.26	902.2	2,618.7	3.32	59.3	304.8
+1.197D															0.0	0.00	0.0	0.0
Length = 26.0 ft	1	1	0.106	0.061	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	10.84	387.0	3,643.5	1.45	25.9	424.0
+1.148D+0.750L+0.750S															0.0	0.00	0.0	0.0
Length = 26.0 ft	1	1	0.261	0.147	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	26.60	950.1	3,643.5	3.50	62.5	424.0
+0.60D															0.0	0.00	0.0	0.0
Length = 26.0 ft	1	1	0.053	0.031	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	5.43	193.9	3,643.5	0.73	13.0	424.0
+0.4027D															0.0	0.00	0.0	0.0
Length = 26.0 ft	1	1	0.036	0.021	1.60	1.00	1.00	1.00	0.949	1.00	1.00	1.00	3.64	130.2	3,643.5	0.49	8.7	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3730	13.854		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	2.237	3.548
Max Upward from Load Combinations	2.237	3.548
Max Upward from Load Cases	1.390	2.263
D Only	0.847	1.285
+D+L	2.237	3.548
+D+S	1.139	1.943
+D+0.750L	1.889	2.983
+D+0.750L+0.750S	2.109	3.476
+0.60D	0.508	0.771
L Only	1.390	2.263
S Only	0.292	0.658

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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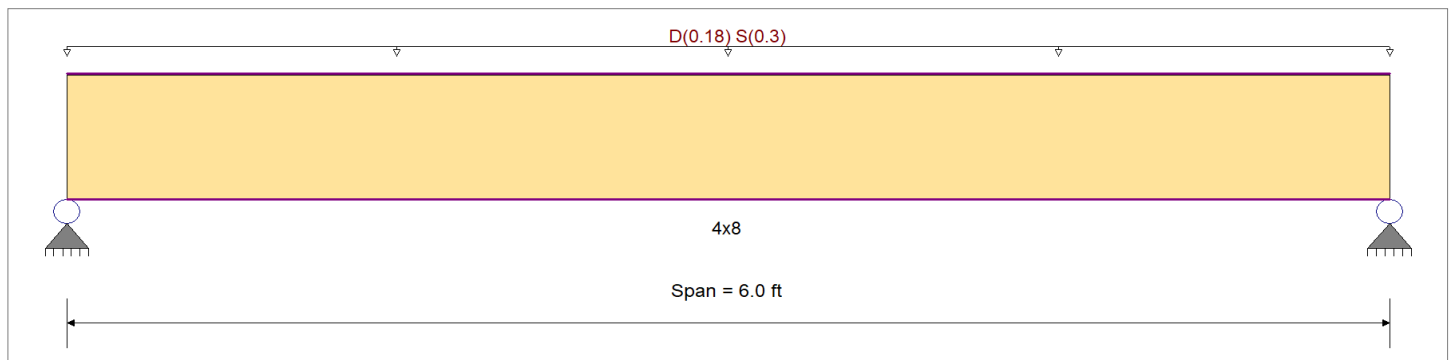
DESCRIPTION: HDR#1

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	875.0 psi	Ebend- xx	1,300.0ksi
	Fc - Prll	600.0 psi	Eminbend - xx	470.0ksi
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	625.0 psi		
Wood Grade : No.2	Fv	170.0 psi		
	Ft	425.0 psi	Density	30.590pcf
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 NOT internally calculated and added
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 12.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.646 1	Maximum Shear Stress Ratio	=	0.350 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	845.36psi	fv: Actual	=	68.35 psi
F'b	=	1,308.13psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
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
Maximum Deflection					
Max Downward Transient Deflection	0.061 in	Ratio =	1182 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.097 in	Ratio =	738 >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 6.0 ft	1	0.310	0.168	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.81	317.0	1,023.8	0.0	0.00	0.0	0.0
+D+S	Length = 6.0 ft	1	0.646	0.350	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	2.16	845.4	1,308.1	0.0	0.00	0.0	0.0
+D+0.750S	Length = 6.0 ft	1	0.545	0.295	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.82	713.3	1,308.1	0.0	0.00	0.0	0.0
+0.60D	Length = 6.0 ft	1	0.105	0.057	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.49	190.2	1,820.0	0.0	0.00	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: HDR#1

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0974	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	1.440	1.440
Max Upward from Load Combinations	1.440	1.440
Max Upward from Load Cases	0.900	0.900
D Only	0.540	0.540
+D+S	1.440	1.440
+D+0.750S	1.215	1.215
+0.60D	0.324	0.324
S Only	0.900	0.900

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: HDR#2

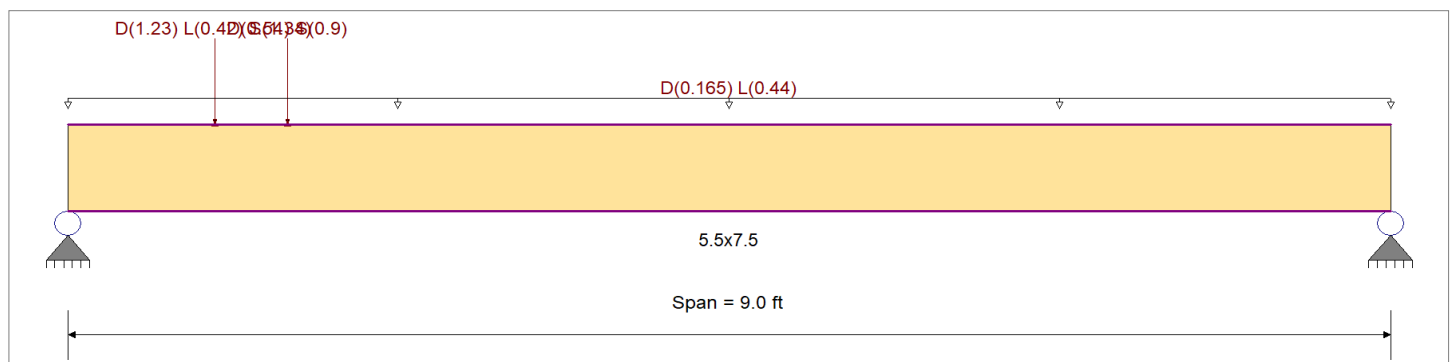
CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

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 = 0.040 ksf, Tributary Width = 11.0 ft, (FLOOR)

Point Load : D = 0.540, S = 0.90 k @ 1.50 ft, (HDR#1)

Point Load : D = 1.230, L = 0.420, S = 1.340 k @ 1.0 ft, (BM#14)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.728	1	Maximum Shear Stress Ratio	=	0.624	: 1
Section used for this span		5.5x7.5		Section used for this span		5.5x7.5	
fb: Actual	=	1,747.07	psi	fv: Actual	=	190.27	psi
F'b	=	2,400.00	psi	F'v	=	304.75	psi
Load Combination		+D+L		Load Combination		+D+0.750L+0.750S	
Location of maximum on span	=	4.040	ft	Location of maximum on span	=	0.000	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.198	in	Ratio =	544	>=360	Span: 1 : L Only
Max Upward Transient Deflection		0	in	Ratio =	0	<360	n/a
Max Downward Total Deflection		0.324	in	Ratio =	333	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection		0	in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v	
D Only	Length = 9.0 ft	1	0.316	0.338	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.93	681.6	2,160.0	0.0	0.00	0.0	0.0
+D+L	Length = 9.0 ft	1	0.728	0.590	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.51	1,747.1	2,400.0	0.0	0.00	0.0	0.0
+D+S	Length = 9.0 ft	1	0.415	0.496	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.92	1,145.0	2,760.0	0.0	0.00	0.0	0.0
+D+0.750L	Length = 9.0 ft	1	0.492	0.415	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.35	1,477.3	3,000.0	0.0	0.00	0.0	0.0
+D+0.750L+0.750S	Length = 9.0 ft	1	0.492	0.415	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.35	1,477.3	3,000.0	0.0	0.00	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: HDR#2

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C _t	CLx	C _v	C _{fu}	C _i	C _r	M	fb	F _b	V	f _v	F _v
Length = 9.0 ft	1	0.634	0.624	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.52	1,750.8	2,760.0	5.23	190.3	304.8	
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 9.0 ft	1	0.107	0.114	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.76	409.0	3,840.0	1.33	48.4	424.0	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.3238	4.303		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	5.547	3.036
Max Upward from Load Combinations	5.547	3.036
Max Upward from Load Cases	2.353	2.027
D Only	2.326	1.009
+D+L	4.679	3.036
+D+S	4.267	1.308
+D+0.750L	4.091	2.529
+D+0.750L+0.750S	5.547	2.754
+0.60D	1.396	0.606
L Only	2.353	2.027
S Only	1.941	0.299

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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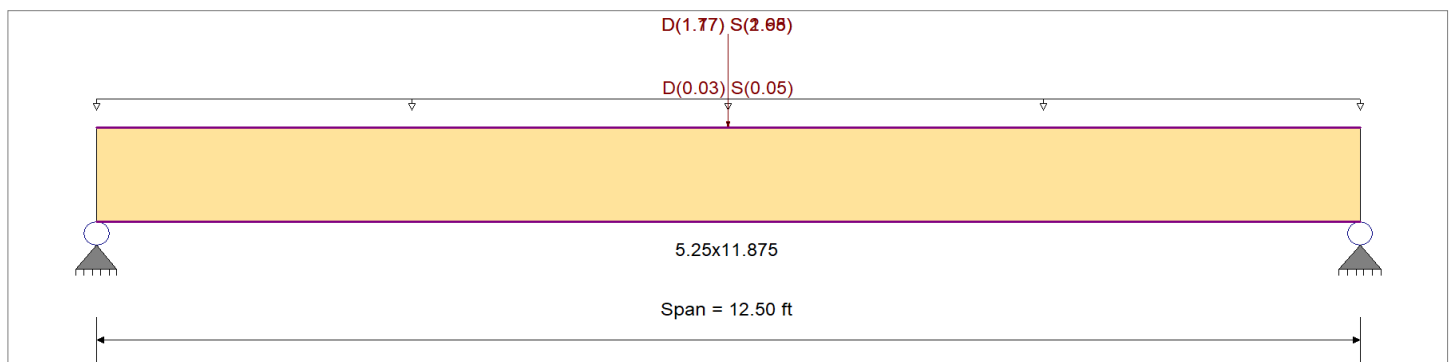
DESCRIPTION: HDR#3

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 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, S = 0.0250 ksf, Tributary Width = 2.0 ft, (ROOF)
 Point Load : D = 1.770, S = 2.680 k @ 6.250 ft, (BM#3)
 Point Load : D = 1.170, S = 1.950 k @ 6.250 ft, (BM#1)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.746 1	Maximum Shear Stress Ratio =	0.311 : 1
Section used for this span	5.25x11.875	Section used for this span	5.25x11.875
fb: Actual =	2,489.68psi	fv: Actual =	103.74 psi
F'b =	3,338.88psi	F'v =	333.50 psi
Load Combination	+D+S	Load Combination	+D+S
Location of maximum on span =	6.250ft	Location of maximum on span =	11.542 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.242 in Ratio =	619 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in Ratio =	0 <360	n/a
Max Downward Total Deflection	0.403 in Ratio =	372 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
	Length = 12.50 ft	1	0.378	0.160	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	10.15	987.6	2,613.0	0.0	0.00	0.0	0.0	0.0
+D+S																				
	Length = 12.50 ft	1	0.746	0.311	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	25.60	2,489.7	3,338.9	0.0	0.00	0.0	0.0	0.0
+D+0.750S																				
	Length = 12.50 ft	1	0.633	0.265	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	21.74	2,114.2	3,338.9	0.0	0.00	0.0	0.0	0.0
+0.60D																				
	Length = 12.50 ft	1	0.128	0.054	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	6.09	592.5	4,645.4	0.0	0.00	0.0	0.0	0.0

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

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DESCRIPTION: HDR#3

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4028	6.296		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	4.407	4.407
Max Upward from Load Combinations	4.407	4.407
Max Upward from Load Cases	2.628	2.628
D Only	1.779	1.779
+D+S	4.407	4.407
+D+0.750S	3.750	3.750
+0.60D	1.068	1.068
S Only	2.628	2.628

Wood Column

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: COL#1

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combinations Used : IBC 2018

General Information

Analysis Method	Allowable Stress Design	Wood Section Name	3.5x7.0
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Trus-Joist
Overall Column Height	9 ft	Wood Member Type	Parallam PSL
<i>(Used for non-slender calculations)</i>			
Wood Species	iLevel Truss Joist	Exact Width	3.50 in
Wood Grade	Parallam PSL 2.0E	Exact Depth	7.0 in
Fb +	2900 psi	Fv	290 psi
Fb -	2900 psi	Ft	2025 psi
Fc - Prll	2900 psi	Density	45.07 pcf
Fc - Perp	750 psi		
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
	Basic	2000	2000
	Minimum	1016.535	1016.535
			2000 ksi
			Allow Stress Modification Factors
			Cf or Cv for Bending
			1.062
			Cf or Cv for Compression
			1.0
			Cf or Cv for Tension
			1.0
			Cm : Wet Use Factor
			1.0
			Ct : Temperature Fact
			1.0
			Cfu : Flat Use Factor
			1.0
			Kf : Built-up columns
			1.0 <i>NDS 15.3.2</i>
			Use Cr : Repetitive ?
			No
			Brace condition for deflection (buckling) along columns :
			X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 9 ft, K
			Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 9 ft, K

Applied Loads

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

Column self weight included : 69.013 lbs * Dead Load Factor

AXIAL LOADS . . .

BM#5: Axial Load at 9.0 ft, D = 3.090, L = 6.190, S = 2.580 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.4683 : 1	Maximum SERVICE Lateral Load Reactions . .	
Load Combination	+D+0.750L+0.750S	Top along Y-Y	0.0 k
Governing NDS Formula	Comp Only, fc/Fc'	Bottom along Y-Y	0.0 k
Location of max.above base	0.0 ft	Top along X-X	0.0 k
Bottom along X-X		Bottom along X-X	0.0 k
At maximum location values are .		Maximum SERVICE Load Lateral Deflections . . .	
Applied Axial	9.737 k	Along Y-Y	0.0 in at 0.0 ft above base
Applied Mx	0.0 k-ft	for load combination :	n/a
Applied My	0.0 k-ft	Along X-X	0.0 in at 0.0 ft above base
Fc : Allowable	848.61 psi	for load combination :	n/a
PASS Maximum Shear Stress Ratio =	0.0 : 1	Other Factors used to calculate allowable stresses . . .	
Load Combination	+0.60D	<u>Bending</u>	<u>Compression</u>
Location of max.above base	9.0 ft	<u>Tension</u>	
Applied Design Shear	0.0 psi		
Allowable Shear	464.0 psi		

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.321	0.1539	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+L	1.000	0.291	0.4526	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+S	1.150	0.254	0.2760	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L	1.250	0.235	0.3740	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L+0.750S	1.150	0.254	0.4683	PASS	0.0 ft	0.0	PASS	9.0 ft
+0.60D	1.600	0.185	0.09016	PASS	0.0 ft	0.0	PASS	9.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments @ Base	My - End Moments @ Top	Mx - End Moments @ Base	Mx - End Moments @ Top
D Only					3.159				

Wood Column

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: COL#1

Maximum Reactions

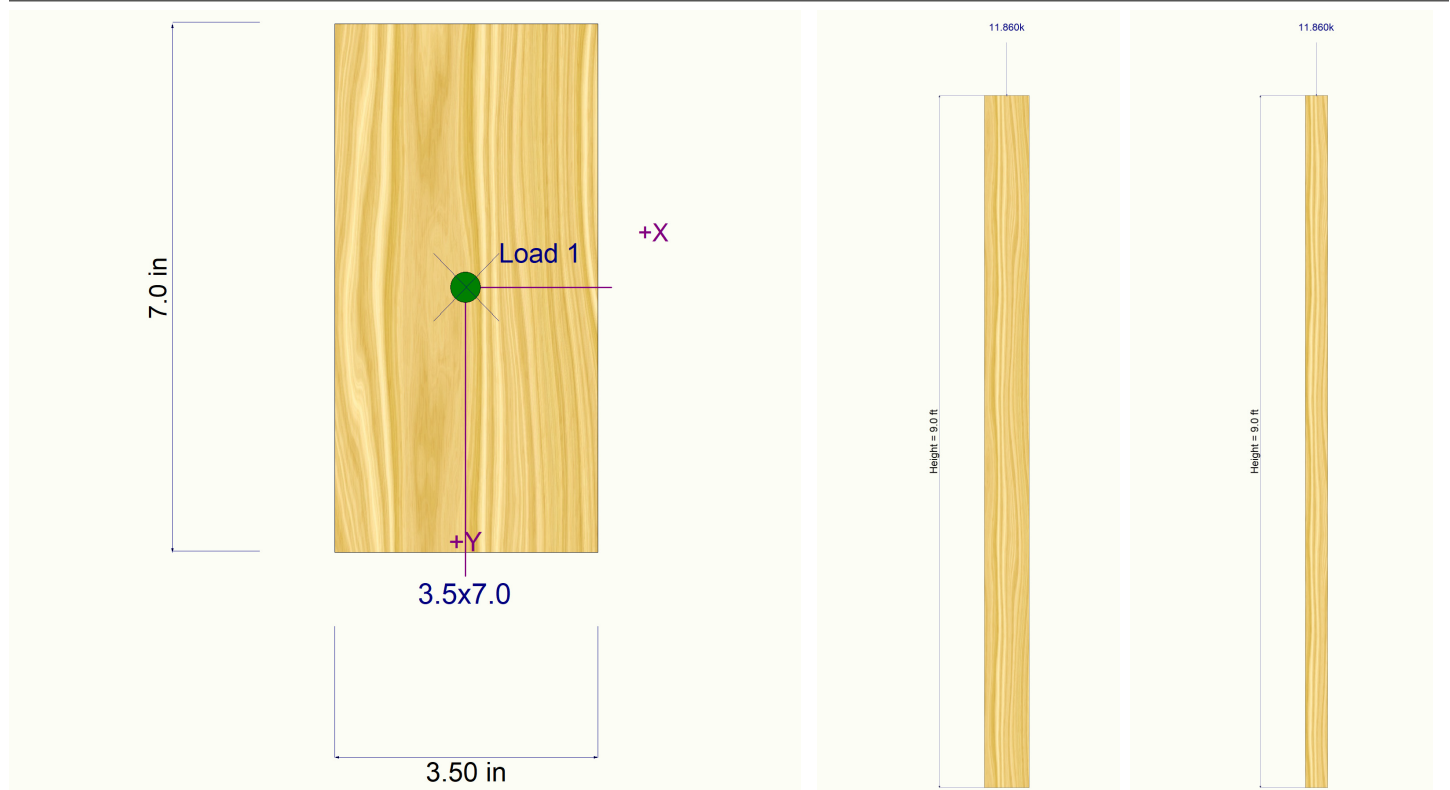
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
+D+L						9.349				
+D+S						5.739				
+D+0.750L						7.802				
+D+0.750L+0.750S						9.737				
+0.60D						1.895				
L Only						6.190				
S Only						2.580				

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft

Sketches



General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#1

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
 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	=	3.0 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

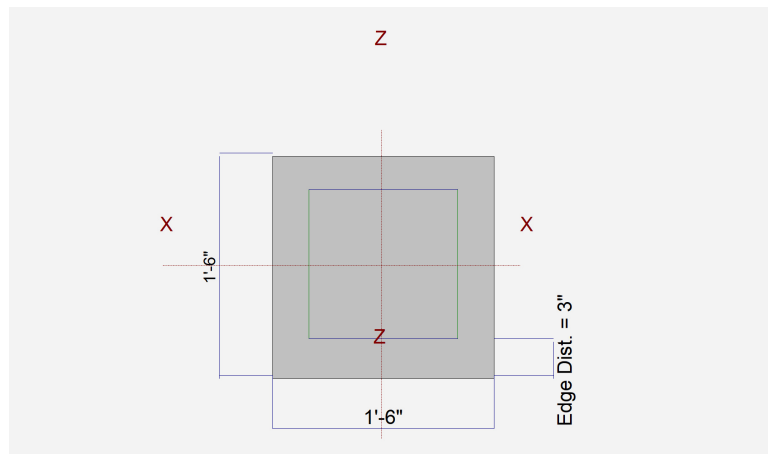
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
-----------------------------------------------------------------------------------------	---	-----------

Dimensions

Width parallel to X-X Axis	=	1.50 ft
Length parallel to Z-Z Axis	=	1.50 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



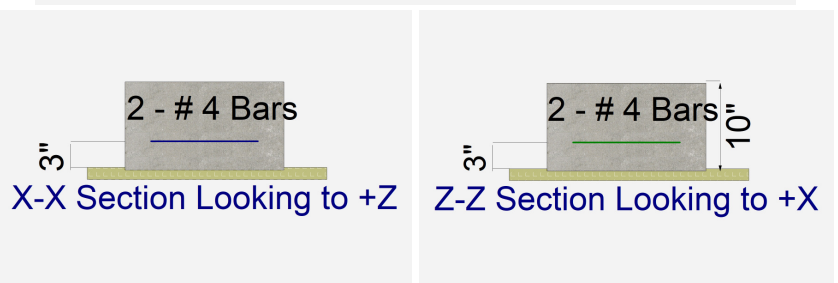
Reinforcing

Bars parallel to X-X Axis	=	2.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	2.0
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	=	1.10		1.540	0.880		k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#1

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4720	Soil Bearing	1.416 ksf	3.0 ksf	+D+0.750L+0.750S 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	0.09719	Z Flexure (+X)	0.5280 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.09719	Z Flexure (-X)	0.5280 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.09719	X Flexure (+Z)	0.5280 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.09719	X Flexure (-Z)	0.5280 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.04917	1-way Shear (+X)	3.688 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.04917	1-way Shear (-X)	3.688 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.04917	1-way Shear (+Z)	3.688 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.04917	1-way Shear (-Z)	3.688 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.1229	2-way Punching	18.439 psi	150.0 psi	+1.20D+1.60L+0.50S

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	3.0	n/a	0.0	0.6097	0.6097	n/a	n/a	0.203
X-X, +D+L	3.0	n/a	0.0	1.294	1.294	n/a	n/a	0.431
X-X, +D+S	3.0	n/a	0.0	1.001	1.001	n/a	n/a	0.334
X-X, +D+0.750L	3.0	n/a	0.0	1.123	1.123	n/a	n/a	0.374
X-X, +D+0.750L+0.750S	3.0	n/a	0.0	1.416	1.416	n/a	n/a	0.472
X-X, +0.60D	3.0	n/a	0.0	0.3658	0.3658	n/a	n/a	0.122
Z-Z, D Only	3.0	0.0	n/a	n/a	n/a	0.6097	0.6097	0.203
Z-Z, +D+L	3.0	0.0	n/a	n/a	n/a	1.294	1.294	0.431
Z-Z, +D+S	3.0	0.0	n/a	n/a	n/a	1.001	1.001	0.334
Z-Z, +D+0.750L	3.0	0.0	n/a	n/a	n/a	1.123	1.123	0.374
Z-Z, +D+0.750L+0.750S	3.0	0.0	n/a	n/a	n/a	1.416	1.416	0.472
Z-Z, +0.60D	3.0	0.0	n/a	n/a	n/a	0.3658	0.3658	0.122

Overturing Stability

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

All units k

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	0.1925	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.40D	0.1925	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60L	0.4730	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60L	0.4730	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60L+0.50S	0.5280	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60L+0.50S	0.5280	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L	0.2613	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L	0.2613	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D	0.1650	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D	0.1650	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L+1.60S	0.4373	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L+1.60S	0.4373	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60S	0.3410	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#1

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.20D+1.60S	0.3410	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L+0.50S	0.3163	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L+0.50S	0.3163	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L+0.70S	0.3383	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L+0.70S	0.3383	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +0.90D	0.1238	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +0.90D	0.1238	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.40D	0.1925	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.40D	0.1925	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60L	0.4730	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60L	0.4730	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60L+0.50S	0.5280	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60L+0.50S	0.5280	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L	0.2613	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L	0.2613	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D	0.1650	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D	0.1650	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L+1.60S	0.4373	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L+1.60S	0.4373	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60S	0.3410	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60S	0.3410	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L+0.50S	0.3163	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L+0.50S	0.3163	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L+0.70S	0.3383	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L+0.70S	0.3383	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +0.90D	0.1238	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +0.90D	0.1238	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	1.34 psi	1.34 psi	1.34 psi	1.34 psi	1.34 psi	75.00 psi	0.02	OK
+1.20D+1.60L	3.30 psi	3.30 psi	3.30 psi	3.30 psi	3.30 psi	75.00 psi	0.04	OK
+1.20D+1.60L+0.50S	3.69 psi	3.69 psi	3.69 psi	3.69 psi	3.69 psi	75.00 psi	0.05	OK
+1.20D+0.50L	1.83 psi	1.83 psi	1.83 psi	1.83 psi	1.83 psi	75.00 psi	0.02	OK
+1.20D	1.15 psi	1.15 psi	1.15 psi	1.15 psi	1.15 psi	75.00 psi	0.02	OK
+1.20D+0.50L+1.60S	3.05 psi	3.05 psi	3.05 psi	3.05 psi	3.05 psi	75.00 psi	0.04	OK
+1.20D+1.60S	2.38 psi	2.38 psi	2.38 psi	2.38 psi	2.38 psi	75.00 psi	0.03	OK
+1.20D+0.50L+0.50S	2.21 psi	2.21 psi	2.21 psi	2.21 psi	2.21 psi	75.00 psi	0.03	OK
+1.20D+0.50L+0.70S	2.36 psi	2.36 psi	2.36 psi	2.36 psi	2.36 psi	75.00 psi	0.03	OK
+0.90D	0.86 psi	0.86 psi	0.86 psi	0.86 psi	0.86 psi	75.00 psi	0.01	OK

All units k

Two-Way "Punching" Shear

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	6.72 psi	150.00psi	0.04482	OK
+1.20D+1.60L	16.52 psi	150.00psi	0.1101	OK
+1.20D+1.60L+0.50S	18.44 psi	150.00psi	0.1229	OK
+1.20D+0.50L	9.12 psi	150.00psi	0.06082	OK
+1.20D	5.76 psi	150.00psi	0.03842	OK
+1.20D+0.50L+1.60S	15.27 psi	150.00psi	0.1018	OK
+1.20D+1.60S	11.91 psi	150.00psi	0.07939	OK
+1.20D+0.50L+0.50S	11.04 psi	150.00psi	0.07363	OK
+1.20D+0.50L+0.70S	11.81 psi	150.00psi	0.07875	OK
+0.90D	4.32 psi	150.00psi	0.02881	OK

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#2

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
 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	=	3.0 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

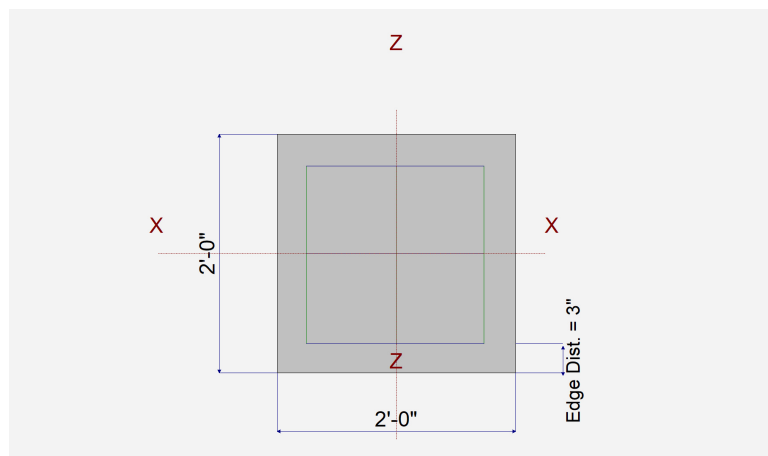
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
-----------------------------------------------------------------------------------------	---	-----------

Dimensions

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

Pedestal dimensions...

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



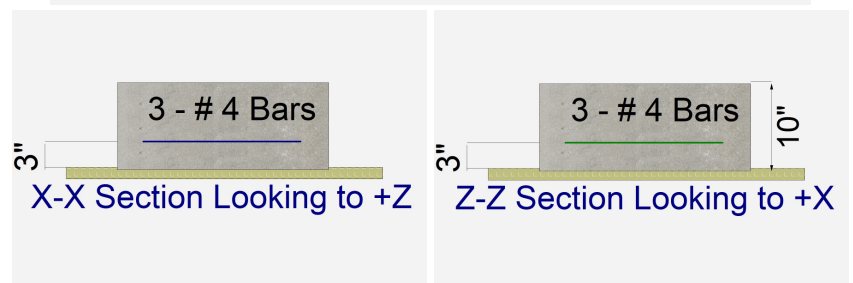
Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis		
Number of Bars	=	3.0
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	=	3.240		5.60	2.670		k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#2

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8270	Soil Bearing	2.481 ksf	3.0 ksf	+D+0.750L+0.750S 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	0.2912	Z Flexure (+X)	1.773 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2912	Z Flexure (-X)	1.773 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2912	X Flexure (+Z)	1.773 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2912	X Flexure (-Z)	1.773 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2364	1-way Shear (+X)	17.729 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2364	1-way Shear (-X)	17.729 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2364	1-way Shear (+Z)	17.729 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2364	1-way Shear (-Z)	17.729 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.4390	2-way Punching	65.850 psi	150.0 psi	+1.20D+1.60L+0.50S

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	3.0	n/a	0.0	0.9308	0.9308	n/a	n/a	0.310
X-X, +D+L	3.0	n/a	0.0	2.331	2.331	n/a	n/a	0.777
X-X, +D+S	3.0	n/a	0.0	1.598	1.598	n/a	n/a	0.533
X-X, +D+0.750L	3.0	n/a	0.0	1.981	1.981	n/a	n/a	0.660
X-X, +D+0.750L+0.750S	3.0	n/a	0.0	2.481	2.481	n/a	n/a	0.827
X-X, +0.60D	3.0	n/a	0.0	0.5585	0.5585	n/a	n/a	0.186
Z-Z, D Only	3.0	0.0	n/a	n/a	n/a	0.9308	0.9308	0.310
Z-Z, +D+L	3.0	0.0	n/a	n/a	n/a	2.331	2.331	0.777
Z-Z, +D+S	3.0	0.0	n/a	n/a	n/a	1.598	1.598	0.533
Z-Z, +D+0.750L	3.0	0.0	n/a	n/a	n/a	1.981	1.981	0.660
Z-Z, +D+0.750L+0.750S	3.0	0.0	n/a	n/a	n/a	2.481	2.481	0.827
Z-Z, +0.60D	3.0	0.0	n/a	n/a	n/a	0.5585	0.5585	0.186

Overturing Stability

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

All units k

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	0.5670	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.40D	0.5670	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	1.606	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	1.606	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	1.773	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	1.773	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.8360	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.8360	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.4860	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.4860	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	1.370	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	1.370	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60S	1.020	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#2

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.20D+1.60S	1.020	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	1.003	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	1.003	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	1.070	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	1.070	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.3645	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.3645	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.5670	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.5670	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	1.606	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	1.606	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	1.773	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	1.773	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.8360	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.8360	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.4860	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.4860	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	1.370	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	1.370	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	1.020	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	1.020	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	1.003	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	1.003	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	1.070	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	1.070	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.3645	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.3645	+X	Bottom	0.2160	AsMin	0.30	6.088	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	5.67 psi	5.67 psi	5.67 psi	5.67 psi	5.67 psi	75.00 psi	0.08	OK
+1.20D+1.60L	16.06 psi	16.06 psi	16.06 psi	16.06 psi	16.06 psi	75.00 psi	0.21	OK
+1.20D+1.60L+0.50S	17.73 psi	17.73 psi	17.73 psi	17.73 psi	17.73 psi	75.00 psi	0.24	OK
+1.20D+0.50L	8.36 psi	8.36 psi	8.36 psi	8.36 psi	8.36 psi	75.00 psi	0.11	OK
+1.20D	4.86 psi	4.86 psi	4.86 psi	4.86 psi	4.86 psi	75.00 psi	0.06	OK
+1.20D+0.50L+1.60S	13.70 psi	13.70 psi	13.70 psi	13.70 psi	13.70 psi	75.00 psi	0.18	OK
+1.20D+1.60S	10.20 psi	10.20 psi	10.20 psi	10.20 psi	10.20 psi	75.00 psi	0.14	OK
+1.20D+0.50L+0.50S	10.03 psi	10.03 psi	10.03 psi	10.03 psi	10.03 psi	75.00 psi	0.13	OK
+1.20D+0.50L+0.70S	10.70 psi	10.70 psi	10.70 psi	10.70 psi	10.70 psi	75.00 psi	0.14	OK
+0.90D	3.65 psi	3.65 psi	3.65 psi	3.65 psi	3.65 psi	75.00 psi	0.05	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	21.06 psi	150.00psi	0.1404	OK
+1.20D+1.60L	59.65 psi	150.00psi	0.3977	OK
+1.20D+1.60L+0.50S	65.85 psi	150.00psi	0.439	OK
+1.20D+0.50L	31.05 psi	150.00psi	0.207	OK
+1.20D	18.05 psi	150.00psi	0.1203	OK
+1.20D+0.50L+1.60S	50.89 psi	150.00psi	0.3392	OK
+1.20D+1.60S	37.89 psi	150.00psi	0.2526	OK
+1.20D+0.50L+0.50S	37.25 psi	150.00psi	0.2483	OK
+1.20D+0.50L+0.70S	39.73 psi	150.00psi	0.2649	OK
+0.90D	13.54 psi	150.00psi	0.09026	OK

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#3

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
 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	=	3.0 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

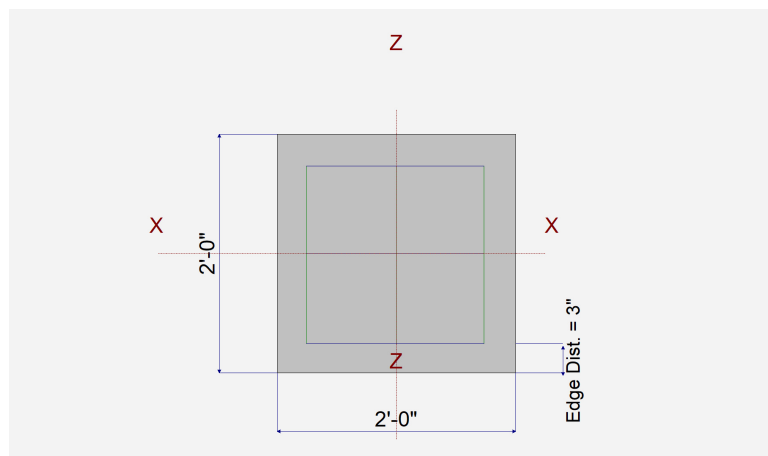
Increases based on footing plan dimension

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

Pedestal dimensions...	=	in
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



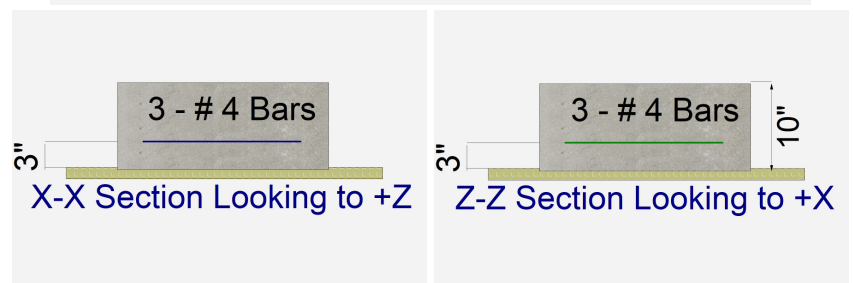
Reinforcing

Bars parallel to X-X Axis	=	3.0
Number of Bars	=	# 4
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	3.0
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	=	1.920		1.890	2.020		k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#3

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4447	Soil Bearing	1.334 ksf	3.0 ksf	+D+0.750L+0.750S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1331	Z Flexure (+X)	0.8101 k-ft/ft	6.088 k-ft/ft	+1.20D+0.50L+1.60S
PASS	0.1331	Z Flexure (-X)	0.8101 k-ft/ft	6.088 k-ft/ft	+1.20D+0.50L+1.60S
PASS	0.1331	X Flexure (+Z)	0.8101 k-ft/ft	6.088 k-ft/ft	+1.20D+0.50L+1.60S
PASS	0.1331	X Flexure (-Z)	0.8101 k-ft/ft	6.088 k-ft/ft	+1.20D+0.50L+1.60S
PASS	0.1080	1-way Shear (+X)	8.101 psi	75.0 psi	+1.20D+0.50L+1.60S
PASS	0.1080	1-way Shear (-X)	8.101 psi	75.0 psi	+1.20D+0.50L+1.60S
PASS	0.1080	1-way Shear (+Z)	8.101 psi	75.0 psi	+1.20D+0.50L+1.60S
PASS	0.1080	1-way Shear (-Z)	8.101 psi	75.0 psi	+1.20D+0.50L+1.60S
PASS	0.2006	2-way Punching	30.090 psi	150.0 psi	+1.20D+0.50L+1.60S

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	3.0	n/a	0.0	0.6008	0.6008	n/a	n/a	0.200
X-X, +D+L	3.0	n/a	0.0	1.073	1.073	n/a	n/a	0.358
X-X, +D+S	3.0	n/a	0.0	1.106	1.106	n/a	n/a	0.369
X-X, +D+0.750L	3.0	n/a	0.0	0.9552	0.9552	n/a	n/a	0.318
X-X, +D+0.750L+0.750S	3.0	n/a	0.0	1.334	1.334	n/a	n/a	0.445
X-X, +0.60D	3.0	n/a	0.0	0.3605	0.3605	n/a	n/a	0.120
Z-Z, D Only	3.0	0.0	n/a	n/a	n/a	0.6008	0.6008	0.200
Z-Z, +D+L	3.0	0.0	n/a	n/a	n/a	1.073	1.073	0.358
Z-Z, +D+S	3.0	0.0	n/a	n/a	n/a	1.106	1.106	0.369
Z-Z, +D+0.750L	3.0	0.0	n/a	n/a	n/a	0.9552	0.9552	0.318
Z-Z, +D+0.750L+0.750S	3.0	0.0	n/a	n/a	n/a	1.334	1.334	0.445
Z-Z, +0.60D	3.0	0.0	n/a	n/a	n/a	0.3605	0.3605	0.120

Overturning Stability

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

All units k

Sliding Stability

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

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	0.3360	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.40D	0.3360	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	0.6660	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	0.6660	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	0.7923	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	0.7923	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.4061	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.4061	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.2880	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.2880	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	0.8101	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	0.8101	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60S	0.6920	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#3

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.20D+1.60S	0.6920	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	0.5324	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	0.5324	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	0.5829	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	0.5829	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.2160	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.2160	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.3360	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.3360	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	0.6660	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	0.6660	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	0.7923	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	0.7923	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.4061	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.4061	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.2880	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.2880	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	0.8101	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	0.8101	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.6920	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.6920	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	0.5324	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	0.5324	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	0.5829	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	0.5829	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.2160	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.2160	+X	Bottom	0.2160	AsMin	0.30	6.088	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.36 psi	3.36 psi	3.36 psi	3.36 psi	3.36 psi	75.00 psi	0.04	OK
+1.20D+1.60L	6.66 psi	6.66 psi	6.66 psi	6.66 psi	6.66 psi	75.00 psi	0.09	OK
+1.20D+1.60L+0.50S	7.92 psi	7.92 psi	7.92 psi	7.92 psi	7.92 psi	75.00 psi	0.11	OK
+1.20D+0.50L	4.06 psi	4.06 psi	4.06 psi	4.06 psi	4.06 psi	75.00 psi	0.05	OK
+1.20D	2.88 psi	2.88 psi	2.88 psi	2.88 psi	2.88 psi	75.00 psi	0.04	OK
+1.20D+0.50L+1.60S	8.10 psi	8.10 psi	8.10 psi	8.10 psi	8.10 psi	75.00 psi	0.11	OK
+1.20D+1.60S	6.92 psi	6.92 psi	6.92 psi	6.92 psi	6.92 psi	75.00 psi	0.09	OK
+1.20D+0.50L+0.50S	5.32 psi	5.32 psi	5.32 psi	5.32 psi	5.32 psi	75.00 psi	0.07	OK
+1.20D+0.50L+0.70S	5.83 psi	5.83 psi	5.83 psi	5.83 psi	5.83 psi	75.00 psi	0.08	OK
+0.90D	2.16 psi	2.16 psi	2.16 psi	2.16 psi	2.16 psi	75.00 psi	0.03	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	12.48 psi	150.00psi	0.0832	OK
+1.20D+1.60L	24.74 psi	150.00psi	0.1649	OK
+1.20D+1.60L+0.50S	29.43 psi	150.00psi	0.1962	OK
+1.20D+0.50L	15.09 psi	150.00psi	0.1006	OK
+1.20D	10.70 psi	150.00psi	0.07131	OK
+1.20D+0.50L+1.60S	30.09 psi	150.00psi	0.2006	OK
+1.20D+1.60S	25.70 psi	150.00psi	0.1714	OK
+1.20D+0.50L+0.50S	19.77 psi	150.00psi	0.1318	OK
+1.20D+0.50L+0.70S	21.65 psi	150.00psi	0.1443	OK
+0.90D	8.02 psi	150.00psi	0.05349	OK

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#4

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
 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	=	3.0 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

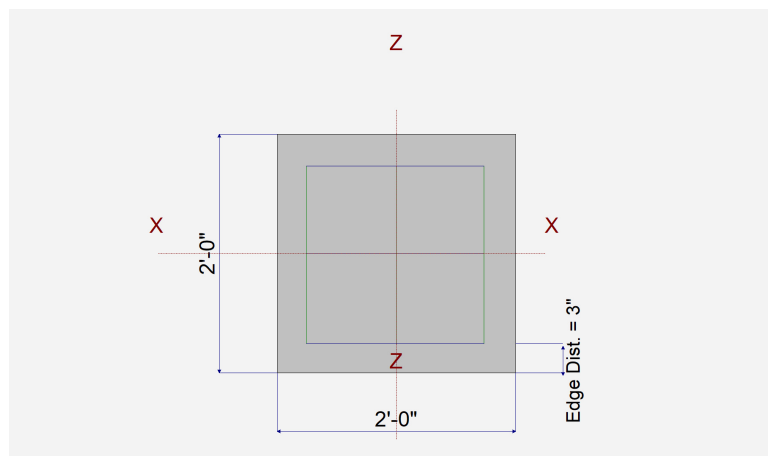
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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Dimensions

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

Pedestal dimensions...

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



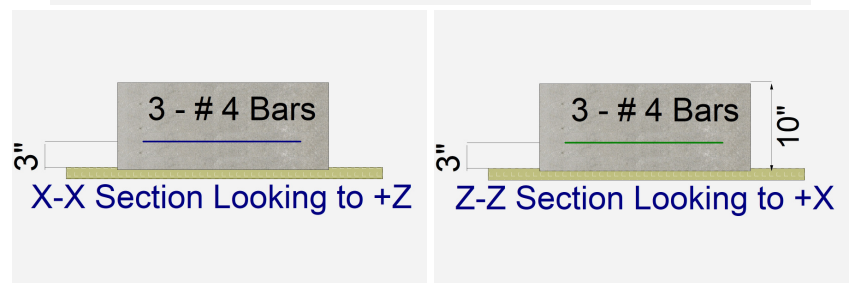
Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	3.0
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis		
Number of Bars	=	3.0
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	=	3.60		6.690	2.390		k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#4

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9077	Soil Bearing	2.723 ksf	3.0 ksf	+D+0.750L+0.750S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3330	Z Flexure (+X)	2.027 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.3330	Z Flexure (-X)	2.027 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.3330	X Flexure (+Z)	2.027 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.3330	X Flexure (-Z)	2.027 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2703	1-way Shear (+X)	20.274 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2703	1-way Shear (-X)	20.274 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2703	1-way Shear (+Z)	20.274 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2703	1-way Shear (-Z)	20.274 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.5020	2-way Punching	75.303 psi	150.0 psi	+1.20D+1.60L+0.50S

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	3.0	n/a	0.0	1.021	1.021	n/a	n/a	0.340
X-X, +D+L	3.0	n/a	0.0	2.693	2.693	n/a	n/a	0.898
X-X, +D+S	3.0	n/a	0.0	1.618	1.618	n/a	n/a	0.539
X-X, +D+0.750L	3.0	n/a	0.0	2.275	2.275	n/a	n/a	0.758
X-X, +D+0.750L+0.750S	3.0	n/a	0.0	2.723	2.723	n/a	n/a	0.908
X-X, +0.60D	3.0	n/a	0.0	0.6125	0.6125	n/a	n/a	0.204
Z-Z, D Only	3.0	0.0	n/a	n/a	n/a	1.021	1.021	0.340
Z-Z, +D+L	3.0	0.0	n/a	n/a	n/a	2.693	2.693	0.898
Z-Z, +D+S	3.0	0.0	n/a	n/a	n/a	1.618	1.618	0.539
Z-Z, +D+0.750L	3.0	0.0	n/a	n/a	n/a	2.275	2.275	0.758
Z-Z, +D+0.750L+0.750S	3.0	0.0	n/a	n/a	n/a	2.723	2.723	0.908
Z-Z, +0.60D	3.0	0.0	n/a	n/a	n/a	0.6125	0.6125	0.204

Overturning Stability

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

All units k

Sliding Stability

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

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	0.630	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.40D	0.630	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	1.878	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	1.878	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	2.027	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	2.027	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.9581	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.9581	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.540	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.540	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	1.436	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	1.436	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60S	1.018	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK

Project Title:
 Engineer:
 Project ID:
 Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#4

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, +1.20D+1.60S	1.018	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	1.108	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	1.108	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	1.167	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	1.167	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.4050	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.4050	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.630	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.630	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	1.878	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	1.878	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	2.027	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	2.027	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.9581	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.9581	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.540	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.540	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	1.436	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	1.436	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	1.018	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	1.018	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	1.108	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	1.108	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	1.167	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	1.167	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.4050	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.4050	+X	Bottom	0.2160	AsMin	0.30	6.088	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	6.30 psi	6.30 psi	6.30 psi	6.30 psi	6.30 psi	75.00 psi	0.08	OK
+1.20D+1.60L	18.78 psi	18.78 psi	18.78 psi	18.78 psi	18.78 psi	75.00 psi	0.25	OK
+1.20D+1.60L+0.50S	20.27 psi	20.27 psi	20.27 psi	20.27 psi	20.27 psi	75.00 psi	0.27	OK
+1.20D+0.50L	9.58 psi	9.58 psi	9.58 psi	9.58 psi	9.58 psi	75.00 psi	0.13	OK
+1.20D	5.40 psi	5.40 psi	5.40 psi	5.40 psi	5.40 psi	75.00 psi	0.07	OK
+1.20D+0.50L+1.60S	14.36 psi	14.36 psi	14.36 psi	14.36 psi	14.36 psi	75.00 psi	0.19	OK
+1.20D+1.60S	10.18 psi	10.18 psi	10.18 psi	10.18 psi	10.18 psi	75.00 psi	0.14	OK
+1.20D+0.50L+0.50S	11.08 psi	11.08 psi	11.08 psi	11.08 psi	11.08 psi	75.00 psi	0.15	OK
+1.20D+0.50L+0.70S	11.67 psi	11.67 psi	11.67 psi	11.67 psi	11.67 psi	75.00 psi	0.16	OK
+0.90D	4.05 psi	4.05 psi	4.05 psi	4.05 psi	4.05 psi	75.00 psi	0.05	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	23.40 psi	150.00psi	0.156	OK
+1.20D+1.60L	69.75 psi	150.00psi	0.465	OK
+1.20D+1.60L+0.50S	75.30 psi	150.00psi	0.502	OK
+1.20D+0.50L	35.59 psi	150.00psi	0.2373	OK
+1.20D	20.06 psi	150.00psi	0.1337	OK
+1.20D+0.50L+1.60S	53.34 psi	150.00psi	0.3556	OK
+1.20D+1.60S	37.81 psi	150.00psi	0.2521	OK
+1.20D+0.50L+0.50S	41.14 psi	150.00psi	0.2742	OK
+1.20D+0.50L+0.70S	43.36 psi	150.00psi	0.289	OK
+0.90D	15.04 psi	150.00psi	0.1003	OK

Combined Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#5

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
 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 : Phi Values	
Flexure :	0.90
Shear :	0.750

Analysis/Design Settings

Calculate footing weight as dead load ?	Yes
Calculate Pedestal weight as dead load ?	No
Min Steel % Bending Reinf (based on 'd')	
Min Allow % Temp Reinf (based on thick)	0.00180
Min. Overturning Safety Factor	1.0: 1
Min. Sliding Safety Factor	1.0: 1

Soil Information

Allowable Soil Bearing	3.0 ksf
Increase Bearing By Footing Weight	No
Soil Passive Sliding Resistance	150.0 pcf
<i>(Uses entry for "Footing base depth below soil surface" for force)</i>	
Coefficient of Soil/Concrete Friction	0.250

Soil Bearing Increase

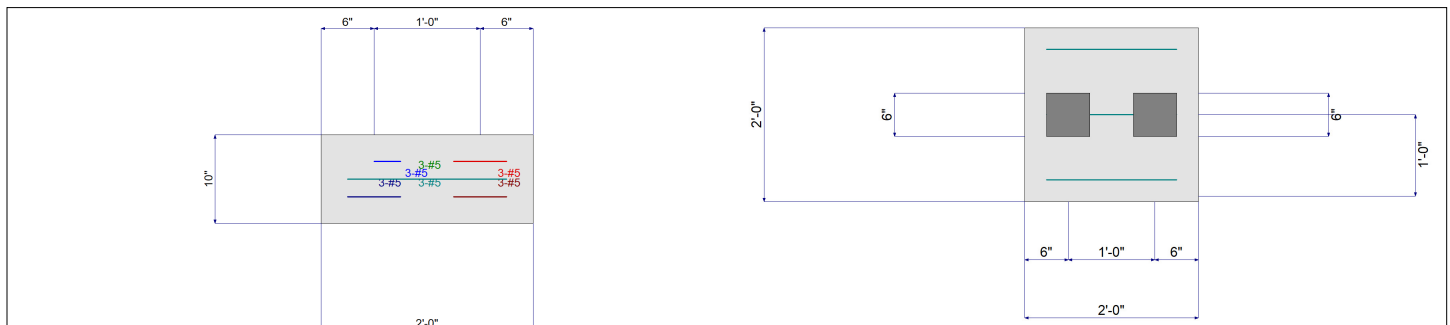
Footing base depth below soil surface	ft
Increases based on footing Depth	
Allowable pressure increase per foot	ksf
when base of footing is below	ft
Increases based on footing Width	
Allowable pressure increase per foot	ksf
when maximum length or width is greater tha	ft
Maximum Allowed Bearing Pressure	3.0 ksf
<i>(A value of zero implies no limit)</i>	
Adjusted Allowable Soil Bearing	3.0 ksf
<i>(Allowable Soil Bearing adjusted for footing weight and depth & width increases as specified by user.)</i>	

Dimensions & Reinforcing

Distance Left of Column #1	=	0.50 ft	Pedestal dimensions...											
Between Columns	=	1.0 ft												
Distance Right of Column #2	=	0.50 ft												
Total Footing Length	=	2.0 ft	Sq. Dim. =	6.0	Col #1	Col #2								
			Height =											
Footing Width	=	2.0 ft												
Footing Thickness	=	10.0 in												
Rebar Center to Concrete Edge @ Top	=	3.0 in												
Rebar Center to Concrete Edge @ Bottom	=	3.0 in												

Applied Loads

Applied @	D	Lr	L	S	W	E	H
Applied @ Left Column							
Axial Load Downward	=	0.710		1.090			k
Moment (+CW)	=						k-ft
Shear (+X)	=						k
Applied @ Right Column							
Axial Load Downward	=	0.470	1.270				k
Moment (+CW)	=						k-ft
Shear (+X)	=						k
Overburden	=						



Project Title:
 Engineer:
 Project ID:
 Project Descr:

Combined Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#5

DESIGN SUMMARY

Design OK

Factor of Safety	Item	Applied	Capacity	Governing Load Combination	
PASS	No OTM	Overturning	0.0 k-ft	0.0 k-ft	No OTM
PASS	No Sliding	Sliding	0.0 k	0.4158 k	No Sliding
PASS	No Uplift	Uplift	0.0 k	0.0 k	No Uplift

Utilization Ratio	Item	Applied	Capacity	Governing Load Combination	
PASS	0.3953	Soil Bearing	1.186 ksf	3.0 ksf	+D+S
PASS	0.02016	1-way Shear - Col #1	1.512 psi	75.0 psi	+1.20D+1.60S
PASS	0.02016	1-way Shear - Col #2	1.512 psi	75.0 psi	+1.20D+1.60S
PASS	0.02376	2-way Punching - Col #1	3.564 psi	150.0 psi	+1.20D+1.60S
PASS	0.03889	2-way Punching - Col #2	5.834 psi	150.0 psi	+1.20D+1.60S
PASS	No Bending	Flexure - Left of Col #1 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.004830	Flexure - Left of Col #1 - Bottom	0.08942 k-ft	18.512 k-ft	+1.20D+1.60S
PASS	0.001168	Flexure - Between Cols - Top	-0.02162 k-ft	18.512 k-ft	+1.20D+1.60S
PASS	0.006125	Flexure - Between Cols - Bottom	0.1134 k-ft	18.512 k-ft	+1.20D+1.60S
PASS	No Bending	Flexure - Right of Col #2 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.004742	Flexure - Right of Col #2 - Bottom	0.08779 k-ft	18.512 k-ft	+1.20D+1.60L

Soil Bearing

Load Combination...	Total Bearing	Eccentricity from Ftg CL	Actual Soil Bearing Stress		Allowable	Actual / Allow Ratio
			@ Left Edge	@ Right Edge		
D Only	1.66 k	-0.072 ft	0.51 ksf	0.33 ksf	3.00 ksf	0.169
+D+L	2.93 k	0.176 ft	0.35 ksf	1.12 ksf	3.00 ksf	0.373
+D+S	2.75 k	-0.242 ft	1.19 ksf	0.19 ksf	3.00 ksf	0.395
+D+0.750L	2.62 k	0.136 ft	0.39 ksf	0.92 ksf	3.00 ksf	0.307
+D+0.750L+0.750S	3.43 k	-0.015 ft	0.90 ksf	0.82 ksf	3.00 ksf	0.299
+0.60D	1.00 k	-0.072 ft	0.30 ksf	0.20 ksf	3.00 ksf	0.101

Overturning Stability

Load Combination...	Moments about Left Edge k-ft			Moments about Right Edge k-ft		
	Overturning	Resisting	Ratio	Overturning	Resisting	Ratio
D Only	0.00	0.00	999.000	0.00	0.00	999.000
+D+L	0.00	0.00	999.000	0.00	0.00	999.000
+D+S	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.750L	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.750L+0.750S	0.00	0.00	999.000	0.00	0.00	999.000
+0.60D	0.00	0.00	999.000	0.00	0.00	999.000

Sliding Stability

Load Combination...	Sliding Force	Resisting Force	Sliding Safety Ratio
D Only	0.00 k	0.42 k	999
+D+L	0.00 k	0.73 k	999
+D+S	0.00 k	0.69 k	999
+D+0.750L	0.00 k	0.65 k	999
+D+0.750L+0.750S	0.00 k	0.86 k	999
+0.60D	0.00 k	0.25 k	999

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+0.60D	0.000	0.000	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.005	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.010	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.015	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.020	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.025	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.030	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.035	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.040	0	0.000	0	0.000	0.000	0.000

Combined Footing

DESCRIPTION: FTNG#5

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+0.60D	0.000	0.045	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.050	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.055	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.060	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.065	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.070	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.075	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.080	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.011	0.085	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.012	0.090	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.014	0.095	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.015	0.100	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.017	0.105	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.018	0.110	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.020	0.115	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.022	0.120	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.024	0.125	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.026	0.130	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.028	0.135	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.030	0.140	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.032	0.145	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.034	0.150	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.036	0.155	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.039	0.160	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.041	0.165	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.044	0.170	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.046	0.175	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.049	0.180	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.052	0.185	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.054	0.190	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.057	0.195	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.060	0.200	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.063	0.205	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.066	0.210	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.069	0.215	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.072	0.220	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.076	0.225	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.079	0.230	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.082	0.235	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.086	0.240	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.089	0.245	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.093	0.250	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.097	0.255	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.100	0.260	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.104	0.265	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.107	0.270	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.110	0.275	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.114	0.280	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.117	0.285	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.120	0.290	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.123	0.295	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.126	0.300	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.129	0.305	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.132	0.310	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.135	0.315	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.138	0.320	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.141	0.325	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.143	0.330	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.146	0.335	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.148	0.340	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.151	0.345	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.153	0.350	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.156	0.355	Bottom	0.432	Min Temp %	0.930	18.512	0.008

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Combined Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#5

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60S	0.158	0.360	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.160	0.365	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.162	0.370	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.164	0.375	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.166	0.380	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.168	0.385	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.170	0.390	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.172	0.395	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.174	0.400	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.175	0.405	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.177	0.410	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.178	0.415	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.180	0.420	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.181	0.425	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.183	0.430	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.184	0.435	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.185	0.440	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.186	0.445	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.187	0.450	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.188	0.455	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.189	0.460	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.190	0.465	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.191	0.470	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.192	0.475	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.192	0.480	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.193	0.485	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.193	0.490	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.194	0.495	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.194	0.500	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.194	0.505	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.194	0.510	Bottom	0.432	Min Temp %	0.930	18.512	0.011
+1.20D+1.60S	0.195	0.515	Bottom	0.432	Min Temp %	0.930	18.512	0.011
+1.20D+1.60S	0.195	0.520	Bottom	0.432	Min Temp %	0.930	18.512	0.011
+1.20D+1.60S	0.195	0.525	Bottom	0.432	Min Temp %	0.930	18.512	0.011
+1.20D+1.60S	0.195	0.530	Bottom	0.432	Min Temp %	0.930	18.512	0.011
+1.20D+1.60S	0.194	0.535	Bottom	0.432	Min Temp %	0.930	18.512	0.011
+1.20D+1.60S	0.194	0.540	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.194	0.545	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.194	0.550	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.193	0.555	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.193	0.560	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.192	0.565	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.191	0.570	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.191	0.575	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.190	0.580	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.189	0.585	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.188	0.590	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.187	0.595	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.186	0.600	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.185	0.605	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.183	0.610	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.182	0.615	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.181	0.620	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.179	0.625	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.178	0.630	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.176	0.635	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60S	0.174	0.640	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.172	0.645	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.171	0.650	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.169	0.655	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.167	0.660	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.165	0.665	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.162	0.670	Bottom	0.432	Min Temp %	0.930	18.512	0.009

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Combined Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#5

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60S	0.160	0.675	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.158	0.680	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60S	0.155	0.685	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.153	0.690	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.150	0.695	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.148	0.700	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.145	0.705	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.142	0.710	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.139	0.715	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60S	0.136	0.720	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.133	0.725	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.130	0.730	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.127	0.735	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.124	0.740	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60S	0.120	0.745	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.117	0.750	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.113	0.755	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.110	0.760	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.107	0.765	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.103	0.770	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60S	0.100	0.775	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.097	0.780	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.094	0.785	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.091	0.790	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.087	0.795	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.084	0.800	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60S	0.081	0.805	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.079	0.810	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.076	0.815	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.073	0.820	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.070	0.825	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.067	0.830	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60S	0.065	0.835	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.062	0.840	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.059	0.845	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.057	0.850	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.054	0.855	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.052	0.860	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.049	0.865	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.047	0.870	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60S	0.045	0.875	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.042	0.880	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.040	0.885	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.038	0.890	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.036	0.895	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.034	0.900	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.031	0.905	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.029	0.910	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60S	0.027	0.915	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.026	0.920	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.024	0.925	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.022	0.930	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.020	0.935	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.018	0.940	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.016	0.945	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.015	0.950	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.013	0.955	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.011	0.960	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60S	0.000	0.965	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	0.970	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	0.975	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	0.980	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	0.985	0	0.000	0	0.000	0.000	0.000

Combined Footing

DESCRIPTION: FTNG#5

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60S	0.000	0.990	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	0.995	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	1.000	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	1.005	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	1.010	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	1.015	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	1.020	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	1.025	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	1.030	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60S	0.000	1.035	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.010	1.040	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.012	1.045	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.013	1.050	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.015	1.055	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.016	1.060	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.018	1.065	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.020	1.070	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.021	1.075	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.023	1.080	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.025	1.085	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.027	1.090	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.029	1.095	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.031	1.100	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.033	1.105	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.035	1.110	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.037	1.115	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.039	1.120	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.041	1.125	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.043	1.130	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.046	1.135	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.048	1.140	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.050	1.145	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.053	1.150	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.055	1.155	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.058	1.160	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.060	1.165	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.063	1.170	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.066	1.175	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.068	1.180	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.071	1.185	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.074	1.190	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.077	1.195	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.080	1.200	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.083	1.205	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.086	1.210	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.089	1.215	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.092	1.220	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.095	1.225	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.098	1.230	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.102	1.235	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.105	1.240	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.108	1.245	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.112	1.250	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.115	1.255	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.119	1.260	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.122	1.265	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.125	1.270	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.128	1.275	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.131	1.280	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.134	1.285	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.137	1.290	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.140	1.295	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.142	1.300	Bottom	0.432	Min Temp %	0.930	18.512	0.008

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Combined Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

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DESCRIPTION: FTNG#5

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60L	0.145	1.305	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.148	1.310	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.150	1.315	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.152	1.320	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.155	1.325	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.157	1.330	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.159	1.335	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.161	1.340	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.163	1.345	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.165	1.350	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.167	1.355	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.169	1.360	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.171	1.365	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.172	1.370	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.174	1.375	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.175	1.380	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.177	1.385	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.178	1.390	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.179	1.395	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.181	1.400	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.182	1.405	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.183	1.410	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.184	1.415	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.185	1.420	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.186	1.425	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.186	1.430	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.187	1.435	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.188	1.440	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.188	1.445	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.189	1.450	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.189	1.455	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.189	1.460	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.190	1.465	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.190	1.470	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.190	1.475	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.190	1.480	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.190	1.485	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.190	1.490	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.190	1.495	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.189	1.500	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.189	1.505	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.189	1.510	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.188	1.515	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.188	1.520	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.187	1.525	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.187	1.530	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.186	1.535	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.185	1.540	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.184	1.545	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.183	1.550	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.182	1.555	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.181	1.560	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.180	1.565	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.179	1.570	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.178	1.575	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.176	1.580	Bottom	0.432	Min Temp %	0.930	18.512	0.010
+1.20D+1.60L	0.175	1.585	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.173	1.590	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.172	1.595	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.170	1.600	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.169	1.605	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.167	1.610	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.165	1.615	Bottom	0.432	Min Temp %	0.930	18.512	0.009

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Combined Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#5

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60L	0.163	1.620	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.161	1.625	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.159	1.630	Bottom	0.432	Min Temp %	0.930	18.512	0.009
+1.20D+1.60L	0.157	1.635	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.155	1.640	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.153	1.645	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.150	1.650	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.148	1.655	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.146	1.660	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.143	1.665	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.141	1.670	Bottom	0.432	Min Temp %	0.930	18.512	0.008
+1.20D+1.60L	0.138	1.675	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.135	1.680	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.133	1.685	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.130	1.690	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.127	1.695	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.124	1.700	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.121	1.705	Bottom	0.432	Min Temp %	0.930	18.512	0.007
+1.20D+1.60L	0.118	1.710	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.115	1.715	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.112	1.720	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.108	1.725	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.105	1.730	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.102	1.735	Bottom	0.432	Min Temp %	0.930	18.512	0.006
+1.20D+1.60L	0.098	1.740	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.095	1.745	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.091	1.750	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.088	1.755	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.084	1.760	Bottom	0.432	Min Temp %	0.930	18.512	0.005
+1.20D+1.60L	0.081	1.765	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.078	1.770	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.074	1.775	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.071	1.780	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.068	1.785	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.065	1.790	Bottom	0.432	Min Temp %	0.930	18.512	0.004
+1.20D+1.60L	0.062	1.795	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.059	1.800	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.056	1.805	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.053	1.810	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.051	1.815	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.048	1.820	Bottom	0.432	Min Temp %	0.930	18.512	0.003
+1.20D+1.60L	0.045	1.825	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.043	1.830	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.040	1.835	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.038	1.840	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.036	1.845	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.033	1.850	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.031	1.855	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.029	1.860	Bottom	0.432	Min Temp %	0.930	18.512	0.002
+1.20D+1.60L	0.027	1.865	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.025	1.870	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.023	1.875	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.021	1.880	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.020	1.885	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.018	1.890	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.016	1.895	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.015	1.900	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.013	1.905	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.012	1.910	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.011	1.915	Bottom	0.432	Min Temp %	0.930	18.512	0.001
+1.20D+1.60L	0.000	1.920	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.925	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.930	0	0.000	0	0.000	0.000	0.000

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Combined Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.12.28

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#5

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+1.20D+1.60L	0.000	1.935	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.940	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.945	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.950	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.955	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.960	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.965	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.970	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.975	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.980	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.985	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.990	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	1.995	0	0.000	0	0.000	0.000	0.000
+1.20D+1.60L	0.000	2.000	0	0.000	0	0.000	0.000	0.000

One Way Shear

Punching Shear

Load Combination...	Phi Vn	vu @ Col #1	vu @ Col #2	Phi Vn	vu @ Col #1	vu @ Col #2
+1.40D	75.00 psi	0.25 psi	0.25 psi	150.00 psi	1.28psi	1.66 psi
+1.20D+1.60L	75.00 psi	1.30 psi	1.30 psi	150.00 psi	0.66psi	1.29 psi
+1.20D+1.60L+0.50S	75.00 psi	0.89 psi	0.89 psi	150.00 psi	1.43psi	0.09 psi
+1.20D+0.50L	75.00 psi	0.26 psi	0.26 psi	150.00 psi	0.96psi	0.57 psi
+1.20D	75.00 psi	0.21 psi	0.21 psi	150.00 psi	1.10psi	1.42 psi
+1.20D+0.50L+1.60S	75.00 psi	1.04 psi	1.04 psi	150.00 psi	3.43psi	4.99 psi
+1.20D+1.60S	75.00 psi	1.51 psi	1.51 psi	150.00 psi	3.56psi	5.83 psi
+1.20D+0.50L+0.50S	75.00 psi	0.15 psi	0.15 psi	150.00 psi	1.73psi	1.95 psi
+1.20D+0.50L+0.70S	75.00 psi	0.31 psi	0.31 psi	150.00 psi	2.04psi	2.50 psi
+0.90D	75.00 psi	0.16 psi	0.16 psi	150.00 psi	0.82psi	1.07 psi

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 4ft wall

Code Reference:

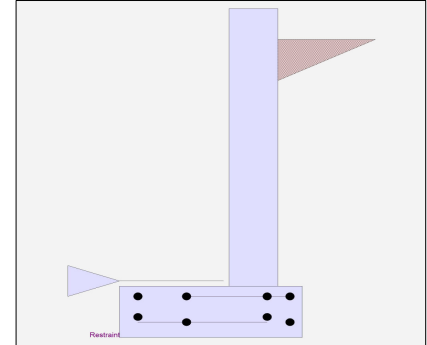
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

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

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	275.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method	:	Uniform
Multiplier Used	=	14.000
(Multiplier used on soil density)		

Lateral Load Applied to Stem

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

Uniform Seismic Force	=	67.667
Total Seismic Force	=	327.056

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 4ft wall

Design Summary

Wall Stability Ratios

Overturning	=	1.29 Ratio < 1.5!
Slab Resists All Sliding !		
Global Stability	=	1.74
Total Bearing Load	=	909 lbs
...resultant ecc.	=	10.43 in
Soil Pressure @ Toe	=	1,593 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	3,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	2,230 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	14.1 psi OK
Footing Shear @ Heel	=	2.5 psi OK
Allowable	=	75.0 psi

Sliding Calcs

Lateral Sliding Force	=	637.8 lbs
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Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

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

Stem Construction

Design Height Above Ftg

ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete
Design Method	=	SD
Thickness	=	8.00
Rebar Size	=	# 4
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.311
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	718.7

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	1,138.7

Moment.....Allowable	=	3,655.6
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Shear.....Actual

Service Level	psi =	
Strength Level	psi =	9.6

Shear.....Allowable	psi =	75.0
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Anet (Masonry)	in2 =	
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Wall Weight	psf =	100.0
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Rebar Depth 'd'	in =	6.25
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Masonry Data

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

Concrete Data

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 4ft wall

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.064 in ² /ft		
(4/3) * As :	0.0853 in ² /ft	Min Stem T&S Reinf Area 0.864 in ²	
200bd/fy : 200(12)(6.25)/40000 :	0.375 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in ² /ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in ² /ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.1728 in ² /ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2 in ² /ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.27 in ² /ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	1.00
Total Footing Width	=	2.50
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	2,230	0 psf
Mu' : Upward	=	1,425	0 ft-#
Mu' : Downward	=	169	38 ft-#
Mu: Design	=	1,256	38 ft-#
phiMn	=	4,264	4,912 ft-#
Actual 1-Way Shear	=	14.06	2.51 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 4 @ 11.11 in	
Heel Reinforcing	=	# 4 @ 11.11 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
 Heel:
 Key:

Min footing T&S reinf Area	0.54	in ²
Min footing T&S reinf Area per foot	0.22	in ² /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 11.11 in		#4@ 22.22 in
#5@ 17.22 in		#5@ 34.44 in
#6@ 24.44 in		#6@ 48.89 in

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 4ft wall

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	408.8	1.61	658.7	Soil Over HL (ab. water tbl)	146.7	2.33	342.2
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.33	342.2
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	228.9	2.42	553.3	Surcharge Over Toe =			
=				Stem Weight(s) =	450.0	1.83	825.0
Total =	637.8	O.T.M. =	1,211.9	Earth @ Stem Transitions =			
				Footing Weight =	312.5	1.25	390.6
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio =			1.29	Total =	909.2 lbs	R.M.=	1,557.8
Vertical Loads used for Soil Pressure =		909.2 lbs					

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.080 in

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 4ft wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment = 15.60 in

Development length for #4 bar specified in this stem design segment = 12.00 in

Hooked embedment length into footing for #4 bar specified in this stem design segment = 6.00 in

As Provided = 0.2000 in²/ft

As Required = 0.1728 in²/ft

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

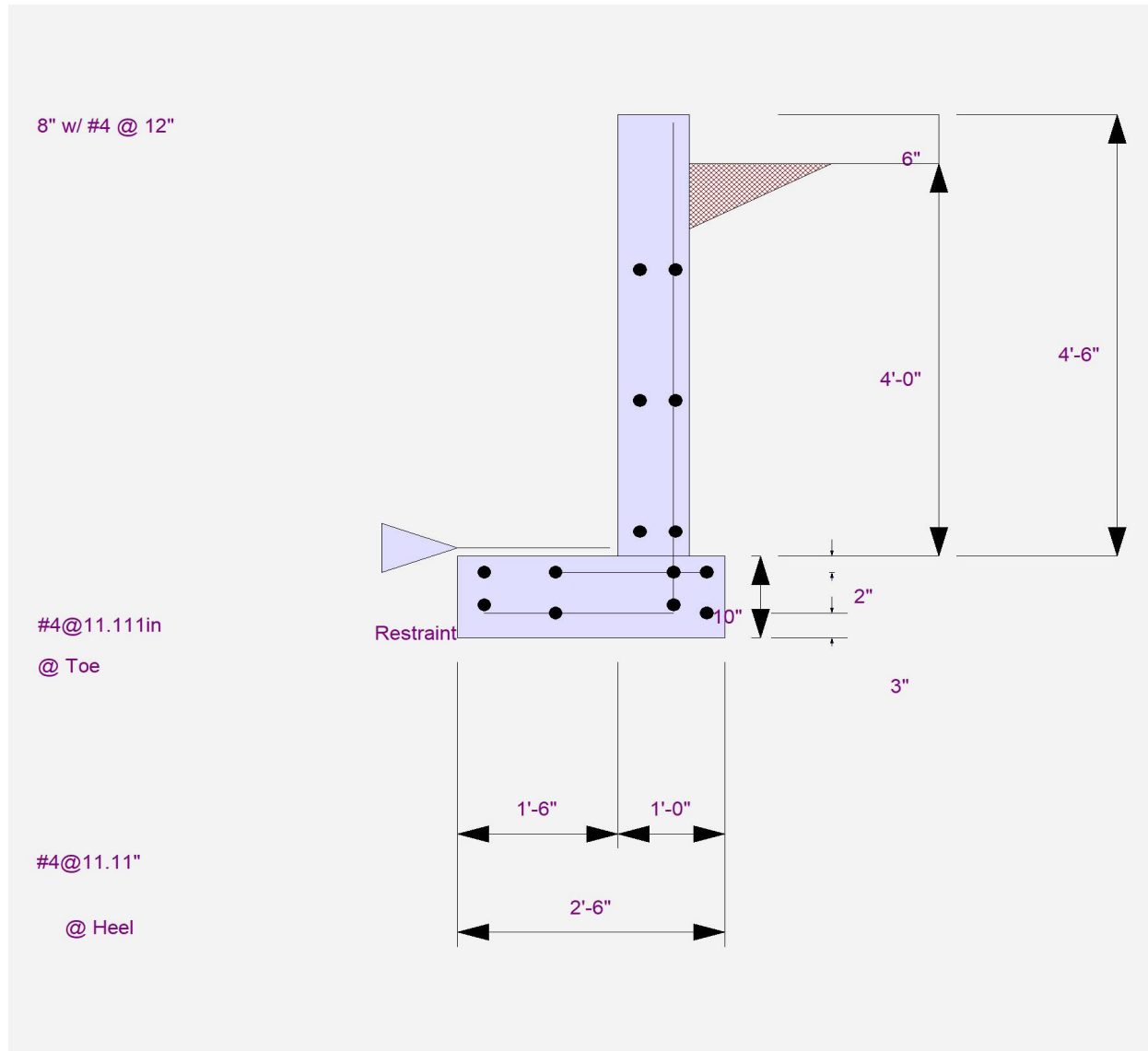
Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 4ft wall



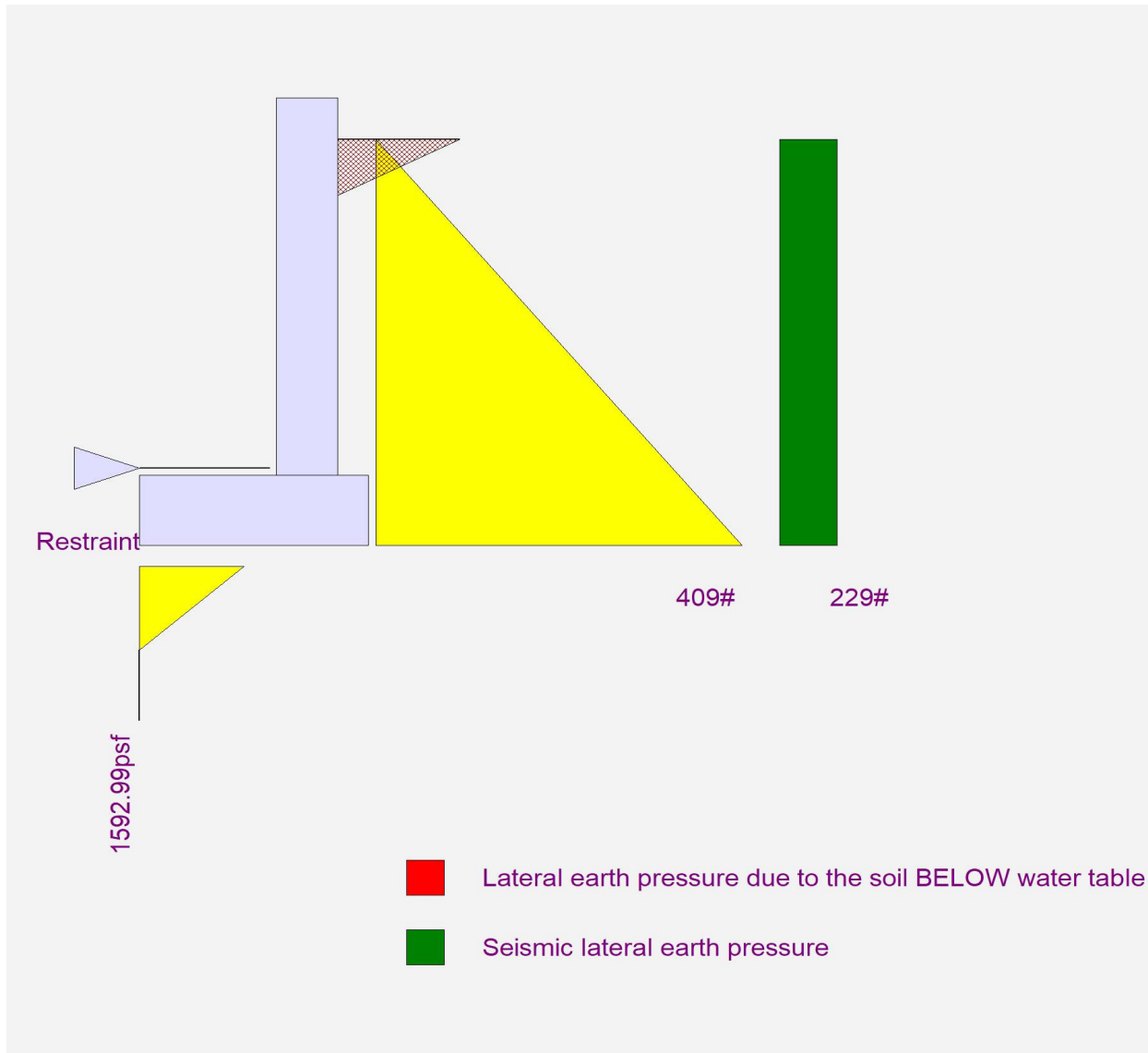
Cantilevered Retaining Wall

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 4ft wall



Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6ft wall

Code Reference:

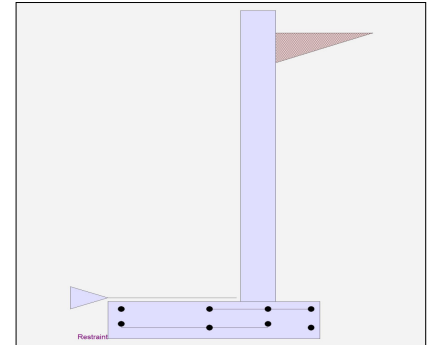
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

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

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	275.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method	:	Uniform
Multiplier Used	=	14.000
(Multiplier used on soil density)		

Lateral Load Applied to Stem

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

Uniform Seismic Force	=	95.667
Total Seismic Force	=	653.722

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6ft wall

Design Summary

Wall Stability Ratios

Overturning	=	1.41	Ratio < 1.5!
Slab Resists All Sliding !			
Global Stability	=	1.50	
Total Bearing Load	=	1,700 lbs	
...resultant ecc.	=	14.20 in	
Soil Pressure @ Toe	=	1,388 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,944 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	25.5 psi	OK
Footing Shear @ Heel	=	8.7 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	1,274.8 lbs
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Vertical component of active lateral soil pressure IS
 NOT considered in the calculation of soil bearing

Load Factors

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

Stem Construction

Design Height Above Ftg

ft =	0.00
Wall Material Above "Ht"	= Concrete
Design Method	= SD
Thickness	= 8.00
Rebar Size	= # 4
Rebar Spacing	= 8.00
Rebar Placed at	= Edge

Design Data

fb/FB + fa/Fa	=	0.690
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	1,582.0

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	3,738.0

Moment.....Allowable	=	5,412.6
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Shear.....Actual

Service Level	psi =	
Strength Level	psi =	21.1

Shear.....Allowable	psi =	75.0
---------------------	-------	------

Anet (Masonry)	in2 =	
----------------	-------	--

Wall Weight	psf =	100.0
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Rebar Depth 'd'	in =	6.25
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Masonry Data

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

Concrete Data

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6ft wall

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.2101 in2/ft		
(4/3) * As :	0.2801 in2/ft	Min Stem T&S Reinf Area 1.248 in2	
200bd/fy : 200(12)(6.25)/40000 :	0.375 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.2801 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.3 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.27 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	2.50 ft
Heel Width	=	1.50
Total Footing Width	=	4.00
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 40,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	1,944	0 psf
Mu' : Upward	=	4,007	0 ft-#
Mu' : Downward	=	469	327 ft-#
Mu: Design	=	3,538	327 ft-#
phiMn	=	4,999	4,912 ft-#
Actual 1-Way Shear	=	25.52	8.72 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 4 @ 9.43 in	
Heel Reinforcing	=	# 4 @ 11.11 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
 Heel:
 Key:

Min footing T&S reinf Area	0.86 in2
Min footing T&S reinf Area per foot	0.22 in2 /ft
If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 11.11 in	#4@ 22.22 in
#5@ 17.22 in	#5@ 34.44 in
#6@ 24.44 in	#6@ 48.89 in

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6ft wall

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	817.2	2.28	1,861.3	Soil Over HL (ab. water tbl)	550.0	3.58	1,970.8
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.58	1,970.8
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	457.6	3.42	1,563.5	Surcharge Over Toe =			
=				Stem Weight(s) =	650.0	2.83	1,841.7
Total =	1,274.8	O.T.M. =	3,424.8	Earth @ Stem Transitions =			
				Footing Weight =	500.0	2.00	1,000.0
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio =			1.41	Total =	1,700.0 lbs	R.M.=	4,812.5
Vertical Loads used for Soil Pressure =		1,700.0 lbs					

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.063 in

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6ft wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment = 15.60 in

Development length for #4 bar specified in this stem design segment = 12.00 in

Hooked embedment length into footing for #4 bar specified in this stem design segment = 6.00 in

As Provided = 0.3000 in²/ft

As Required = 0.2801 in²/ft

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

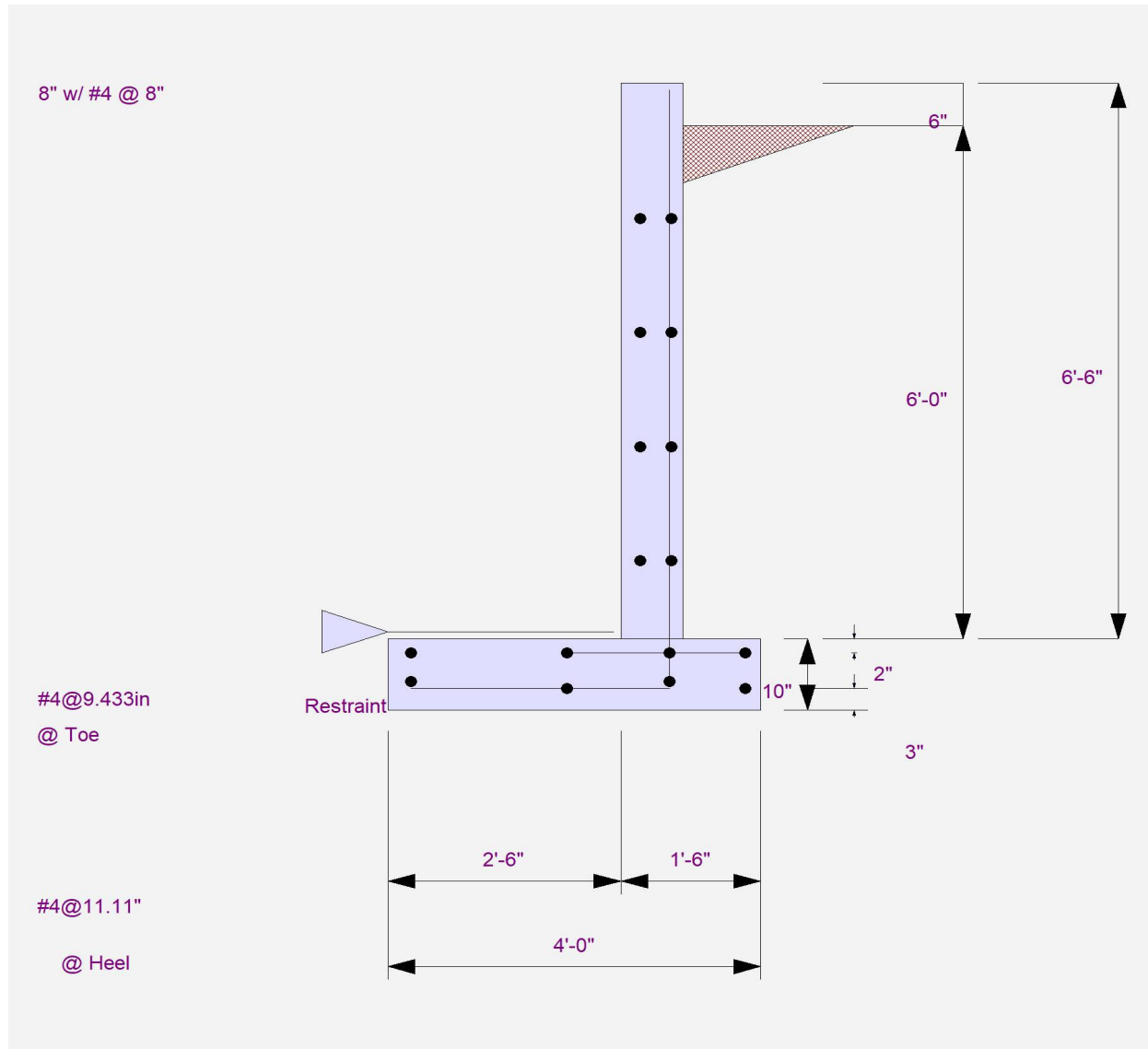
Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6ft wall



Cantilevered Retaining Wall

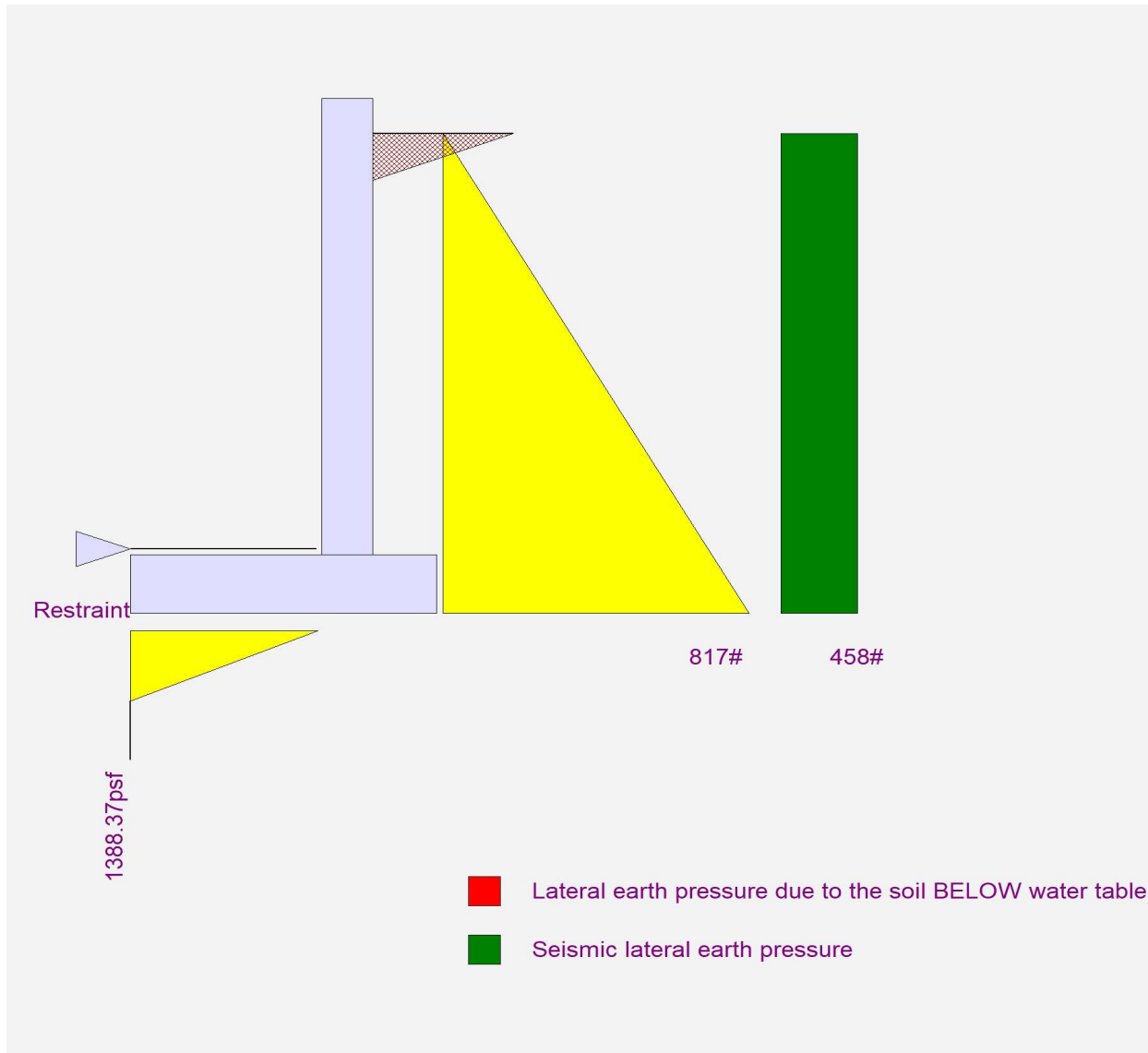
Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 6ft wall



Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 8ft wall

Code Reference

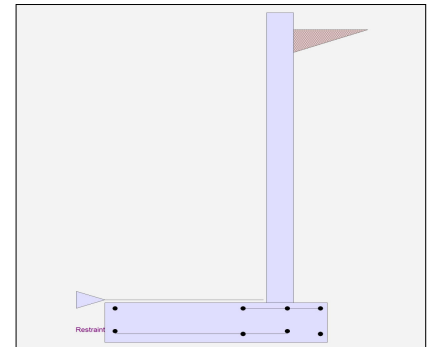
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

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

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	275.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footings Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method	:	Uniform
Multiplier Used	=	14.000
(Multiplier used on soil density)		

Lateral Load Applied to Stem

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

Uniform Seismic Force	=	128.333
Total Seismic Force	=	1,176.389

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 8ft wall

Design Summary

Wall Stability Ratios

Overturning	=	1.22	Ratio < 1.5!
Slab Resists All Sliding !			
Global Stability	=	1.35	
Total Bearing Load	=	2,546 lbs	
...resultant ecc.	=	24.56 in	
Soil Pressure @ Toe	=	2,413 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	3,378 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	23.1 psi	OK
Footing Shear @ Heel	=	7.6 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	2,294.0 lbs
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Vertical component of active lateral soil pressure IS
 NOT considered in the calculation of soil bearing

Load Factors

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

Stem Construction

Design Height Above Ftg

ft =	0.00
Wall Material Above "Ht"	= Concrete
Design Method	= SD
Thickness	= 8.00
Rebar Size	= # 5
Rebar Spacing	= 10.00
Rebar Placed at	= Edge

Design Data

fb/FB + fa/Fa	=	0.923
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	2,818.7

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	8,885.3

Moment.....Allowable	=	9,623.1
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Shear.....Actual

Service Level	psi =	
Strength Level	psi =	38.0

Shear.....Allowable	psi =	75.0
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Anet (Masonry)	in2 =	
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Wall Weight	psf =	100.0
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Rebar Depth 'd'	in =	6.19
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Masonry Data

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

Concrete Data

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 8ft wall

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.3364 in2/ft		
(4/3) * As :	0.4486 in2/ft	Min Stem T&S Reinf Area 1.632 in2	
200bd/fy : 200(12)(6.1875)/60000 :	0.2475 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.3364 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.372 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	0.8382 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	4.00 ft
Heel Width	=	1.50
Total Footing Width	=	5.50
Footing Thickness	=	14.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	3,378	0 psf
Mu' : Upward	=	11,750	0 ft-#
Mu' : Downward	=	1,680	440 ft-#
Mu: Design	=	10,070	440 ft-#
phiMn	=	14,059	15,420 ft-#
Actual 1-Way Shear	=	23.08	7.64 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 12.30 in	
Heel Reinforcing	=	# 5 @ 12.30 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
 Heel:
 Key:

Min footing T&S reinf Area	1.66	in2
Min footing T&S reinf Area per foot	0.30	in2 /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 7.94 in		#4@ 15.87 in
#5@ 12.30 in		#5@ 24.60 in
#6@ 17.46 in		#6@ 34.92 in

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 8ft wall

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	1,470.5	3.06	4,493.2	Soil Over HL (ab. water tbl)	733.3	5.08	3,727.8
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		5.08	3,727.8
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	823.5	4.58	3,774.2	Surcharge Over Toe =			
=				Stem Weight(s) =	850.0	4.33	3,683.3
Total =	2,294.0	O.T.M. =	8,267.4	Earth @ Stem Transitions =			
				Footing Weight =	962.5	2.75	2,646.9
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio =			1.22	Total =	2,545.8 lbs	R.M.=	10,058.0
Vertical Loads used for Soil Pressure =	2,545.8	lbs					

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.104 in

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 8ft wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #5 bar specified in this stem design segment = 23.40 in

Development length for #5 bar specified in this stem design segment = 18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment = 9.50 in

As Provided = 0.3720 in²/ft

As Required = 0.3364 in²/ft

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

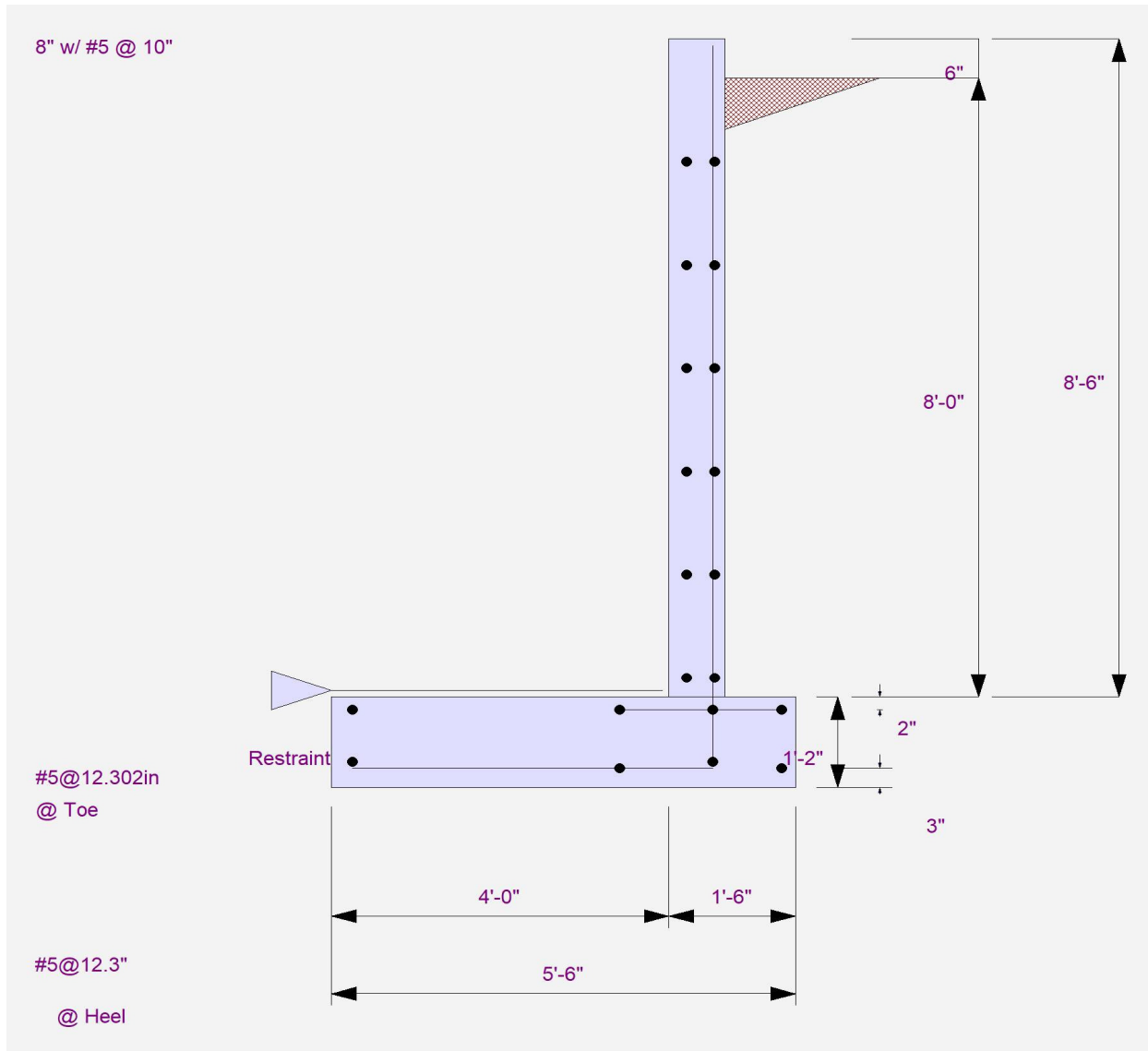
Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

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DESCRIPTION: 8ft wall



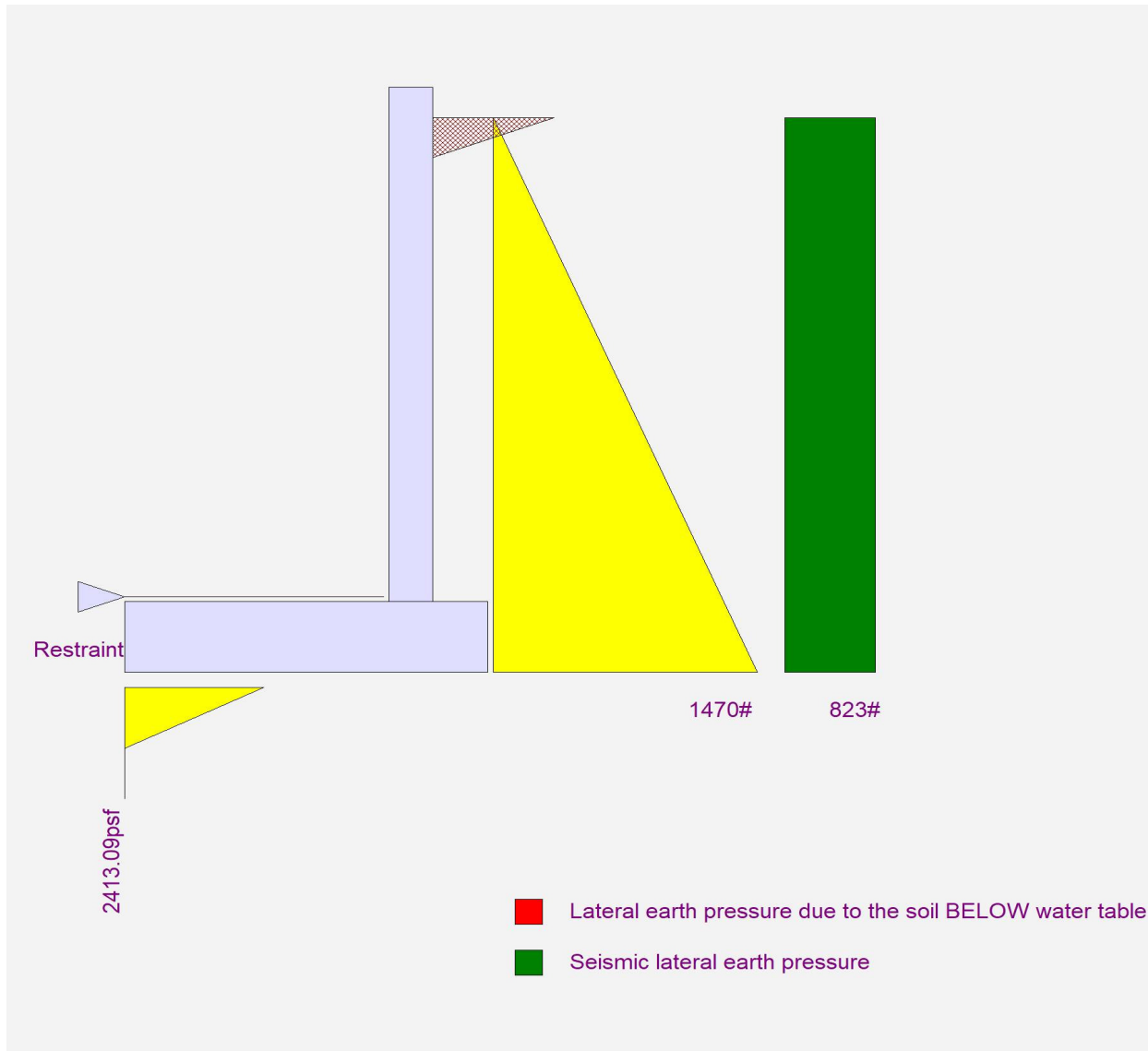
Cantilevered Retaining Wall

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 8ft wall



Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 10ft wall

Code Reference

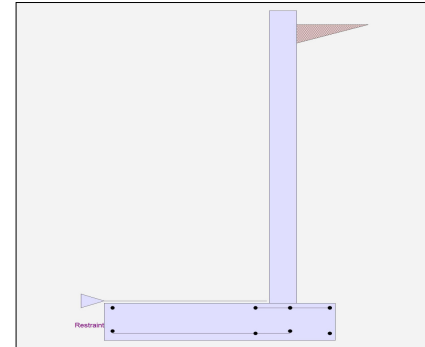
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	3,000.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	275.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method	:	Uniform
Multiplier Used	=	14.000
(Multiplier used on soil density)		

Lateral Load Applied to Stem

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

Uniform Seismic Force	=	158.667
Total Seismic Force	=	1,798.222

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

CK Engineering LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: 10ft wall

Design Summary

Wall Stability Ratios

Overturning	=	1.30	Ratio < 1.5!
Slab Resists All Sliding !			
Global Stability	=	1.32	
Total Bearing Load	=	3,996 lbs	
...resultant ecc.	=	28.13 in	
Soil Pressure @ Toe	=	2,304 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	3,000 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	3,226 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	31.0 psi	OK
Footing Shear @ Heel	=	11.2 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	3,506.5 lbs
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Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

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

Stem Construction

Design Height Above Ftg

ft =	0.00
Wall Material Above "Ht"	= Concrete
Design Method	= SD
Thickness	= 10.00
Rebar Size	= # 6
Rebar Spacing	= 9.00
Rebar Placed at	= Edge

Design Data

fb/FB + fa/Fa	=	0.943
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Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	4,386.7

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	17,266.7

Moment.....Allowable	=	18,302.4
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Shear.....Actual

Service Level	psi =	
Strength Level	psi =	47.9

Shear.....Allowable	psi =	75.0
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Anet (Masonry)	in2 =	
----------------	-------	--

Wall Weight	psf =	125.0
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Rebar Depth 'd'	in =	7.63
-----------------	------	------

Masonry Data

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

Concrete Data

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Cantilevered Retaining Wall

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DESCRIPTION: 10ft wall

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.5252 in2/ft		
(4/3) * As :	0.7002 in2/ft	Min Stem T&S Reinf Area 2.520 in2	
200bd/fy : 200(12)(7.625)/60000 :	0.305 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.240 in2/ft	
0.0018bh : 0.0018(12)(10) :	0.216 in2/ft	Horizontal Reinforcing Options :	
	=====	One layer of :	Two layers of :
Required Area :	0.5252 in2/ft	#4@ 10.00 in	#4@ 20.00 in
Provided Area :	0.5867 in2/ft	#5@ 15.50 in	#5@ 31.00 in
Maximum Area :	1.0329 in2/ft	#6@ 22.00 in	#6@ 44.00 in

Footing Data

Toe Width	=	5.00 ft
Heel Width	=	2.00
Total Footing Width	=	7.00
Footing Thickness	=	16.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft
f'c =	2,500 psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

		<u>Toe</u>	<u>Heel</u>
Factored Pressure	=	3,226	0 psf
Mu' : Upward	=	21,503	0 ft-#
Mu' : Downward	=	3,000	1,062 ft-#
Mu: Design	=	18,503	1,062 ft-#
phiMn	=	28,521	22,180 ft-#
Actual 1-Way Shear	=	30.96	11.23 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 6 @ 10.00 in	
Heel Reinforcing	=	# 5 @ 10.00 in	
Key Reinforcing	=	None Spec'd	
Footing Torsion, Tu	=		0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=		0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
 Heel:
 Key:

Min footing T&S reinf Area	2.42	in2
Min footing T&S reinf Area per foot	0.35	in2 /ft
If one layer of horizontal bars:		If two layers of horizontal bars:
#4@ 6.94 in		#4@ 13.89 in
#5@ 10.76 in		#5@ 21.53 in
#6@ 15.28 in		#6@ 30.56 in

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31

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DESCRIPTION: 10ft wall

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
HL Act Pres (ab water tbl)	2,247.8	3.78	8,491.6	Soil Over HL (ab. water tbl)	1,283.3	6.42	8,234.7
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		6.42	8,234.7
Hydrostatic Force				Watre Table			
Buoyant Force =				Sloped Soil Over Heel =			
Surcharge over Heel =				Surcharge Over Heel =			
Surcharge Over Toe =				Adjacent Footing Load =			
Adjacent Footing Load =				Axial Dead Load on Stem =			
Added Lateral Load =				* Axial Live Load on Stem =			
Load @ Stem Above Soil =				Soil Over Toe =			
Seismic Earth Load =	1,258.8	5.67	7,132.9	Surcharge Over Toe =			
=				Stem Weight(s) =	1,312.5	5.42	7,109.4
Total =	3,506.5	O.T.M. =	15,624.6	Earth @ Stem Transitions =			
				Footing Weight =	1,400.0	3.50	4,900.0
				Key Weight =			
				Vert. Component =			
Resisting/Overturning Ratio =			1.30	Total =	3,995.8 lbs	R.M.=	20,244.1
Vertical Loads used for Soil Pressure =		3,995.8 lbs					

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.096 in

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

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DESCRIPTION: 10ft wall

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #6 bar specified in this stem design segment = 28.08 in

Development length for #6 bar specified in this stem design segment = 21.60 in

Hooked embedment length into footing for #6 bar specified in this stem design segment = 11.28 in

As Provided = 0.5867 in²/ft

As Required = 0.5252 in²/ft

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

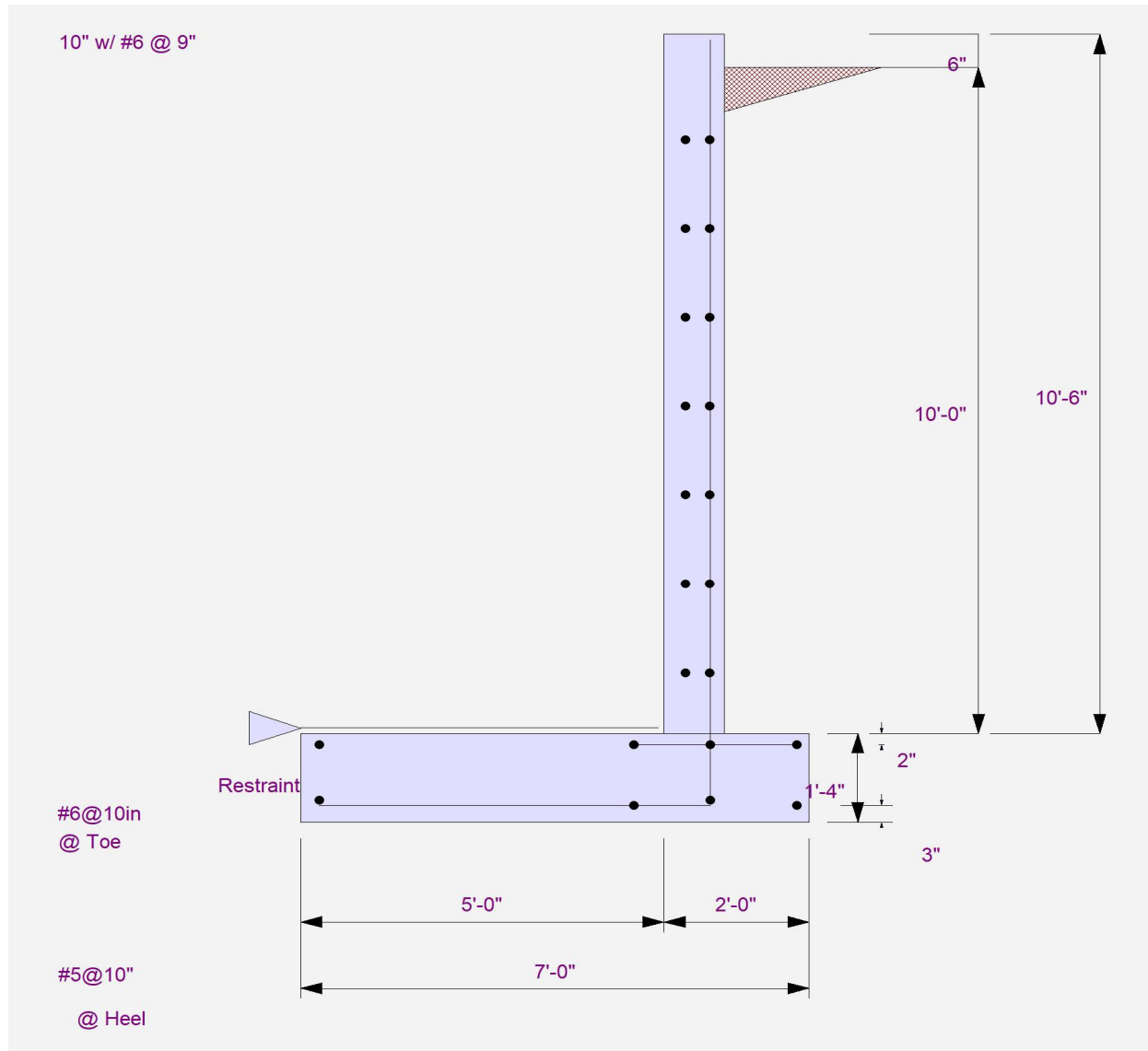
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Cantilevered Retaining Wall

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DESCRIPTION: 10ft wall

