

# CK Engineering LLC.

19229 38th PL NE  
Lake Forest Park, WA 98155

Phone: (206) 417-0670

## STRUCTURAL CALCULATIONS

Lateral & Gravity Design  
23-032



9/6/2023

MOSS RESIDENCE  
6550 80th Ave SE  
Mercer Island, WA 98040  
September 6, 2023

⚠ This is a beta release of the new ATC Hazards by Location website. Please [contact us](#) with feedback.

ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

## ATC Hazards by Location

### Search Information

**Address:** 6550 80th Ave SE, Mercer Island, WA 98040, USA  
**Coordinates:** 47.5434427, -122.2320811  
**Elevation:** 206 ft  
**Timestamp:** 2023-08-19T20:29:42.408Z  
**Hazard Type:** Seismic  
**Reference Document:** ASCE7-16  
**Risk Category:** I  
**Site Class:** D-default



### Basic Parameters

Name	Value	Description
$S_S$	1.467	$MCE_R$ ground motion (period=0.2s)
$S_1$	0.508	$MCE_R$ ground motion (period=1.0s)
$S_{MS}$	1.761	Site-modified spectral acceleration value
$S_{M1}$	* null	Site-modified spectral acceleration value
$S_{DS}$	1.174	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)
$CR_1$	0.898	Coefficient of risk (1.0s)
PGA	0.628	$MCE_G$ peak ground acceleration
$F_{PGA}$	1.2	Site amplification factor at PGA
$PGA_M$	0.754	Site modified peak ground acceleration
$T_L$	6	Long-period transition period (s)
$S_sRT$	1.467	Probabilistic risk-targeted ground motion (0.2s)
$S_sUH$	1.627	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
$S_sD$	4.266	Factored deterministic acceleration value (0.2s)
$S_1RT$	0.508	Probabilistic risk-targeted ground motion (1.0s)
$S_1UH$	0.566	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
$S_1D$	1.64	Factored deterministic acceleration value (1.0s)
$PGA_d$	1.42	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.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

## Disclaimer

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

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

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## ATC Hazards by Location

### Search Information

**Address:** 6550 80th Ave SE, Mercer Island, WA 98040, USA  
**Coordinates:** 47.5434427, -122.2320811  
**Elevation:** 206 ft  
**Timestamp:** 2023-08-19T20:28:30.883Z  
**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

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### 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:	6550 80th Ave SE Mercer Island, WA 98040		
Number of Stories:	2	Engineer:	PK

Roof Loading

Roofing	Metal	1.8
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.	3.4
TOTAL DEAD LOAD:		15.0 psf
ROOF SNOW LOAD:		25.0 psf

Upper Floor Loading

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

Main Floor Loading

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

Soil Bearing Capacity:	1500 psf
Frost Depth:	18 in

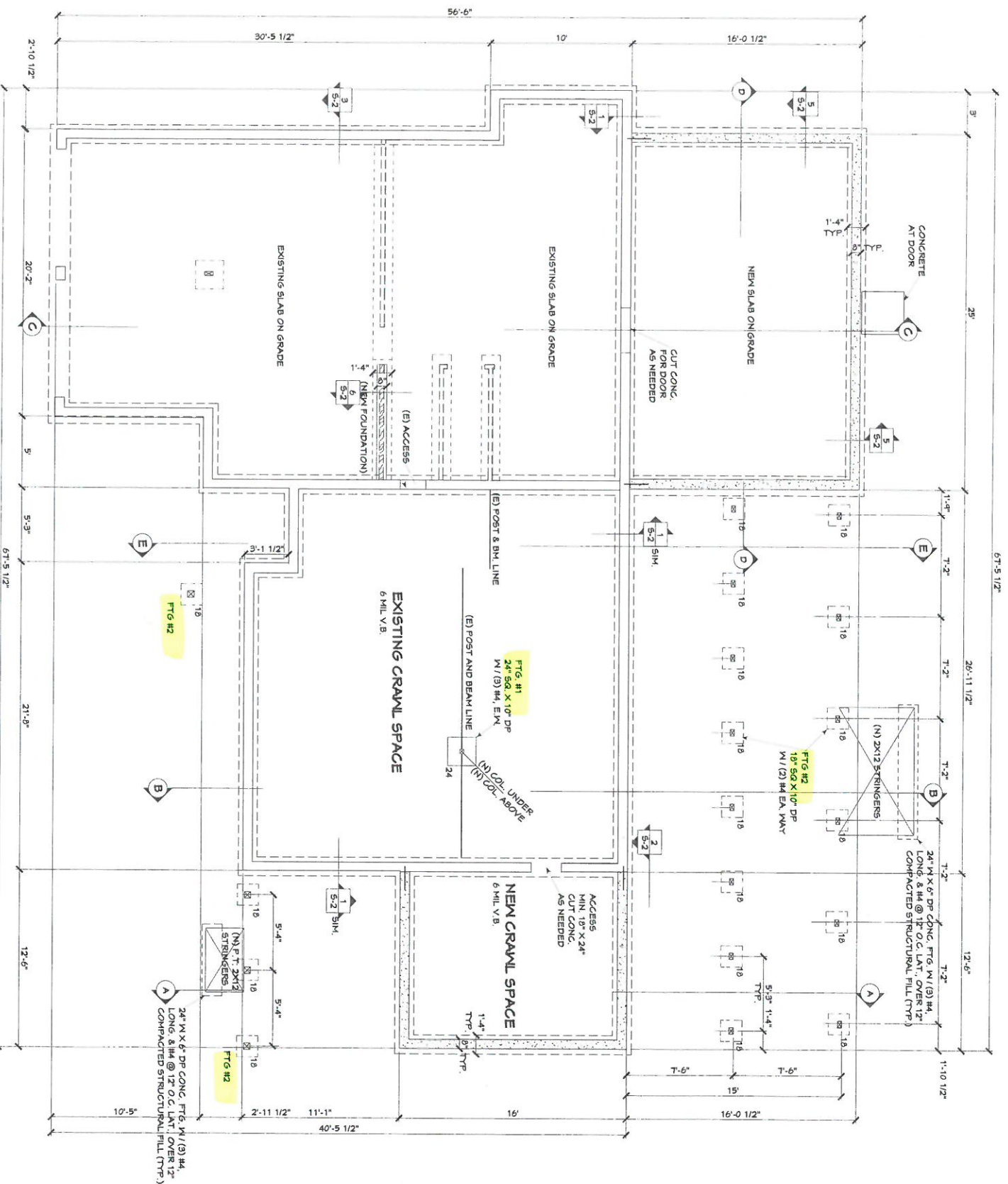












**REVISED FOUNDATION PLAN**  
1/4" = 1'-0"

EXISTING  
NEW

NOTES:  
-16" W X 8" DEEP CONT. FTG. WITH (2) #4 CONT., TYP. U.N.O.  
-8" W STEEL WALL WITH #4 @ 16" O.C. HORIZ. & VERT. TYP. U.N.O.

UPPER FL. REAR (MAIN BDRM)

SHEARWALL

WIND

SEISMIC

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

V(from upper)= 7078 lb                      7369 lb  
 V(from main)= 0 lb                              0 lb  
 V(from lower)= 0 lb                              0 lb  
 Σ (Wind) = 7,078 lb                      Σ (Smc) = 7,369 lb  
 v = 116 PLF                                      v = 120 PLF

Tributary Width (Upper Floor)  
**8.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **5.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**8.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Not Used  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

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

USE **SW6**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **925 lbs** = 925 lbs      Wind controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **818 lbs** = 818 lbs      Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 962 lbs**

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

UPPER FL. MID 1 (BATH, WALK-IN)

SHEARWALL

WIND

SEISMIC

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

V(from upper)= 7078 lb                      7369 lb  
 V(from main)= 0 lb                              0 lb  
 V(from lower)= 0 lb                              0 lb  
 Σ (Wind) = 7,078 lb                      Σ (Smc) = 7,369 lb  
 v = 246 PLF                                      v = 256 PLF

Tributary Width (Upper Floor)  
**17.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **4.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**17.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Not Used  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

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

USE **SW4**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **1965 lbs** = 1965 lbs      Wind controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **1921 lbs** = 1921 lbs      Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 2045 lbs**

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

UPPER FL. MID 2 (BDRM, STAIRS)

SHEARWALL

WIND

SEISMIC

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

V(from upper)= 7078 lb                      7369 lb  
 V(from main)= 0 lb                              0 lb  
 V(from lower)= 0 lb                              0 lb  
 Σ (Wind) = 7,078 lb                      Σ (Smc) = 7,369 lb  
 v = 208 PLF                                      v = 217 PLF

Tributary Width (Upper Floor)  
**18.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **5.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**18.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Not Used  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

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

USE **SW6**

Seismic controls shearwall design

C<sub>TOTAL</sub> = (floor above) + (this floor) = **1664 lbs** = 1664 lbs      Wind controls  
 T<sub>TOTAL</sub> = (floor above) + (this floor) = **1588 lbs** = 1588 lbs      Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 1732 lbs**

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

UPPER FL. FRONT (BDRMS)

SHEARWALL

WIND

SEISMIC

**Floor Info**  
**Upper** Floor Level, e.g. Upper, Main, Lower  
**Li-Rt** Load Direction, e.g. Left-Right, Front-Rear  
 (For Left Wall, Use Front-Rear Load Direction)  
**CDX** Sheathing type  
 Values in accordance with AF&PA SDPWS-2015  
**Roof** Resisting Dead Load  
 (e.g. Roof, Upper Floor, Main Floor)  
**17.00 ft** Total Length of Shearwalls  
 $V(\text{from upper}) = 7078 \text{ lb}$        $7369 \text{ lb}$   
 $V(\text{from main}) = 0 \text{ lb}$        $0 \text{ lb}$   
 $V(\text{from lower}) = 0 \text{ lb}$        $0 \text{ lb}$   
 $\Sigma (\text{Wind}) = 7,078 \text{ lb}$        $\Sigma (\text{Smc}) = 7,369 \text{ lb}$   
 $v = 68 \text{ PLF}$        $v = 71 \text{ PLF}$

Tributary Width (Upper Floor)  
**8.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **4.5 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**8.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Not Used  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

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

USE **SW6**

$C_{TOTAL} =$  (floor above) + (this floor) = **544 lbs** = 544 lbs Wind controls  
 $T_{TOTAL} =$  (floor above) + (this floor) = **432 lbs** = 432 lbs Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 566 lbs**

NO HOLDOWNS REQUIRED **OK**

UPPER FL. LEFT (BATH)

SHEARWALL

WIND

SEISMIC

**Floor Info**  
**Upper** Floor Level, e.g. Upper, Main, Lower  
**Fi-Rr** Load Direction, e.g. Left-Right, Front-Rear  
 (For Left Wall, Use Front-Rear Load Direction)  
**CDX** Sheathing type  
 Values in accordance with AF&PA SDPWS-2015  
**Roof** Resisting Dead Load  
 (e.g. Roof, Upper Floor, Main Floor)  
**32.50 ft** Total Length of Shearwalls  
 $V(\text{from upper}) = 5800 \text{ lb}$        $7369 \text{ lb}$   
 $V(\text{from main}) = 0 \text{ lb}$        $0 \text{ lb}$   
 $V(\text{from lower}) = 0 \text{ lb}$        $0 \text{ lb}$   
 $\Sigma (\text{Wind}) = 5,800 \text{ lb}$        $\Sigma (\text{Smc}) = 7,369 \text{ lb}$   
 $v = 89 \text{ PLF}$        $v = 113 \text{ PLF}$

Tributary Width (Upper Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **9.5 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Not Used  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

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

USE **SW6**

$C_{TOTAL} =$  (floor above) + (this floor) = **714 lbs** = 714 lbs Wind controls  
 $T_{TOTAL} =$  (floor above) + (this floor) = **669 lbs** = 669 lbs Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 907 lbs**

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

UPPER FL. RIGHT (BDRM, MAIN BDRM)

SHEARWALL

WIND

SEISMIC

**Floor Info**  
**Upper** Floor Level, e.g. Upper, Main, Lower  
**Fi-Rr** Load Direction, e.g. Left-Right, Front-Rear  
 (For Left Wall, Use Front-Rear Load Direction)  
**CDX** Sheathing type  
 Values in accordance with AF&PA SDPWS-2015  
**Roof** Resisting Dead Load  
 (e.g. Roof, Upper Floor, Main Floor)  
**23.00 ft** Total Length of Shearwalls  
 $V(\text{from upper}) = 5800 \text{ lb}$        $7369 \text{ lb}$   
 $V(\text{from main}) = 0 \text{ lb}$        $0 \text{ lb}$   
 $V(\text{from lower}) = 0 \text{ lb}$        $0 \text{ lb}$   
 $\Sigma (\text{Wind}) = 5,800 \text{ lb}$        $\Sigma (\text{Smc}) = 7,369 \text{ lb}$   
 $v = 126 \text{ PLF}$        $v = 160 \text{ PLF}$

Tributary Width (Upper Floor)  
**1.0** tributary width  
**2.0** total width  
 Tributary Width (Main Floor)  
**1.0** tributary width  
**2.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width  
 Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **9.0 ft**  
 Aspect Ratio OK  
 Use alternate R factor for seismic? **No**

Tributary Area (Upper Floor)  
**1.0** tributary area  
**2.0** total area  
 Tributary Area (Main Floor)  
**1.0** tributary area  
**2.0** total area  
 Not Used  
**1.0** tributary area  
**2.0** total area  
 Weight of Shearwall = **10.0 lbs**  
 Tributary width for dead load = **1.0 ft**  
 Length of adjoining wall = **1.0 ft**

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

USE **SW6**

$C_{TOTAL} =$  (floor above) + (this floor) = **1009 lbs** = 1009 lbs Wind controls  
 $T_{TOTAL} =$  (floor above) + (this floor) = **1054 lbs** = 1054 lbs Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: **E = 1282 lbs**

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

MAIN FL. REAR (REC.RM)

SHEARWALL

WIND

SEISMIC

Floor Info

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

V(from upper)= 7078 lb 7369 lb  
 V(from main)= 13073 lb 6738 lb  
 V(from lower)= 0 lb 0 lb  
 $\Sigma$  (Wind) = 20,152 lb  $\Sigma$  (Smc) = 14,107 lb  
 v = 366 PLF v = 256 PLF

3x framing required per IBC

SDPWS, Table 4.3A → 1.4 x 0.93 x 353 = 460 PLF

Tributary Width (Upper Floor)  
**8.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**8.0** tributary width  
**49.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width

Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **4.5 ft**

Aspect Ratio OK

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

Tributary Area (Upper Floor)  
**8.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**8.0** tributary area  
**49.0** 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**

USE **SW4**

$C_{TOTAL}$  = (floor above) + (this floor) = + 2924 lbs = 2924 lbs Wind controls  
 $T_{TOTAL}$  = (floor above) + (this floor) = + 2739 lbs = 2739 lbs Load case 8 controls - Wind

Wind controls shearwall design

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 2047 lbs

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

MAIN FL. MID 1 (BDRM & OFFICE, KITCHEN, DINING)

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)  
**25.00 ft** Total Length of Shearwalls

V(from upper)= 7078 lb 7369 lb  
 V(from main)= 13073 lb 6738 lb  
 V(from lower)= 0 lb 0 lb  
 $\Sigma$  (Wind) = 20,152 lb  $\Sigma$  (Smc) = 14,107 lb  
 v = 280 PLF v = 196 PLF

SDPWS, Table 4.3A → 1.4 x 0.93 x 242 = 315 PLF

Tributary Width (Upper Floor)  
**17.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**17.0** tributary width  
**49.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width

Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **4.0 ft**

Aspect Ratio OK

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

Tributary Area (Upper Floor)  
**17.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**17.0** tributary area  
**49.0** 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**

USE **SW6**

$C_{TOTAL}$  = (floor above) + (this floor) = + 2237 lbs = 2237 lbs Wind controls  
 $T_{TOTAL}$  = (floor above) + (this floor) = + 2066 lbs = 2066 lbs Load case 8 controls - Wind

Wind controls shearwall design

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1566 lbs

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

MAIN FL. MID 2 (GARAGE)

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)  
**17.00 ft** Total Length of Shearwalls

V(from upper)= 7078 lb 7369 lb  
 V(from main)= 13073 lb 6738 lb  
 V(from lower)= 0 lb 0 lb  
 $\Sigma$  (Wind) = 20,152 lb  $\Sigma$  (Smc) = 14,107 lb  
 v = 435 PLF v = 305 PLF

SDPWS, Table 4.3A → 1.4 x 0.93 x 353 = 460 PLF

Tributary Width (Upper Floor)  
**18.0** tributary width  
**49.0** total width  
 Tributary Width (Main Floor)  
**18.0** tributary width  
**49.0** total width  
 Not Used  
**1.0** tributary width  
**2.0** total width

Height of Shearwall = **8.0 ft**  
 Length of Shearwall = **8.0 ft**

Aspect Ratio OK

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

Tributary Area (Upper Floor)  
**18.0** tributary area  
**49.0** total area  
 Tributary Area (Main Floor)  
**18.0** tributary area  
**49.0** 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**

USE **SW4**

$C_{TOTAL}$  = (floor above) + (this floor) = **1664** + 3484 lbs = 5148 lbs Wind controls  
 $T_{TOTAL}$  = (floor above) + (this floor) = **1588** + 3199 lbs = 4787 lbs Load case 8 controls - Wind

Wind controls shearwall design

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 2439 lbs

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

MAIN FL. MID 2 (LIVING RM)

SHEARWALL

WIND

SEISMIC

Floor Info	
Main	Floor Level, e.g. Upper, Main, Lower
Li-Rt	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type Values in accordance with AF&PA SDPWS-2015
U/FL	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
17.00 ft	Total Length of Shearwalls
V(from upper)= 7078 lb	7369 lb
V(from main)= 13073 lb	6738 lb
V(from lower)= 0 lb	0 lb
Σ (Wind) = 20,152 lb	Σ (Smc) = 14,107 lb
v = 385 PLF	v = 198 PLF

Tributary Width (Upper Floor)	
0.0	tributary width
2.0	total width
Tributary Width (Main Floor)	
1.0	tributary width
2.0	total width
Not Used	
1.0	tributary width
2.0	total width
Height of Shearwall = 8.0 ft	
Length of Shearwall = 4.5 ft	

Tributary Area (Upper Floor)	
0.0	tributary area
2.0	total area
Tributary Area (Main Floor)	
1.0	tributary area
2.0	total area
Not Used	
1.0	tributary area
2.0	total area
Weight of Shearwall = 10.0 lbs	
Tributary width for dead load = 1.0 ft	
Length of adjoining wall = 1.0 ft	

Use alternate R factor for seismic?  No

SDPWS, Table 4.3A → 1.4 x 0.93 x 353 = 460 PLF

USE **SW4**

$C_{TOTAL} =$  (floor above) + (this floor) =  + 3076 lbs = 3076 lbs  
 $T_{TOTAL} =$  (floor above) + (this floor) =  + 2891 lbs = 2891 lbs

Wind controls shearwall design

Wind controls holddown design

Wind controls  
Load case 8 controls - Wind

HDU4

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

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1585 lbs

MAIN FL. FRONT (GARAGE)

SHEARWALL

WIND

SEISMIC

Floor Info	
Main	Floor Level, e.g. Upper, Main, Lower
Li-Rt	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type Values in accordance with AF&PA SDPWS-2015
Roof	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
5.00 ft	Total Length of Shearwalls
V(from upper)= 7078 lb	7369 lb
V(from main)= 13073 lb	6738 lb
V(from lower)= 0 lb	0 lb
Σ (Wind) = 20,152 lb	Σ (Smc) = 14,107 lb
v = 765 PLF	v = 516 PLF

Tributary Width (Upper Floor)	
8.0	tributary width
49.0	total width
Tributary Width (Main Floor)	
10.0	tributary width
49.0	total width
Not Used	
1.0	tributary width
2.0	total width
Height of Shearwall = 4.0 ft	
Length of Shearwall = 5.0 ft	

Tributary Area (Upper Floor)	
8.0	tributary area
49.0	total area
Tributary Area (Main Floor)	
10.0	tributary area
49.0	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	

Use alternate R factor for seismic?  No

SDPWS, Table 4.3A → 1.4 x 0.93 x 595 = 775 PLF

USE **SW2**

$C_{TOTAL} =$  (floor above) + (this floor) =  + 3059 lbs = 3059 lbs  
 $T_{TOTAL} =$  (floor above) + (this floor) =  + 2981 lbs = 2981 lbs

Wind controls shearwall design

Wind controls holddown design

Wind controls  
Load case 8 controls - Wind

HDU4

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

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 2063 lbs

MAIN FL. LEFT (GARAGE, REC. RM)

SHEARWALL

WIND

SEISMIC

Floor Info	
Main	Floor Level, e.g. Upper, Main, Lower
Li-Rt	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type Values in accordance with AF&PA SDPWS-2015
Roof	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
28.00 ft	Total Length of Shearwalls
V(from upper)= 5800 lb	7369 lb
V(from main)= 14633 lb	6738 lb
V(from lower)= 0 lb	0 lb
Σ (Wind) = 20,433 lb	Σ (Smc) = 14,107 lb
v = 213 PLF	v = 182 PLF

Tributary Width (Upper Floor)	
1.0	tributary width
2.0	total width
Tributary Width (Main Floor)	
14.0	tributary width
67.0	total width
Not Used	
1.0	tributary width
2.0	total width
Height of Shearwall = 8.0 ft	
Length of Shearwall = 4.0 ft	

Tributary Area (Upper Floor)	
1.0	tributary area
2.0	total area
Tributary Area (Main Floor)	
14.0	tributary area
67.0	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	

Use alternate R factor for seismic?  No

SDPWS, Table 4.3A → 0.93 x 260 = 242 PLF

USE **SW6**

$C_{TOTAL} =$  (floor above) + (this floor) =  714 + 1702 lbs = 2416 lbs  
 $T_{TOTAL} =$  (floor above) + (this floor) =  669 + 1564 lbs = 2233 lbs

Seismic controls shearwall design

Wind controls holddown design

Wind controls  
Load case 8 controls - Wind

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

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1455 lbs

MAIN FL. MID 1 (GARAGE, REC RM.)

SHEARWALL

WIND

SEISMIC

Floor Info	
Main	Floor Level, e.g. Upper, Main, Lower
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type Values in accordance with AF&PA SDPWS-2015
U/FL	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
32.00 ft	Total Length of Shearwalls
V(from upper)= 5800 lb	7369 lb
V(from main)= 14633 lb	6738 lb
V(from lower)= 0 lb	0 lb
Σ (Wind) = 20,433 lb	Σ (Smc) = 14,107 lb
v = 205 PLF	v = 168 PLF

Tributary Width (Upper Floor)	
1.0	tributary width
2.0	total width
Tributary Width (Main Floor)	
1.0	tributary width
4.0	total width
Not Used	
1.0	tributary width
2.0	total width
Height of Shearwall = 8.0 ft	
Length of Shearwall = 16.0 ft	
Aspect Ratio OK	
Use alternate R factor for seismic? No	

Tributary Area (Upper Floor)	
1.0	tributary area
2.0	total area
Tributary Area (Main Floor)	
1.0	tributary area
4.0	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 → 0.93 x 242 = 225 PLF

USE SW6

Seismic controls shearwall design

C <sub>TOTAL</sub> =	(floor above) + (this floor) =	1009	+	1640 lbs	=	2649 lbs	Wind controls
T <sub>TOTAL</sub> =	(floor above) + (this floor) =	1054	+	1127 lbs	=	2181 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 = 1342 lbs

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

MAIN FL. MID 2 (LIVING 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)
11.00 ft	Total Length of Shearwalls
V(from upper)= 5800 lb	7369 lb
V(from main)= 14633 lb	6738 lb
V(from lower)= 0 lb	0 lb
Σ (Wind) = 20,433 lb	Σ (Smc) = 14,107 lb
v = 199 PLF	v = 91 PLF

Tributary Width (Upper Floor)	
0.0	tributary width
2.0	total width
Tributary Width (Main Floor)	
10.0	tributary width
67.0	total width
Not Used	
1.0	tributary width
2.0	total width
Height of Shearwall = 8.0 ft	
Length of Shearwall = 11.0 ft	
Aspect Ratio OK	
Use alternate R factor for seismic? No	

Tributary Area (Upper Floor)	
0.0	tributary area
2.0	total area
Tributary Area (Main Floor)	
10.0	tributary area
67.0	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 <sub>TOTAL</sub> =	(floor above) + (this floor) =		+	1588 lbs	=	1588 lbs	Wind controls
T <sub>TOTAL</sub> =	(floor above) + (this floor) =		+	1288 lbs	=	1288 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 = 731 lbs

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

MAIN FL. RIGHT ( DINING )

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)
16.00 ft	Total Length of Shearwalls
V(from upper)= 5800 lb	7369 lb
V(from main)= 14633 lb	6738 lb
V(from lower)= 0 lb	0 lb
Σ (Wind) = 20,433 lb	Σ (Smc) = 14,107 lb
v = 82 PLF	v = 38 PLF

Tributary Width (Upper Floor)	
0.0	tributary width
2.0	total width
Tributary Width (Main Floor)	
6.0	tributary width
67.0	total width
Not Used	
1.0	tributary width
2.0	total width
Height of Shearwall = 8.0 ft	
Length of Shearwall = 16.0 ft	
Aspect Ratio OK	
Use alternate R factor for seismic? No	

Tributary Area (Upper Floor)	
0.0	tributary area
2.0	total area
Tributary Area (Main Floor)	
6.0	tributary area
67.0	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 <sub>TOTAL</sub> =	(floor above) + (this floor) =		+	655 lbs	=	655 lbs	Wind controls
T <sub>TOTAL</sub> =	(floor above) + (this floor) =		+	240 lbs	=	240 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 = 302 lbs

NO HOLDOWNS REQUIRED OK



## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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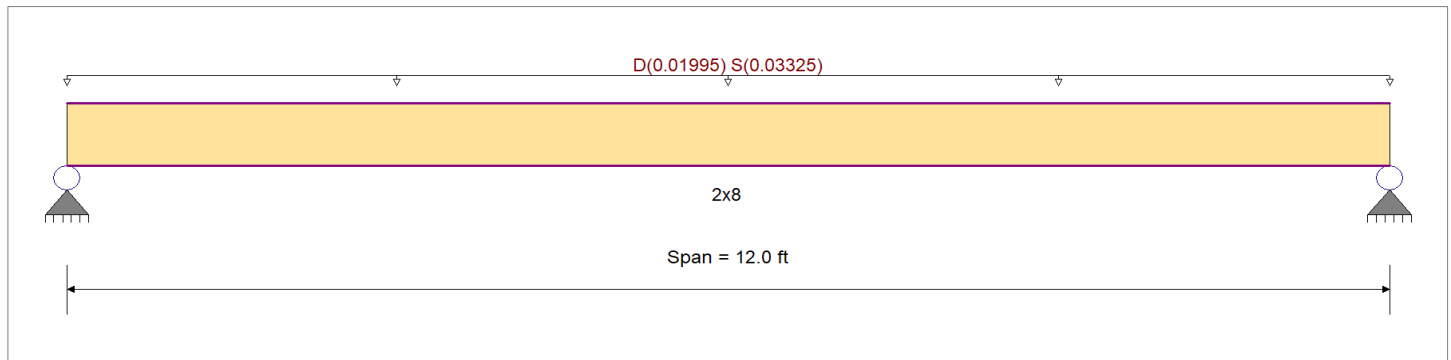
**DESCRIPTION: RAFTERS**

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	850 psi	<i>E : Modulus of Elasticity</i>	
Load Combination : IBC 2018	Fb -	850 psi	Ebend- xx	1300ksi
	Fc - Prll	1300 psi	Eminbend - xx	470ksi
Wood Species : Hem-Fir	Fc - Perp	405 psi		
Wood Grade : No.2	Fv	150 psi		
	Ft	525 psi	Density	26.84pcf
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 NOT internally calculated and added  
 Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 1.330 ft, (ROOF)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.648</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.231</b> : 1
Section used for this span		<b>2x8</b>	Section used for this span		<b>2x8</b>
fb: Actual	=	874.48psi	fv: Actual	=	39.85 psi
F'b	=	1,348.95psi	F'v	=	172.50 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
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.252 in	Ratio =	<b>571</b>	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	<b>0</b>	<360	n/a
Max Downward Total Deflection	0.403 in	Ratio =	<b>357</b>	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	<b>0</b>	<240	n/a

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 12.0 ft	1	0.311	0.111	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.36	327.9	1,055.7	0.0	0.00	0.0	0.0
+D+S	Length = 12.0 ft	1	0.648	0.231	1.15	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.96	874.5	1,349.0	0.29	39.8	172.5	0.0
+D+0.750S	Length = 12.0 ft	1	0.547	0.195	1.15	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.81	737.8	1,349.0	0.24	33.6	172.5	0.0
+0.60D	Length = 12.0 ft	1	0.105	0.037	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.22	196.8	1,876.8	0.07	9.0	240.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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**DESCRIPTION: RAFTERS**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4032	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	0.319	0.319
Max Upward from Load Combinations	0.319	0.319
Max Upward from Load Cases	0.200	0.200
D Only	0.120	0.120
+D+S	0.319	0.319
+D+0.750S	0.269	0.269
+0.60D	0.072	0.072
S Only	0.200	0.200



Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION: UPPER FL. JOIST**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.5586	7.807		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	0.426	0.426
Max Upward from Load Combinations	0.426	0.426
Max Upward from Load Cases	0.310	0.310
D Only	0.116	0.116
+D+L	0.426	0.426
+D+0.750L	0.349	0.349
+0.60D	0.070	0.070
L Only	0.310	0.310

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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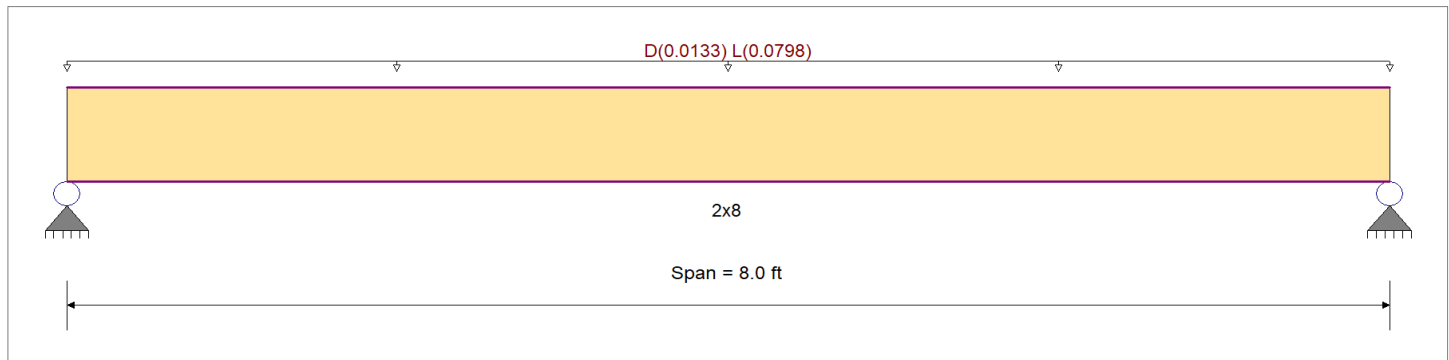
**DESCRIPTION:** DECK JOIST

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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 NOT internally calculated and added  
 Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 1.330 ft, (DECK)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.725</b> < 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.366</b> < 1
Section used for this span		<b>2x8</b>	Section used for this span		<b>2x8</b>
fb: Actual	=	680.15psi	fv: Actual	=	43.87 psi
F'b	=	938.40psi	F'v	=	120.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.000ft	Location of maximum on span	=	7.416 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.126 in	Ratio = 763	>=360	Span: 1 : L Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.147 in	Ratio = 654	>=240	Span: 1 : +D+L	
Max Upward Total Deflection	0 in	Ratio = 0	<240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 8.0 ft	1	0.115	0.058	0.90	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.11	97.2	844.6	0.0	0.00	0.0	0.0
+D+L	Length = 8.0 ft	1	0.725	0.366	1.00	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.74	680.2	938.4	0.32	43.9	120.0	0.0
+D+0.750L	Length = 8.0 ft	1	0.456	0.230	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.59	534.4	1,173.0	0.25	34.5	150.0	0.0
+0.60D	Length = 8.0 ft	1	0.039	0.020	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.06	58.3	1,501.4	0.03	3.8	192.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION:** DECK JOIST

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1467	4.029		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	0.372	0.372
Max Upward from Load Combinations	0.372	0.372
Max Upward from Load Cases	0.319	0.319
D Only	0.053	0.053
+D+L	0.372	0.372
+D+0.750L	0.293	0.293
+0.60D	0.032	0.032
L Only	0.319	0.319

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION:** DECK JOIST 2

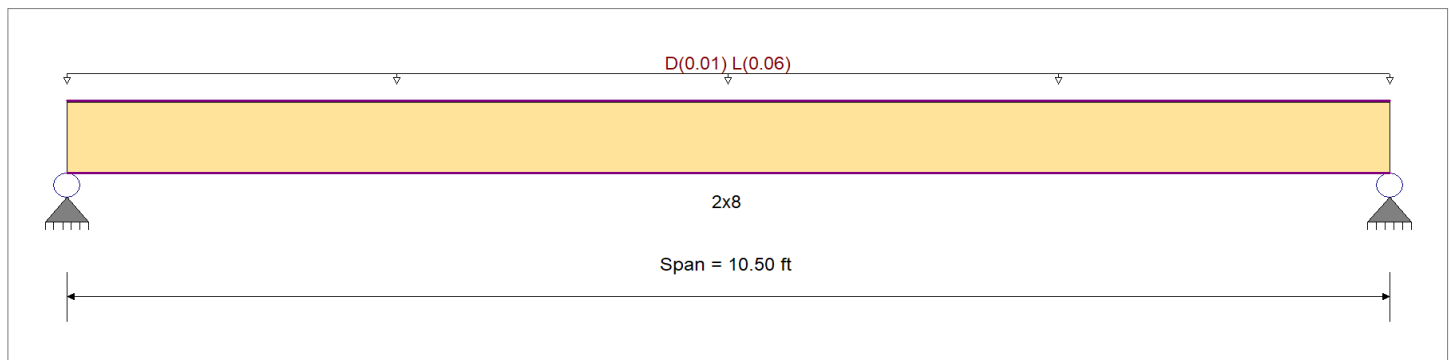
### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16

Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	850.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	850.0 psi	Ebend- xx
	Fc - Prll	1,300.0 psi	Eminbend - xx
Wood Species : Hem-Fir	Fc - Perp	405.0 psi	
Wood Grade : No.2	Fv	150.0 psi	
	Ft	525.0 psi	Density
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 NOT internally calculated and added

Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 1.0 ft, (DECK)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.939</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.376</b> : 1
Section used for this span		<b>2x8</b>	Section used for this span		<b>2x8</b>
fb: Actual	=	880.95psi	fv: Actual	=	45.14 psi
F'b	=	938.40psi	F'v	=	120.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.250ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.281 in	Ratio = 449 >=360	Span: 1 : L Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.327 in	Ratio = 384 >=240	Span: 1 : +D+L		
Max Upward Total Deflection	0 in	Ratio = 0 <240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 10.50 ft	1		0.149	0.060	0.90	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.14	125.9	844.6	0.0	0.00	0.0	0.0	108.0
+D+L																				
Length = 10.50 ft	1		0.939	0.376	1.00	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.96	881.0	938.4	0.33	45.1	120.0	0.0	0.0
+D+0.750L																				
Length = 10.50 ft	1		0.590	0.236	1.25	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.76	692.2	1,173.0	0.26	35.5	150.0	0.0	0.0
+0.60D																				
Length = 10.50 ft	1		0.050	0.020	1.60	1.00	1.00	1.00	1.200	1.00	0.80	1.15	0.08	75.5	1,501.4	0.03	3.9	192.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION: DECK JOIST 2**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3273	5.288		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	0.368	0.368
Max Upward from Load Combinations	0.368	0.368
Max Upward from Load Cases	0.315	0.315
D Only	0.053	0.053
+D+L	0.368	0.368
+D+0.750L	0.289	0.289
+0.60D	0.032	0.032
L Only	0.315	0.315



## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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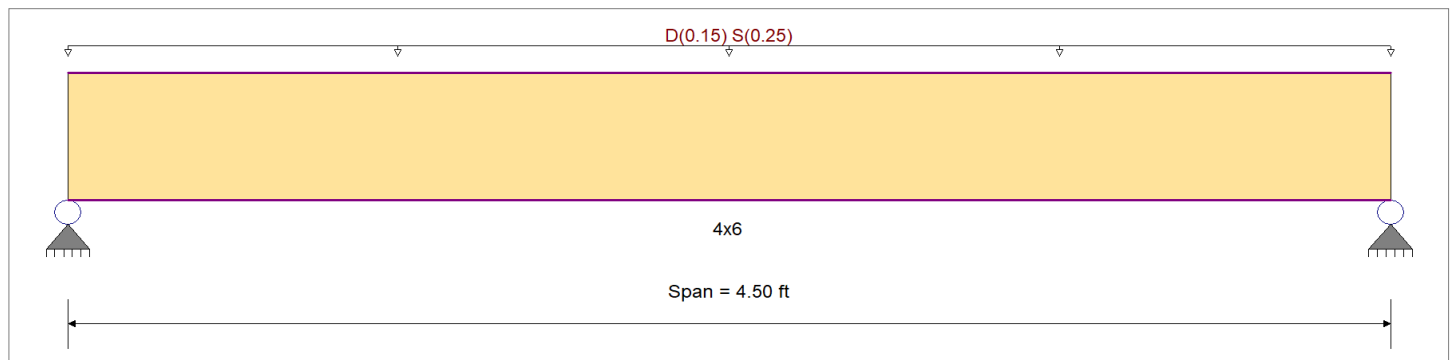
**DESCRIPTION:** HDR#1

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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 = 10.0 ft, (ROOF)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.526</b> < 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.288</b> < 1
Section used for this span		<b>4x6</b>	Section used for this span		<b>4x6</b>
fb: Actual	=	688.55psi	fv: Actual	=	56.31 psi
F'b	=	1,308.13psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	2.250ft	Location of maximum on span	=	4.057 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.037 in	Ratio = 1468 >=360	Span: 1 : S Only		
Max Upward Transient Deflection	0 in	Ratio = 0 <360	n/a		
Max Downward Total Deflection	0.059 in	Ratio = 917 >=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 <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 4.50 ft	1		0.252	0.138	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.38	258.2	1,023.8	0.27	21.1	153.0		
+D+S																				
Length = 4.50 ft	1		0.526	0.288	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	1.01	688.5	1,308.1	0.72	56.3	195.5		
+D+0.750S																				
Length = 4.50 ft	1		0.444	0.243	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.85	581.0	1,308.1	0.61	47.5	195.5		
+0.60D																				
Length = 4.50 ft	1		0.085	0.047	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.23	154.9	1,820.0	0.16	12.7	272.0		

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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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	0.0588	2.266		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	0.900	0.900
Max Upward from Load Combinations	0.900	0.900
Max Upward from Load Cases	0.563	0.563
D Only	0.338	0.338
+D+S	0.900	0.900
+D+0.750S	0.759	0.759
+0.60D	0.203	0.203
S Only	0.563	0.563

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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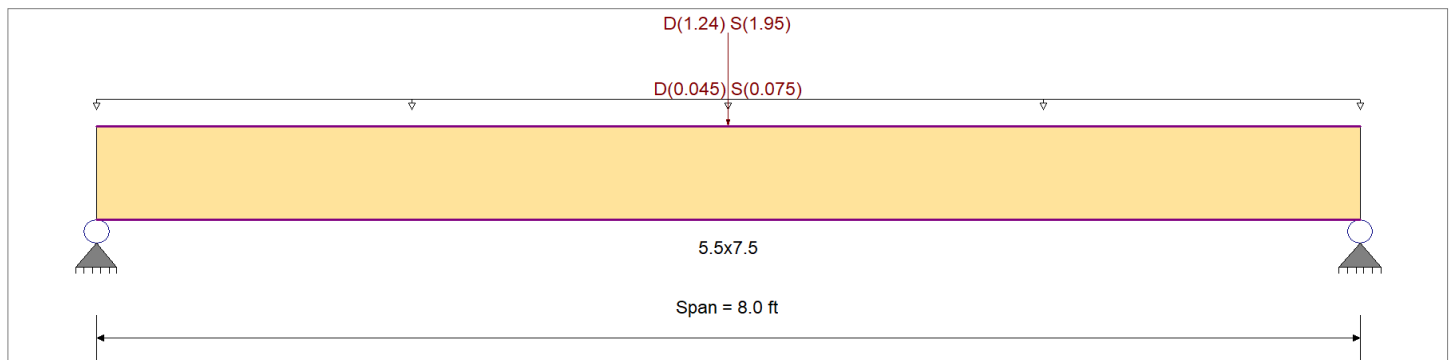
**DESCRIPTION:** HDR#2

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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 = 3.0 ft, (ROOF)  
 Point Load : D = 1.240, S = 1.950 k @ 4.0 ft, (BM#1)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.625</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.242</b> : 1
Section used for this span		<b>5.5x7.5</b>	Section used for this span		<b>5.5x7.5</b>
fb: Actual	=	1,724.86psi	fv: Actual	=	73.88 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.000ft	Location of maximum on span	=	7.387 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.124 in	Ratio =	<b>775</b> >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	<b>0</b> <360	n/a	
Max Downward Total Deflection	0.204 in	Ratio =	<b>470</b> >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	<b>0</b> <240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 8.0 ft	1	0.314	0.122	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.91	677.6	2,160.0	0.0	0.00	0.0	0.0
+D+S	Length = 8.0 ft	1	0.625	0.242	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.41	1,724.9	2,760.0	0.0	0.00	0.0	0.0
+D+0.750S	Length = 8.0 ft	1	0.530	0.206	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	6.29	1,463.0	2,760.0	0.0	0.00	0.0	0.0
+0.60D	Length = 8.0 ft	1	0.106	0.041	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.75	406.6	3,840.0	0.0	0.00	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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**DESCRIPTION:** HDR#2

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2042	4.029		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	2.111	2.111
Max Upward from Load Combinations	2.111	2.111
Max Upward from Load Cases	1.275	1.275
D Only	0.836	0.836
+D+S	2.111	2.111
+D+0.750S	1.792	1.792
+0.60D	0.501	0.501
S Only	1.275	1.275

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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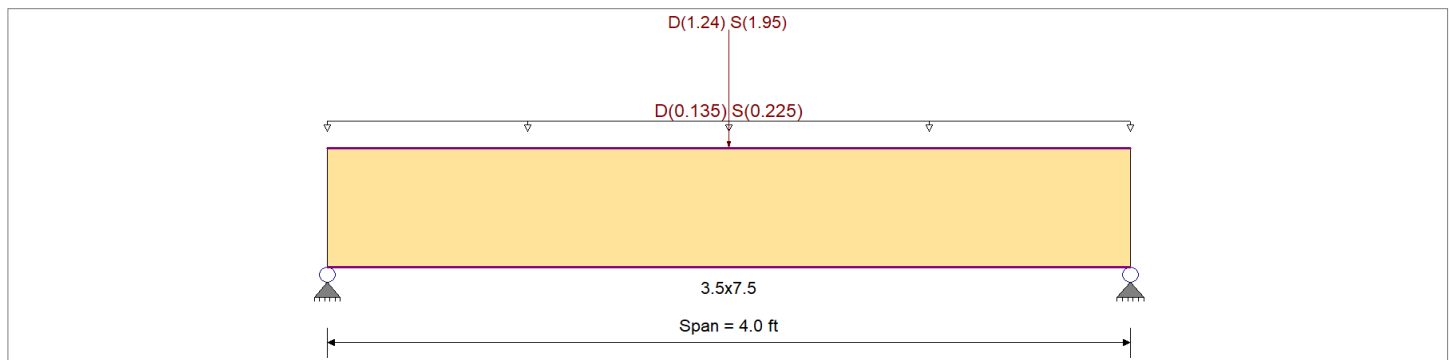
**DESCRIPTION:** HDR#3

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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 = 9.0 ft, (ROOF)  
 Point Load : D = 1.240, S = 1.950 k @ 2.0 ft, (BM#1)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.520</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.394</b> : 1
Section used for this span		<b>3.5x7.5</b>	Section used for this span		<b>3.5x7.5</b>
fb: Actual	=	1,434.10psi	fv: Actual	=	120.12 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	2.000ft	Location of maximum on span	=	3.387 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.026 in	Ratio = 1826	>=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.043 in	Ratio = 1118	>=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 <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only	Length = 4.0 ft	1	0.258	0.195	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.52	556.4	2,160.0	0.00	0.00	0.0	0.0	0.0
+D+S	Length = 4.0 ft	1	0.520	0.394	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.92	1,434.1	2,760.0	0.00	0.00	0.0	0.0	0.0
+D+0.750S	Length = 4.0 ft	1	0.440	0.334	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.32	1,214.7	2,760.0	0.00	0.00	0.0	0.0	0.0
+0.60D	Length = 4.0 ft	1	0.087	0.066	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.91	333.8	3,840.0	0.00	0.00	0.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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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	0.0429	2.015		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	2.326	2.326
Max Upward from Load Combinations	2.326	2.326
Max Upward from Load Cases	1.425	1.425
D Only	0.901	0.901
+D+S	2.326	2.326
+D+0.750S	1.970	1.970
+0.60D	0.541	0.541
S Only	1.425	1.425



Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION: HDR#4**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0839	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	0.974	0.974
Max Upward from Load Combinations	0.974	0.974
Max Upward from Load Cases	0.600	0.600
D Only	0.374	0.374
+D+S	0.974	0.974
+D+0.750S	0.824	0.824
+0.60D	0.224	0.224
S Only	0.600	0.600





Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION: HDR#5**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4313	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	2.440	2.440
Max Upward from Load Combinations	2.440	2.440
Max Upward from Load Cases	1.484	1.484
D Only	0.956	0.956
+D+S	2.440	2.440
+D+0.750S	2.069	2.069
+0.60D	0.573	0.573
S Only	1.484	1.484

## Wood Beam

Project File: 23-032.ec6

LIC#: KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION:** HDR#6

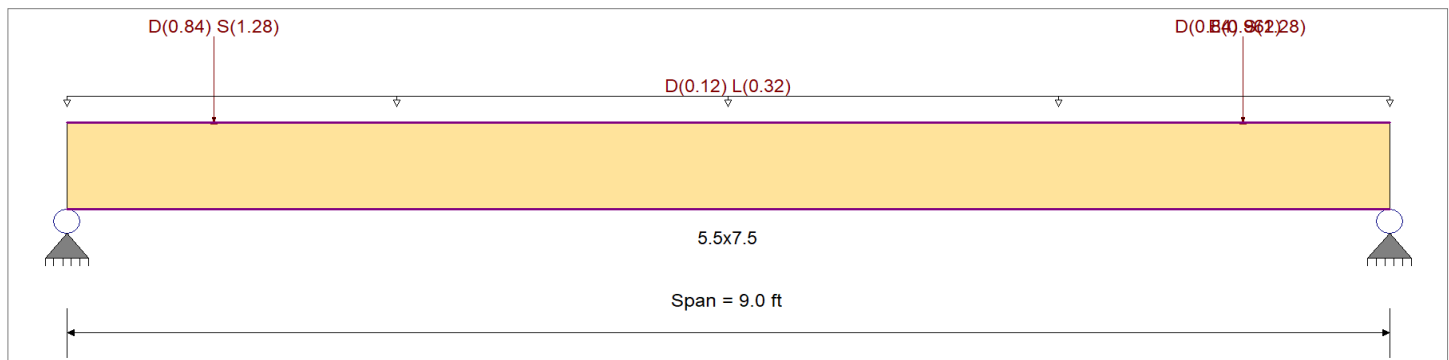
### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLOOR)

Point Load : D = 0.840, S = 1.280 k @ 1.0 ft, (HDR#2)

Point Load : D = 0.840, S = 1.280 k @ 8.0 ft, (HDR#2)

Point Load : E = 0.9620 k @ 8.0 ft, (SW6)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.522</b>	1	Maximum Shear Stress Ratio	=	<b>0.542</b>	: 1
Section used for this span		<b>5.5x7.5</b>		Section used for this span		<b>5.5x7.5</b>	
fb: Actual	=	1,253.36psi		fv: Actual	=	229.70 psi	
F'b	=	2,400.00psi		F'v	=	424.00 psi	
Load Combination		+D+L		Load Combination		+1.126D+0.750L+0.750S+3.413E	
Location of maximum on span	=	4.500ft		Location of maximum on span	=	8.376 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
<b>Maximum Deflection</b>							
Max Downward Transient Deflection		0.137 in	Ratio =	<b>791</b>	>=360	Span: 1 : L Only	
Max Upward Transient Deflection		0 in	Ratio =	<b>0</b>	<360	n/a	
Max Downward Total Deflection		0.260 in	Ratio =	<b>416</b>	>=240	Span: 1 : +D+0.750L+0.750S+0.5250E	
Max Upward Total Deflection		0 in	Ratio =	<b>0</b>	<240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only	Length = 9.0 ft	1	0.231	0.204	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.15	499.3	2,160.0	0.0	0.00	0.0	238.5
+D+L	Length = 9.0 ft	1	0.522	0.354	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.39	1,253.4	2,400.0	0.0	0.00	0.0	265.0
+D+S	Length = 9.0 ft	1	0.289	0.313	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.43	797.2	2,760.0	0.0	0.00	0.0	304.8
+D+0.750L	Length = 9.0 ft	1	0.355	0.249	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.58	1,064.8	3,000.0	0.0	0.00	0.0	331.3

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

(c) ENERCALC INC 1983-2023

**DESCRIPTION: HDR#6**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	f <sub>v</sub>	F <sub>v</sub>
+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 = 9.0 ft	1		0.467	0.385	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.54	1,288.3	2,760.0	3.23	117.5	304.8
+1.168D+4.550E						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1		0.332	0.468	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.48	1,275.3	3,840.0	5.46	198.4	424.0
+1.126D+0.750L+0.750S+3.4						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		0.462	0.542	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	7.62	1,773.4	3,840.0	6.32	229.7	424.0
+0.60D						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1		0.078	0.069	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.29	299.6	3,840.0	0.80	29.2	424.0
+0.4320D+4.550E						1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 9.0 ft	1		0.271	0.383	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	4.47	1,040.6	3,840.0	4.47	162.5	424.0

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E	1	0.2595	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	3.516	3.909
Max Upward from Load Combinations	3.516	3.909
Max Upward from Load Cases	1.440	1.440
D Only	1.420	1.420
+D+L	2.860	2.860
+D+S	2.700	2.700
+D+0.750L	2.500	2.500
+D+0.750L+0.750S	3.460	3.460
+D+0.70E	1.495	2.019
+D+0.750L+0.750S+0.5250E	3.516	3.909
+0.60D	0.852	0.852
+0.60D+0.70E	0.927	1.451
L Only	1.440	1.440
S Only	1.280	1.280
E Only	0.107	0.855

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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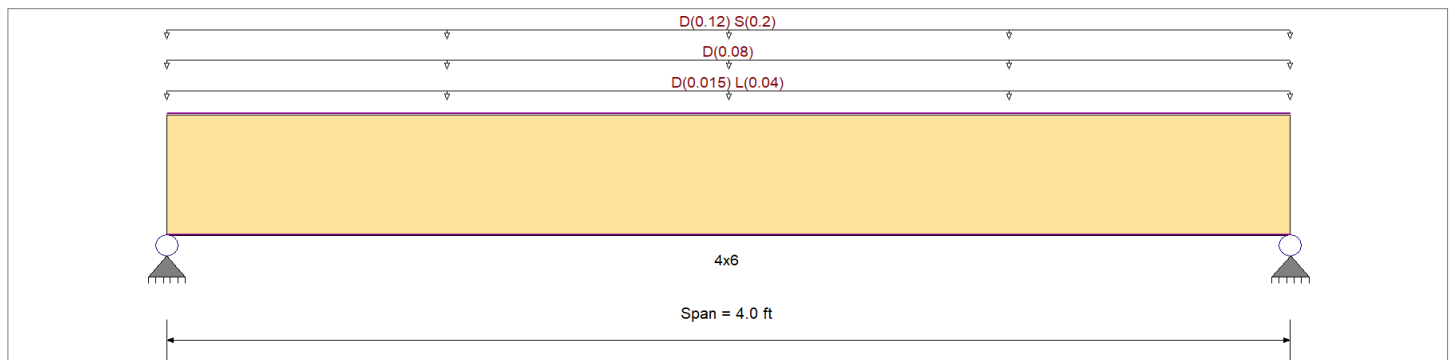
**DESCRIPTION:** HDR#7

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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 calculated and added to loading

Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.0 ft, (FLOOR)

Uniform Load : D = 0.010 ksf, Tributary Width = 8.0 ft, (WALL)

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 8.0 ft, (ROOF)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.436</b>	1	Maximum Shear Stress Ratio	=	<b>0.258</b>	: 1
Section used for this span		<b>4x6</b>		Section used for this span		<b>4x6</b>	
fb: Actual	=	570.00psi		fv: Actual	=	50.53 psi	
F'b	=	1,308.13psi		F'v	=	195.50 psi	
Load Combination		+D+S		Load Combination		+D+S	
Location of maximum on span	=	2.000ft		Location of maximum on span	=	3.547 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
<b>Maximum Deflection</b>							
Max Downward Transient Deflection		0.018 in	Ratio =	<b>2613</b>	>=360	Span: 1 : S Only	
Max Upward Transient Deflection		0 in	Ratio =	<b>0</b>	<360	n/a	
Max Downward Total Deflection		0.038 in	Ratio =	<b>1247</b>	>=240	Span: 1 : +D+S	
Max Upward Total Deflection		0 in	Ratio =	<b>0</b>	<240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only																			
Length = 4.0 ft	1	0.291	0.173	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.44	298.0	1,023.8	0.34	26.4	153.0		
+D+L																			
Length = 4.0 ft	1	0.310	0.184	1.00	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.52	352.4	1,137.5	0.40	31.2	170.0		
+D+S																			
Length = 4.0 ft	1	0.436	0.258	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.84	570.0	1,308.1	0.65	50.5	195.5		
+D+0.750L																			
Length = 4.0 ft	1	0.238	0.141	1.25	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.50	338.8	1,421.9	0.39	30.0	212.5		
+D+0.750L+0.750S																			
Length = 4.0 ft	1				1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0		

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION: HDR#7**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	fv	F <sub>v</sub>
Length = 4.0 ft	1	0.415	0.246	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.80	542.8	1,308.1	0.62	48.1	195.5	
+1.168D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 4.0 ft	1	0.191	0.113	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.51	348.0	1,820.0	0.40	30.9	272.0	
+1.126D+0.750L+0.750S					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 4.0 ft	1	0.319	0.189	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.85	580.3	1,820.0	0.66	51.5	272.0	
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 4.0 ft	1	0.098	0.058	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.26	178.8	1,820.0	0.20	15.9	272.0	
+0.4320D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0	
Length = 4.0 ft	1	0.071	0.042	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.19	128.7	1,820.0	0.15	11.4	272.0	

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0385	2.015		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	0.838	0.838
Max Upward from Load Combinations	0.838	0.838
Max Upward from Load Cases	0.438	0.438
D Only	0.438	0.438
+D+L	0.518	0.518
+D+S	0.838	0.838
+D+0.750L	0.498	0.498
+D+0.750L+0.750S	0.798	0.798
+0.60D	0.263	0.263
L Only	0.080	0.080
S Only	0.400	0.400

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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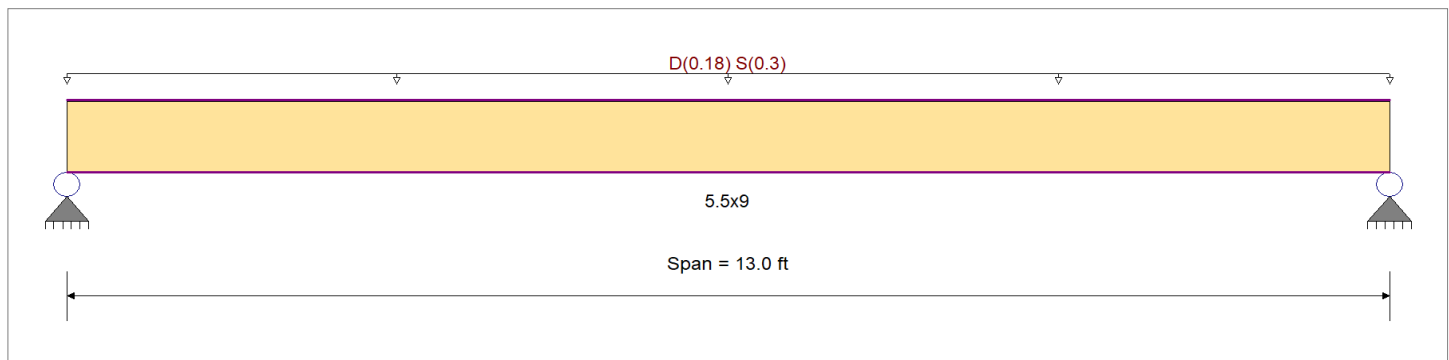
DESCRIPTION: BM#1

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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 = 12.0 ft, (ROOF)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.607</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.282</b> : 1
Section used for this span		<b>5.5x9</b>	Section used for this span		<b>5.5x9</b>
fb: Actual	=	1,675.42psi	fv: Actual	=	86.08 psi
F'b	=	2,760.00psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.500ft	Location of maximum on span	=	12.288 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.322 in	Ratio =	<b>483</b> >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	<b>0</b> <360	n/a	
Max Downward Total Deflection	0.527 in	Ratio =	<b>295</b> >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	<b>0</b> <240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 13.0 ft	1	0.301	0.140	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.03	651.2	2,160.0	0.0	0.00	0.0	0.0	0.0	238.5
+D+S																				
Length = 13.0 ft	1	0.607	0.282	1.15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	10.37	1,675.4	2,760.0	0.0	0.00	0.0	0.0	0.0	304.8
+D+0.750S																				
Length = 13.0 ft	1	0.514	0.239	1.15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8.78	1,419.4	2,760.0	0.0	0.00	0.0	0.0	0.0	304.8
+0.60D																				
Length = 13.0 ft	1	0.102	0.047	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.42	390.7	3,840.0	0.0	0.00	0.0	0.0	0.0	424.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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	0.5274	6.547		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	3.190	3.190
Max Upward from Load Combinations	3.190	3.190
Max Upward from Load Cases	1.950	1.950
D Only	1.240	1.240
+D+S	3.190	3.190
+D+0.750S	2.702	2.702
+0.60D	0.744	0.744
S Only	1.950	1.950



## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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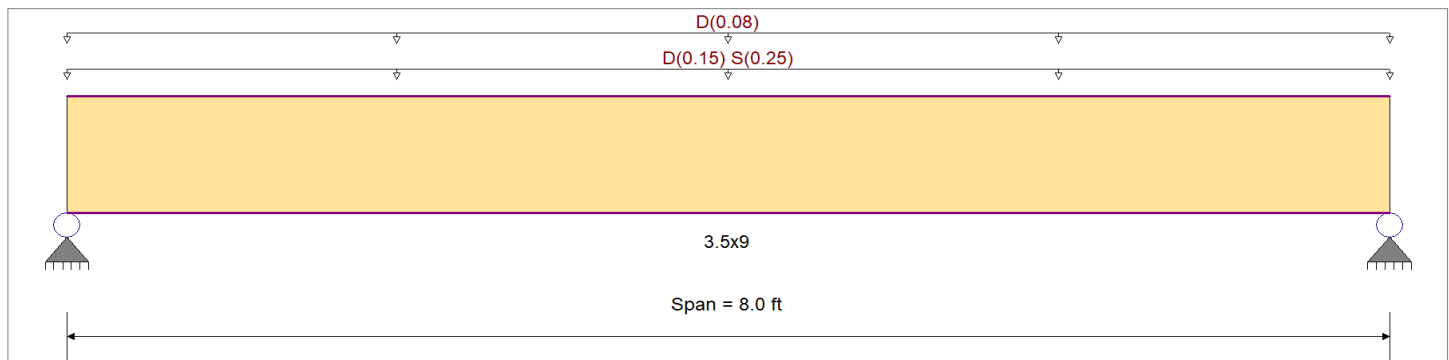
DESCRIPTION: BM#2

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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 = 10.0 ft, (ROOF)  
 Uniform Load : D = 0.010 ksf, Tributary Width = 8.0 ft, (WALL)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.358</b> 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.249</b> : 1
Section used for this span		<b>3.5x9</b>	Section used for this span		<b>3.5x9</b>
fb: Actual	=	989.11 psi	fv: Actual	=	75.81 psi
F'b	=	2,760.00 psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.000ft	Location of maximum on span	=	7.270 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.061 in	Ratio = 1585	>=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio = 0	<360	n/a	
Max Downward Total Deflection	0.118 in	Ratio = 814	>=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 <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v
D Only	Length = 8.0 ft	1	0.223	0.155	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.89	481.2	2,160.0	0.77	36.9	238.5
+D+S	Length = 8.0 ft	1	0.358	0.249	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.89	989.1	2,760.0	1.59	75.8	304.8
+D+0.750S	Length = 8.0 ft	1	0.312	0.217	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.39	862.1	2,760.0	1.39	66.1	304.8
+0.60D	Length = 8.0 ft	1	0.075	0.052	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.14	288.7	3,840.0	0.46	22.1	424.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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	0.1179	4.029		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	1.947	1.947
Max Upward from Load Combinations	1.947	1.947
Max Upward from Load Cases	1.000	1.000
D Only	0.947	0.947
+D+S	1.947	1.947
+D+0.750S	1.697	1.697
+0.60D	0.568	0.568
S Only	1.000	1.000

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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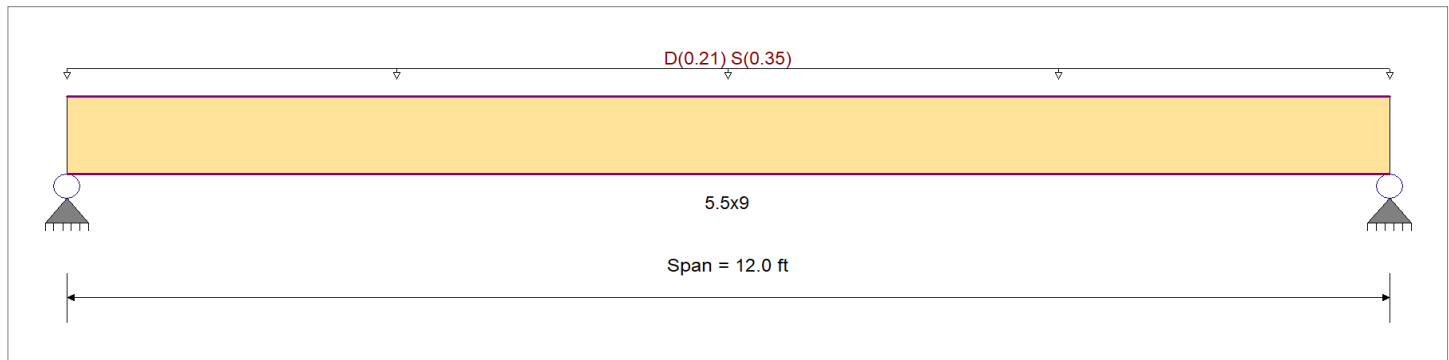
DESCRIPTION: BM#3

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, 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 = 14.0 ft, (ROOF)

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.602</b>	1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.298</b>	: 1
Section used for this span		<b>5.5x9</b>		Section used for this span		<b>5.5x9</b>	
fb: Actual	=	1,660.30psi		fv: Actual	=	90.89 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	
<b>Maximum Deflection</b>							
Max Downward Transient Deflection		0.273 in	Ratio =	<b>527</b>	>=360	Span: 1 : S Only	
Max Upward Transient Deflection		0 in	Ratio =	<b>0</b>	<360	n/a	
Max Downward Total Deflection		0.445 in	Ratio =	<b>323</b>	>=240	Span: 1 : +D+S	
Max Upward Total Deflection		0 in	Ratio =	<b>0</b>	<240	n/a	

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only																			
Length = 12.0 ft	1		0.297	0.147	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.97	642.1	2,160.0	0.0	0.00	0.0	0.0
+D+S																			
Length = 12.0 ft	1		0.602	0.298	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	10.27	1,660.3	2,760.0	0.0	0.00	0.0	0.0
+D+0.750S																			
Length = 12.0 ft	1		0.509	0.253	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	8.70	1,405.8	2,760.0	0.0	0.00	0.0	0.0
+0.60D																			
Length = 12.0 ft	1		0.100	0.050	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.38	385.3	3,840.0	0.0	0.00	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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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	0.4453	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	3.424	3.424
Max Upward from Load Combinations	3.424	3.424
Max Upward from Load Cases	2.100	2.100
D Only	1.324	1.324
+D+S	3.424	3.424
+D+0.750S	2.899	2.899
+0.60D	0.795	0.795
S Only	2.100	2.100

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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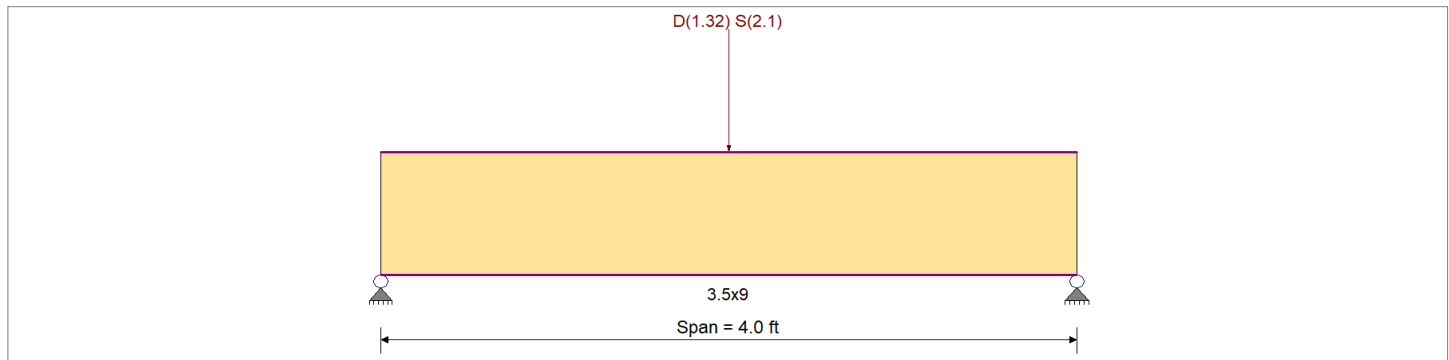
**DESCRIPTION:** BM#3.1

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, 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  
 Point Load : D = 1.320, S = 2.10 k @ 2.0 ft, (BM#3)

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio</b> = <b>0.316</b> 1	<b>Maximum Shear Stress Ratio</b> = <b>0.269</b> : 1
Section used for this span = <b>3.5x9</b>	Section used for this span = <b>3.5x9</b>
fb: Actual = 872.04psi	fv: Actual = 81.84 psi
F'b = 2,760.00psi	F'v = 304.75 psi
Load Combination = +D+S	Load Combination = +D+S
Location of maximum on span = 2.000ft	Location of maximum on span = 3.255 ft
Span # where maximum occurs = Span # 1	Span # where maximum occurs = Span # 1
<b>Maximum Deflection</b>	
Max Downward Transient Deflection = 0.013 in Ratio = <b>3776</b> >=360	Span: 1 : S Only
Max Upward Transient Deflection = 0 in Ratio = <b>0</b> <360	n/a
Max Downward Total Deflection = 0.021 in Ratio = <b>2307</b> >=240	Span: 1 : +D+S
Max Upward Total Deflection = 0 in Ratio = <b>0</b> <240	n/a

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>v</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 4.0 ft	1		0.157	0.133	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.33	338.7	2,160.0	0.0	0.00	0.0	0.0	0.0
+D+S																				
Length = 4.0 ft	1		0.316	0.269	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	3.43	872.0	2,760.0	0.0	0.00	0.0	0.0	0.0
+D+0.750S																				
Length = 4.0 ft	1		0.268	0.228	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.91	738.7	2,760.0	0.0	0.00	0.0	0.0	0.0
+0.60D																				
Length = 4.0 ft	1		0.053	0.045	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.80	203.2	3,840.0	0.0	0.00	0.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION: BM#3.1**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0208	2.015		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	1.724	1.724
Max Upward from Load Combinations	1.724	1.724
Max Upward from Load Cases	1.050	1.050
D Only	0.674	0.674
+D+S	1.724	1.724
+D+0.750S	1.461	1.461
+0.60D	0.404	0.404
S Only	1.050	1.050

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION:** BM#4

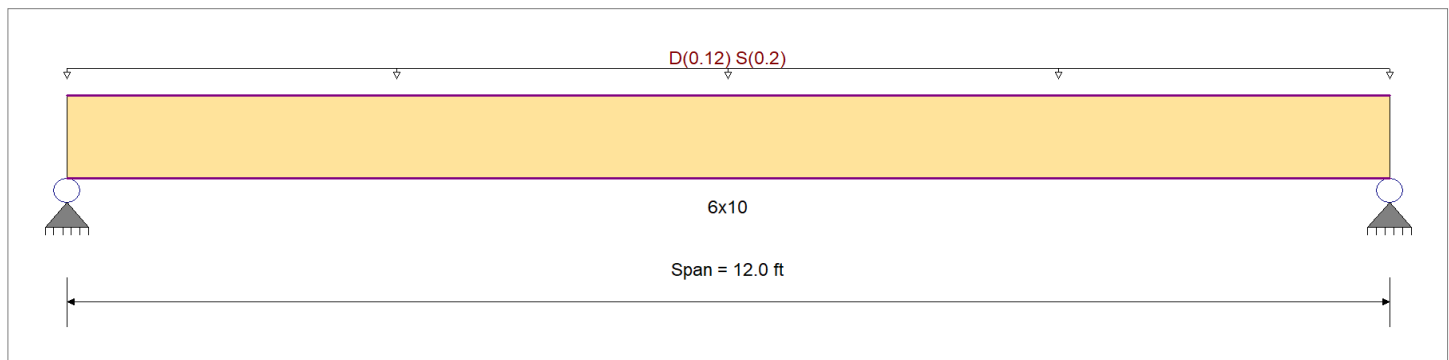
### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, 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 calculated and added to loading

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 8.0 ft, (ROOF)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.859</b> < 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.253</b> < 1
Section used for this span		<b>6x10</b>	Section used for this span		<b>6x10</b>
fb: Actual	=	864.48psi	fv: Actual	=	49.54 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
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.184 in	Ratio =	<b>783</b> >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	<b>0</b> <360	n/a	
Max Downward Total Deflection	0.304 in	Ratio =	<b>473</b> >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	<b>0</b> <240	n/a	

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 12.0 ft	1		0.435	0.128	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.36	342.3	787.5	0.0	0.00	0.0	0.0	0.0
+D+S																				
Length = 12.0 ft	1		0.859	0.253	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.96	864.5	1,006.3	0.0	0.00	0.0	0.0	0.0
+D+0.750S																				
Length = 12.0 ft	1		0.729	0.215	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	5.06	733.9	1,006.3	0.0	0.00	0.0	0.0	0.0
+0.60D																				
Length = 12.0 ft	1		0.147	0.043	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.42	205.4	1,400.0	0.0	0.00	0.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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**DESCRIPTION: BM#4**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3042	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	1.987	1.987
Max Upward from Load Combinations	1.987	1.987
Max Upward from Load Cases	1.200	1.200
D Only	0.787	0.787
+D+S	1.987	1.987
+D+0.750S	1.687	1.687
+0.60D	0.472	0.472
S Only	1.200	1.200



**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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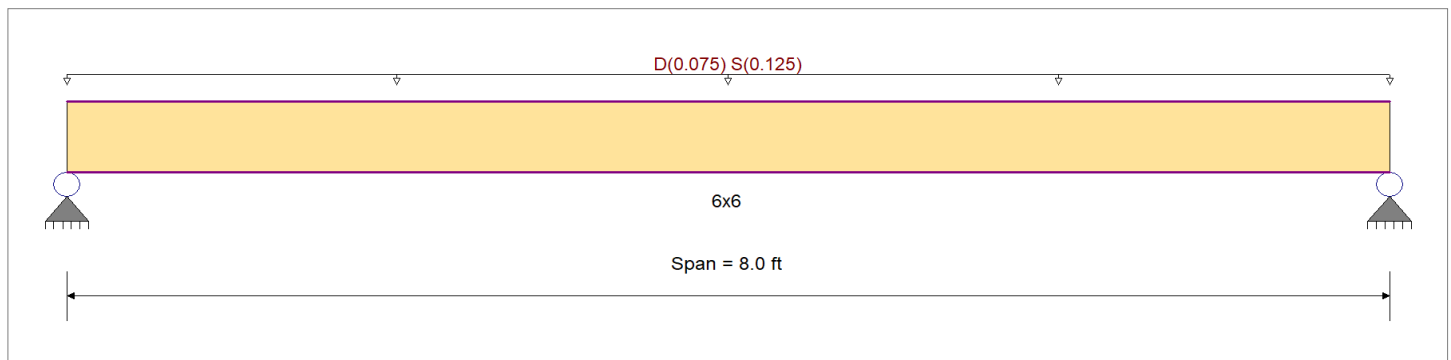
**DESCRIPTION:** BM#5

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
 Load Combination Set : IBC 2018

**Material Properties**

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	875.0 psi	Ebend- xx
	Fc - Prll	600.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	170.0 psi	
	Ft	425.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			30.590pcf



**Applied Loads**

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 5.0 ft, (ROOF)

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.710</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.187</b> : 1
Section used for this span		<b>6x6</b>	Section used for this span		<b>6x6</b>
fb: Actual	=	714.66psi	fv: Actual	=	36.46 psi
F'b	=	1,006.25psi	F'v	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.000ft	Location of maximum on span	=	7.562 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.117 in	Ratio =	<b>821</b> >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in	Ratio =	<b>0</b> <360	n/a	
Max Downward Total Deflection	0.193 in	Ratio =	<b>497</b> >=240	Span: 1 : +D+S	
Max Upward Total Deflection	0 in	Ratio =	<b>0</b> <240	n/a	

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values			
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v	
D Only																0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.358	0.094	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.65	281.9	787.5	0.29	14.4	153.0		
+D+S															0.0	0.00	0.0	0.0	
Length = 8.0 ft	1	0.710	0.187	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.65	714.7	1,006.3	0.74	36.5	195.5		
+D+0.750S															0.0	0.00	0.0	0.0	
Length = 8.0 ft	1	0.603	0.158	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.40	606.5	1,006.3	0.62	30.9	195.5		
+0.60D															0.0	0.00	0.0	0.0	
Length = 8.0 ft	1	0.121	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.39	169.1	1,400.0	0.17	8.6	272.0		

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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**DESCRIPTION: BM#5**

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1930	4.029		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	0.826	0.826
Max Upward from Load Combinations	0.826	0.826
Max Upward from Load Cases	0.500	0.500
D Only	0.326	0.326
+D+S	0.826	0.826
+D+0.750S	0.701	0.701
+0.60D	0.195	0.195
S Only	0.500	0.500

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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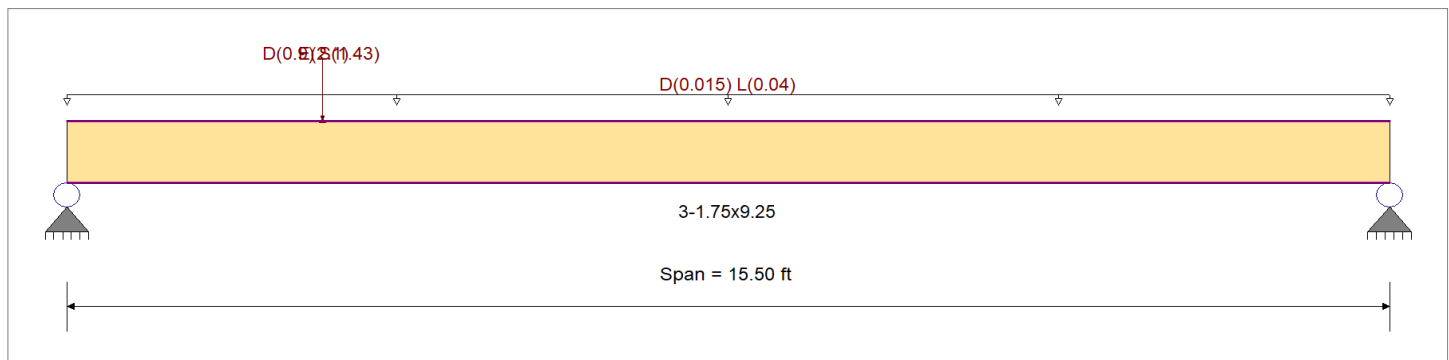
**DESCRIPTION:** BM#6

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2600 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2600 psi	Ebend- xx
	Fc - Prll	2510 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750 psi	
Wood Grade : MicroLam LVL 1.9 E	Fv	285 psi	Density
	Ft	1555 psi	Repetitive Member Stress Increase
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 = 1.0 ft, (FLOOR)  
 Point Load : D = 0.90, S = 1.430 k @ 3.0 ft, (HDR#3)  
 Point Load : E = 2.10 k @ 3.0 ft, (SW4)

### DESIGN SUMMARY

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.929</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.588</b> : 1
Section used for this span		<b>3-1.75x9.25</b>	Section used for this span		<b>3-1.75x9.25</b>
fb: Actual	=	4,163.04psi	fv: Actual	=	267.99 psi
F'b	=	4,482.29psi	F'v	=	456.00 psi
Load Combination	=	+1.168D+4.550E	Load Combination	=	+1.168D+4.550E
Location of maximum on span	=	2.998ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.243 in	Ratio =	<b>766</b> >=360	Span: 1 : E Only
Max Upward Transient Deflection		0 in	Ratio =	<b>0</b> <360	n/a
Max Downward Total Deflection		0.443 in	Ratio =	<b>419</b> >=240	Span: 1 : +D+0.750L+0.750S+0.5250E
Max Upward Total Deflection		0 in	Ratio =	<b>0</b> <240	n/a

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 15.50 ft	1		0.156	0.100	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.46	393.9	2,521.3	0.83	25.7	256.5		
+D+L																				
Length = 15.50 ft	1		0.188	0.120	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	3.28	525.3	2,801.4	1.11	34.3	285.0		
+D+S																				
Length = 15.50 ft	1		0.294	0.187	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	5.91	948.0	3,221.6	1.98	61.3	327.8		
+D+0.750L																				
Length = 15.50 ft	1		0.139	0.090	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	3.04	487.0	3,501.8	1.04	32.2	356.3		
+D+0.750L+0.750S																				
Length = 15.50 ft	1																			

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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**DESCRIPTION: BM#6**

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	fv	F <sub>v</sub>
Length = 15.50 ft	1	1	0.279	0.180	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	5.61	899.6	3,221.6	1.91	58.9	327.8
+1.168D+4.550E																		
Length = 15.50 ft	1	1	0.929	0.588	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	25.97	4,163.0	4,482.3	8.68	268.0	456.0
+1.126D+0.750L+0.750S+3.4																		
Length = 15.50 ft	1	1	0.831	0.528	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	23.25	3,726.5	4,482.3	7.79	240.6	456.0
+0.60D																		
Length = 15.50 ft	1	1	0.053	0.034	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	1.47	236.3	4,482.3	0.50	15.4	456.0
+0.4320D+4.550E																		
Length = 15.50 ft	1	1	0.864	0.546	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	24.16	3,873.2	4,482.3	8.06	249.1	456.0

**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	0.4431	6.958		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	2.829	0.944
Max Upward from Load Combinations	2.829	0.944
Max Upward from Load Cases	1.694	0.406
D Only	0.842	0.290
+D+L	1.152	0.600
+D+S	1.995	0.567
+D+0.750L	1.075	0.523
+D+0.750L+0.750S	1.939	0.731
+D+0.70E	2.028	0.575
+D+0.750L+0.750S+0.5250E	2.829	0.944
+0.60D	0.505	0.174
+0.60D+0.70E	1.691	0.459
L Only	0.310	0.310
S Only	1.153	0.277
E Only	1.694	0.406

## Wood Beam

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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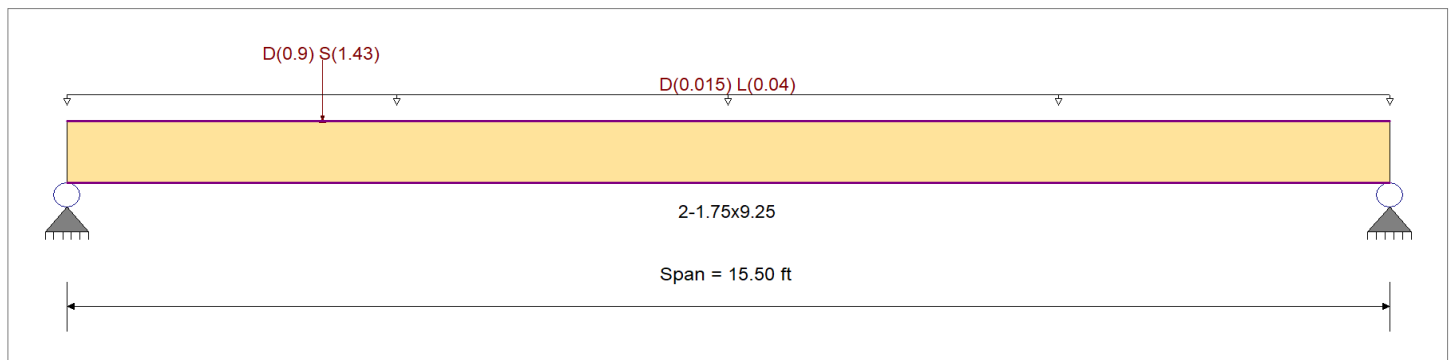
DESCRIPTION: BM#7

### CODE REFERENCES

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
 Load Combination Set : IBC 2018

### Material Properties

Analysis Method : Allowable Stress Design	Fb +	2,600.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	2,600.0 psi	Ebend- xx
	Fc - Prll	2,510.0 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi	
Wood Grade : MicroLam LVL 1.9 E	Fv	285.0 psi	Density
	Ft	1,555.0 psi	Repetitive Member Stress Increase
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 = 1.0 ft, (FLOOR)  
 Point Load : D = 0.90, S = 1.430 k @ 3.0 ft, (HDR#3)

### DESIGN SUMMARY

**Design OK**

Maximum Bending Stress Ratio	=	<b>0.441</b> : 1	Maximum Shear Stress Ratio	=	<b>0.281</b> : 1
Section used for this span	=	<b>2-1.75x9.25</b>	Section used for this span	=	<b>2-1.75x9.25</b>
fb: Actual	=	1,422.07 psi	fv: Actual	=	91.93 psi
F'b	=	3,221.65 psi	F'v	=	327.75 psi
Load Combination	=	+D+S	Load Combination	=	+D+S
Location of maximum on span	=	2.998 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection	0.248 in	Ratio = <b>750</b> >=360	Span: 1 : S Only		
Max Upward Transient Deflection	0 in	Ratio = <b>0</b> <360	n/a		
Max Downward Total Deflection	0.474 in	Ratio = <b>392</b> >=240	Span: 1 : +D+0.750L+0.750S		
Max Upward Total Deflection	0 in	Ratio = <b>0</b> <240	n/a		

### Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values						
			M	V	CD	CM	C <sub>t</sub>	CL <sub>x</sub>	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v				
D Only																						
	Length = 15.50 ft	1	0.234	0.150	0.90	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.46	590.8	2,521.3	0.83	38.5	256.5	0.00	0.0	0.0	
+D+L																						
	Length = 15.50 ft	1	0.281	0.181	1.00	1.00	1.00	1.00	1.036	1.00	1.00	1.04	3.28	788.0	2,801.4	1.11	51.5	285.0	0.00	0.0	0.0	
+D+S																						
	Length = 15.50 ft	1	0.441	0.281	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	5.91	1,422.1	3,221.6	1.98	91.9	327.8	0.00	0.0	0.0	
+D+0.750L																						
	Length = 15.50 ft	1	0.209	0.135	1.25	1.00	1.00	1.00	1.036	1.00	1.00	1.04	3.04	730.5	3,501.8	1.04	48.3	356.3	0.00	0.0	0.0	
+D+0.750L+0.750S																						

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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 <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	f <sub>v</sub>	F <sub>v</sub>
Length = 15.50 ft	1	0.419	0.269	1.15	1.00	1.00	1.00	1.036	1.00	1.00	1.04	5.61	1,349.4	3,221.6	1.91	88.3	327.8	
+1.168D					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0	
Length = 15.50 ft	1	0.154	0.099	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	2.87	690.0	4,482.3	0.97	45.0	456.0	
+1.126D+0.750L+0.750S					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0	
Length = 15.50 ft	1	0.318	0.204	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	5.92	1,423.9	4,482.3	2.01	93.2	456.0	
+0.60D					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0	
Length = 15.50 ft	1	0.079	0.051	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	1.47	354.5	4,482.3	0.50	23.1	456.0	
+0.4320D					1.00	1.00	1.00	1.036	1.00	1.00	1.04			0.0	0.00	0.0	0.0	
Length = 15.50 ft	1	0.057	0.036	1.60	1.00	1.00	1.00	1.036	1.00	1.00	1.04	1.06	255.2	4,482.3	0.36	16.6	456.0	

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.4738	7.071		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	1.995	0.731
Max Upward from Load Combinations	1.995	0.731
Max Upward from Load Cases	1.153	0.310
D Only	0.842	0.290
+D+L	1.152	0.600
+D+S	1.995	0.567
+D+0.750L	1.075	0.523
+D+0.750L+0.750S	1.939	0.731
+0.60D	0.505	0.174
L Only	0.310	0.310
S Only	1.153	0.277

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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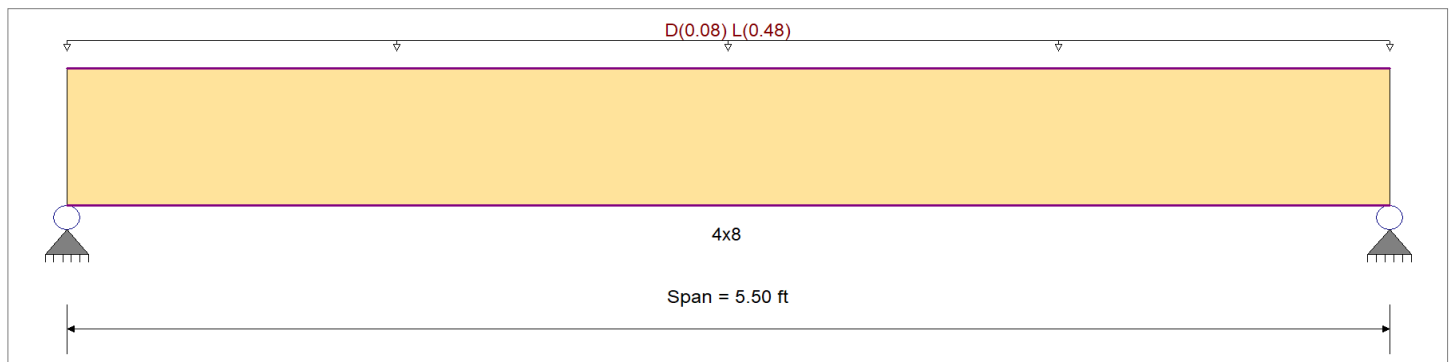
**DESCRIPTION: BM#8**

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
 Load Combination Set : IBC 2018

**Material Properties**

Analysis Method : Allowable Stress Design	Fb +	875.0 psi	E : Modulus of Elasticity
Load Combination : IBC 2018	Fb -	875.0 psi	Ebend- xx
	Fc - Prll	600.0 psi	Eminbend - xx
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	625.0 psi	
Wood Grade : No.2	Fv	170.0 psi	
	Ft	425.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			30.590pcf



**Applied Loads**

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

Beam self weight NOT internally calculated and added  
 Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 8.0 ft, (DECK)

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.911</b> : 1	<b>Maximum Shear Stress Ratio</b>	=	<b>0.523</b> : 1
Section used for this span		<b>4x8</b>	Section used for this span		<b>4x8</b>
fb: Actual	=	828.73psi	fv: Actual	=	71.10 psi
F'b	=	910.00psi	F'v	=	136.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.750ft	Location of maximum on span	=	4.898 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
<b>Maximum Deflection</b>					
Max Downward Transient Deflection		0.072 in Ratio =	<b>911</b> >=360	Span: 1 : L Only	
Max Upward Transient Deflection		0 in Ratio =	<b>0</b> <360	n/a	
Max Downward Total Deflection		0.084 in Ratio =	<b>781</b> >=240	Span: 1 : +D+L	
Max Upward Total Deflection		0 in Ratio =	<b>0</b> <240	n/a	

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 5.50 ft	1		0.145	0.083	0.90	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.30	118.4	819.0	0.0	0.00	0.0	0.0	0.0
+D+L																				
Length = 5.50 ft	1		0.911	0.523	1.00	1.00	1.00	1.00	1.300	1.00	0.80	1.00	2.12	828.7	910.0	1.20	71.1	136.0	0.0	0.0
+D+0.750L																				
Length = 5.50 ft	1		0.572	0.329	1.25	1.00	1.00	1.00	1.300	1.00	0.80	1.00	1.66	651.1	1,137.5	0.95	55.9	170.0	0.0	0.0
+1.168D																				
Length = 5.50 ft	1		0.095	0.055	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.35	138.3	1,456.0	0.20	11.9	217.6	0.0	0.0
+1.126D+0.750L																				
Length = 5.50 ft	1		0.457	0.263	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	1.70	666.1	1,456.0	0.97	57.1	217.6	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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 <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	f <sub>v</sub>	F <sub>v</sub>
+0.60D						1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 5.50 ft	<b>1</b>		0.049	0.028	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.18	71.0	1,456.0	0.10	6.1	217.6
+0.4320D						1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 5.50 ft	<b>1</b>		0.035	0.020	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.13	51.1	1,456.0	0.07	4.4	217.6

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0845	2.770		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	1.540	1.540
Max Upward from Load Combinations	1.540	1.540
Max Upward from Load Cases	1.320	1.320
D Only	0.220	0.220
+D+L	1.540	1.540
+D+0.750L	1.210	1.210
+0.60D	0.132	0.132
L Only	1.320	1.320



**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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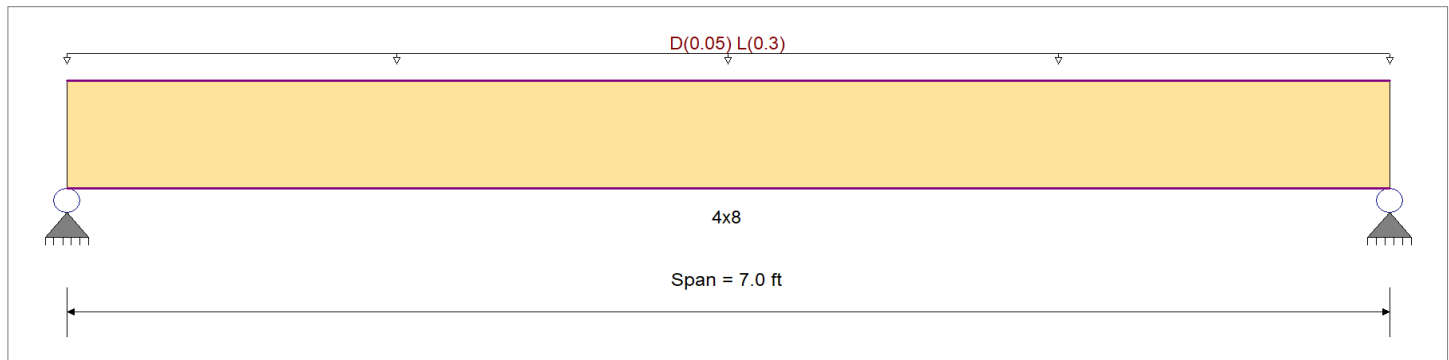
**DESCRIPTION: BM#9**

**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, 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 = 0.010, L = 0.060 ksf, Tributary Width = 5.0 ft, (DECK)

**DESIGN SUMMARY**

**Design OK**

<b>Maximum Bending Stress Ratio</b>	=	<b>0.922</b>	<b>1</b>	<b>Maximum Shear Stress Ratio</b>	=	<b>0.443</b>	<b>: 1</b>
Section used for this span		<b>4x8</b>		Section used for this span		<b>4x8</b>	
fb: Actual	=	839.00psi		fv: Actual	=	60.26 psi	
F'b	=	910.00psi		F'v	=	136.00 psi	
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	3.500ft		Location of maximum on span	=	6.412 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
<b>Maximum Deflection</b>							
Max Downward Transient Deflection		0.119 in	Ratio =	<b>707</b>	>=360	Span: 1 : L Only	
Max Upward Transient Deflection		0 in	Ratio =	<b>0</b>	<360	n/a	
Max Downward Total Deflection		0.139 in	Ratio =	<b>606</b>	>=240	Span: 1 : +D+L	
Max Upward Total Deflection		0 in	Ratio =	<b>0</b>	<240	n/a	

**Maximum Forces & Stresses for Load Combinations**

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 7.0 ft	1		0.146	0.070	0.90	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.31	119.9	819.0	0.0	0.00	0.0	0.0	0.0
+D+L																				
Length = 7.0 ft	1		0.922	0.443	1.00	1.00	1.00	1.00	1.300	1.00	0.80	1.00	2.14	839.0	910.0	0.0	0.00	0.0	0.0	0.0
+D+0.750L																				
Length = 7.0 ft	1		0.580	0.278	1.25	1.00	1.00	1.00	1.300	1.00	0.80	1.00	1.68	659.2	1,137.5	0.0	0.00	0.0	0.0	0.0
+1.168D																				
Length = 7.0 ft	1		0.096	0.046	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.36	140.0	1,456.0	0.0	0.00	0.0	0.0	0.0
+1.126D+0.750L																				
Length = 7.0 ft	1		0.463	0.223	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	1.72	674.3	1,456.0	0.0	0.00	0.0	0.0	0.0

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**Wood Beam**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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 <sub>t</sub>	CLx	C <sub>F</sub>	C <sub>fu</sub>	C <sub>i</sub>	C <sub>r</sub>	M	fb	F <sub>b</sub>	V	f <sub>v</sub>	F <sub>v</sub>
+0.60D						1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 7.0 ft	<b>1</b>		0.049	0.024	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.18	71.9	1,456.0	0.09	5.2	217.6
+0.4320D						1.00	1.00	1.00	1.300	1.00	0.80	1.00			0.0	0.00	0.0	0.0
Length = 7.0 ft	<b>1</b>		0.036	0.017	1.60	1.00	1.00	1.00	1.300	1.00	0.80	1.00	0.13	51.8	1,456.0	0.06	3.7	217.6

**Overall Maximum Deflections**

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1385	3.526		0.0000	0.000

**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.225	1.225
Max Upward from Load Combinations	1.225	1.225
Max Upward from Load Cases	1.050	1.050
D Only	0.175	0.175
+D+L	1.225	1.225
+D+0.750L	0.963	0.963
+0.60D	0.105	0.105
L Only	1.050	1.050

## Wood Column

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION:** COL#1

### Code References

Calculations per NDS 2018, IBC 2021, ASCE 7-16  
 Load Combinations Used : IBC 2018

### General Information

Analysis Method	Allowable Stress Design	Wood Section Name	<b>3.5x7.0</b>
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Trus-Joist
Overall Column Height	14 ft	Wood Member Type	Parallam PSL
<i>( Used for non-slender calculations )</i>			
Wood Species	iLevel Truss Joist	Exact Width	<b>3.50</b> in
Wood Grade	Parallam PSL 2.0E	Exact Depth	<b>7.0</b> in
Fb +	2,900.0 psi	Fv	290.0 psi
Fb -	2,900.0 psi	Ft	2,025.0 psi
Fc - Prll	2,900.0 psi	Density	45.070 pcf
Fc - Perp	750.0 psi		
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
	Basic	2,000.0	2,000.0
	Minimum	1,016.54	1,016.54
			2,000.0 ksi
			Column Buckling Condition:
			ABOUT X-X Axis: Lux = 14 ft, Kx = 1.0
			ABOUT Y-Y Axis: Luy = 14 ft, Ky = 1.0
			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
			Use Cr : Repetitive ? No

### Applied Loads

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

Column self weight included : 107.354 lbs \* Dead Load Factor

AXIAL LOADS . . .

BM#2 & 3.1: Axial Load at 14.0 ft, D = 1.620, S = 2.950 k

### DESIGN SUMMARY

#### Bending & Shear Check Results

**PASS** Max. Axial+Bending Stress Ratio = **0.5327 : 1**  
 Load Combination +D+S  
 Governing NDS Formula Comp Only, fc/Fc'  
 Location of max.above base 0.0 ft  
 At maximum location values are .  
 Applied Axial 4.677 k  
 Applied Mx 0.0 k-ft  
 Applied My 0.0 k-ft  
 Fc : Allowable 358.358 psi

**Maximum SERVICE Lateral Load Reactions . .**  
 Top along Y-Y 0.0 k Bottom along Y-Y 0.0 k  
 Top along X-X 0.0 k Bottom along X-X 0.0 k

**Maximum SERVICE Load Lateral Deflections . . .**  
 Along Y-Y 0.0 in at 0.0 ft above base  
 for load combination : n/a  
 Along X-X 0.0 in at 0.0 ft above base  
 for load combination : n/a

**Other Factors used to calculate allowable stresses . . .**  
Bending Compression Tension

**PASS** Maximum Shear Stress Ratio = **0.0 : 1**  
 Load Combination +0.60D  
 Location of max.above base 14.0 ft  
 Applied Design Shear 0.0 psi  
 Allowable Shear 464.0 psi

### Load Combination Results

Load Combination	C <sub>D</sub>	C <sub>P</sub>	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.137	0.1975	PASS	0.0 ft	0.0	PASS	14.0 ft
+D+S	1.150	0.107	0.5327	PASS	0.0 ft	0.0	PASS	14.0 ft
+D+0.750S	1.150	0.107	0.4487	PASS	0.0 ft	0.0	PASS	14.0 ft
+0.60D	1.600	0.078	0.1176	PASS	0.0 ft	0.0	PASS	14.0 ft

### Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					1.727				
+D+S					4.677				
+D+0.750S					3.940				

## Wood Column

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION:** COL#1

### Maximum Reactions

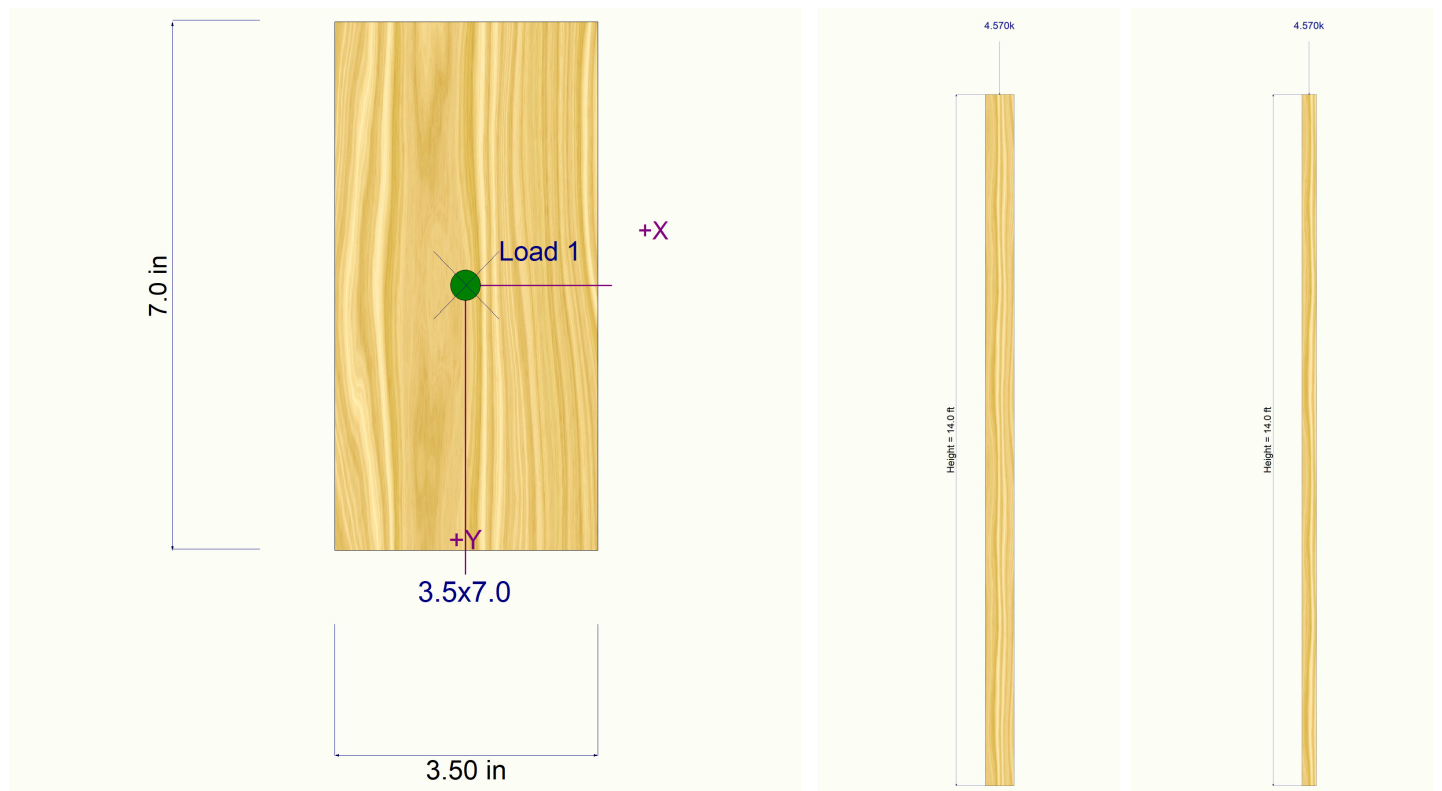
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
+0.60D						1.036					
S Only						2.950					

### Maximum Deflections for Load Combinations

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

### Sketches



## General Footing

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION:** FTNG#1

### Code References

Calculations per ACI 318-19, IBC 2021, 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	=	1.50 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	150.0 pcf
Soil/Concrete Friction Coeff.	=	0.250

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

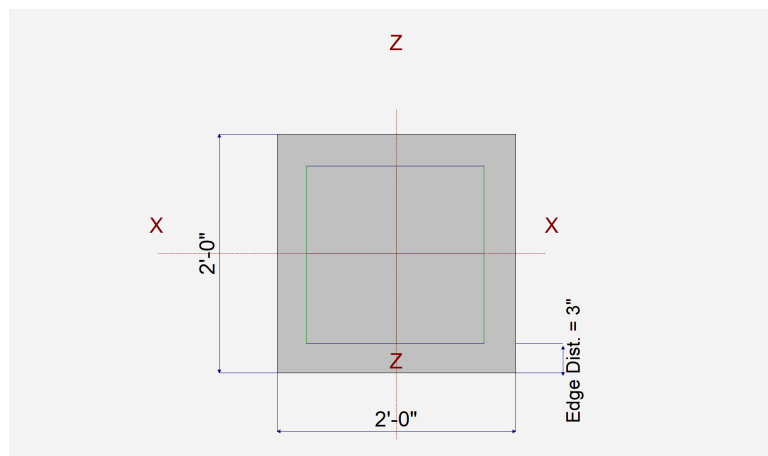
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	2.0 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



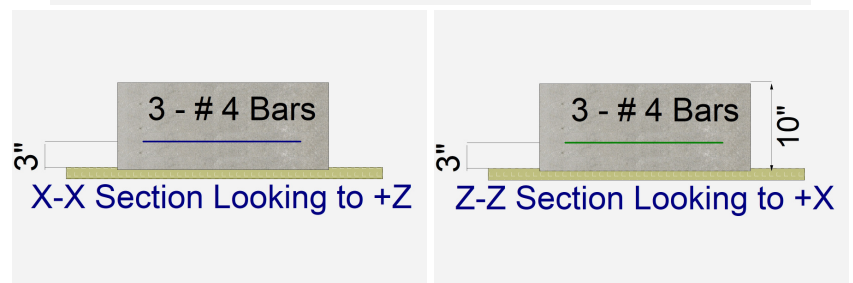
### Reinforcing

Bars parallel to X-X Axis		
Number of Bars	=	3
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	=	0.950			1.0		k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

**General Footing**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION: FTNG#1**

**DESIGN SUMMARY**

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4055	Soil Bearing	0.6083 ksf	1.50 ksf	+D+S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.05626	Z Flexure (+X)	0.3425 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60S
PASS	0.05626	Z Flexure (-X)	0.3425 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60S
PASS	0.05626	X Flexure (+Z)	0.3425 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60S
PASS	0.05626	X Flexure (-Z)	0.3425 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60S
PASS	0.04567	1-way Shear (+X)	3.425 psi	75.0 psi	+1.20D+1.60S
PASS	0.04567	1-way Shear (-X)	3.425 psi	75.0 psi	+1.20D+1.60S
PASS	0.04567	1-way Shear (+Z)	3.425 psi	75.0 psi	+1.20D+1.60S
PASS	0.04567	1-way Shear (-Z)	3.425 psi	75.0 psi	+1.20D+1.60S
PASS	0.08481	2-way Punching	12.721 psi	150.0 psi	+1.20D+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	1.50	n/a	0.0	0.3583	0.3583	n/a	n/a	0.239
X-X, +D+S	1.50	n/a	0.0	0.6083	0.6083	n/a	n/a	0.406
X-X, +D+0.750S	1.50	n/a	0.0	0.5458	0.5458	n/a	n/a	0.364
X-X, +0.60D	1.50	n/a	0.0	0.2150	0.2150	n/a	n/a	0.143
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.3583	0.3583	0.239
Z-Z, +D+S	1.50	0.0	n/a	n/a	n/a	0.6083	0.6083	0.406
Z-Z, +D+0.750S	1.50	0.0	n/a	n/a	n/a	0.5458	0.5458	0.364
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2150	0.2150	0.143

**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	0.1663	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.40D	0.1663	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.1425	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.1425	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50S	0.2050	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50S	0.2050	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60S	0.3425	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60S	0.3425	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.70S	0.230	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.70S	0.230	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.1069	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.1069	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.1663	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.1663	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.1425	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.1425	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50S	0.2050	-X	Bottom	0.2160	AsMin	0.30	6.088	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**General Footing**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

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
Z-Z, +1.20D+0.50S	0.2050	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.3425	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.3425	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.70S	0.230	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.70S	0.230	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.1069	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.1069	+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	1.66 psi	1.66 psi	1.66 psi	1.66 psi	1.66 psi	75.00 psi	0.02	OK
+1.20D	1.43 psi	1.43 psi	1.43 psi	1.43 psi	1.43 psi	75.00 psi	0.02	OK
+1.20D+0.50S	2.05 psi	2.05 psi	2.05 psi	2.05 psi	2.05 psi	75.00 psi	0.03	OK
+1.20D+1.60S	3.43 psi	3.43 psi	3.43 psi	3.43 psi	3.43 psi	75.00 psi	0.05	OK
+1.20D+0.70S	2.30 psi	2.30 psi	2.30 psi	2.30 psi	2.30 psi	75.00 psi	0.03	OK
+0.90D	1.07 psi	1.07 psi	1.07 psi	1.07 psi	1.07 psi	75.00 psi	0.01	OK

**Two-Way "Punching" Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	6.18 psi	150.00psi	0.04117	OK
+1.20D	5.29 psi	150.00psi	0.03529	OK
+1.20D+0.50S	7.61 psi	150.00psi	0.05076	OK
+1.20D+1.60S	12.72 psi	150.00psi	0.08481	OK
+1.20D+0.70S	8.54 psi	150.00psi	0.05695	OK
+0.90D	3.97 psi	150.00psi	0.02646	OK

All units k

## General Footing

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION:** FTNG#2

### Code References

Calculations per ACI 318-19, IBC 2021, 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	=	1.50 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	150.0 pcf
Soil/Concrete Friction Coeff.	=	0.250

#### Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

#### Increases based on footing depth

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

#### Increases based on footing plan dimension

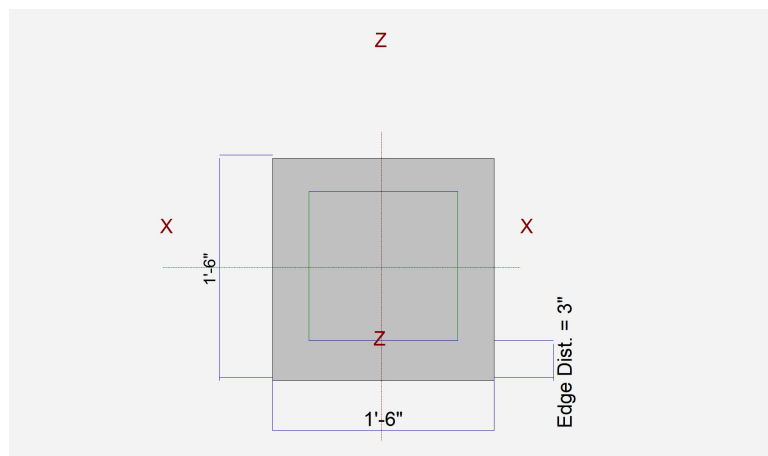
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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### Dimensions

Width parallel to X-X Axis	=	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



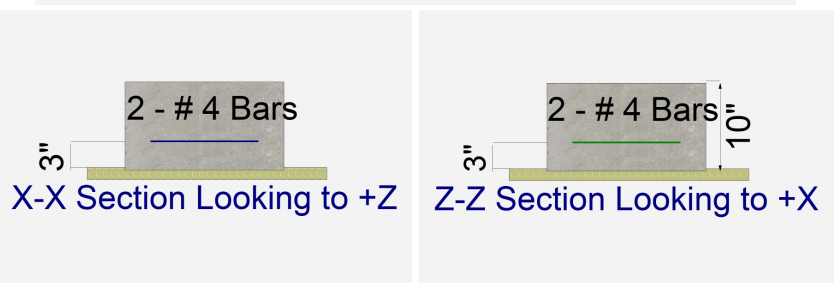
### Reinforcing

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

Bars parallel to Z-Z Axis	=	
Number of Bars	=	2.0
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	=	0.440		2.640			k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k



**General Footing**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**DESCRIPTION: FTNG#2**

**DESIGN SUMMARY**

**Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9933	Soil Bearing	1.490 ksf	1.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1093	Z Flexure (+X)	0.5940 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L
PASS	0.1093	Z Flexure (-X)	0.5940 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L
PASS	0.1093	X Flexure (+Z)	0.5940 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L
PASS	0.1093	X Flexure (-Z)	0.5940 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L
PASS	0.05531	1-way Shear (+X)	4.149 psi	75.0 psi	+1.20D+1.60L
PASS	0.05531	1-way Shear (-X)	4.149 psi	75.0 psi	+1.20D+1.60L
PASS	0.05531	1-way Shear (+Z)	4.149 psi	75.0 psi	+1.20D+1.60L
PASS	0.05531	1-way Shear (-Z)	4.149 psi	75.0 psi	+1.20D+1.60L
PASS	0.1383	2-way Punching	20.744 psi	150.0 psi	+1.20D+1.60L

**Detailed Results**

**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Zecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				(in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	1.50	n/a	0.0	0.3164	0.3164	n/a	n/a	n/a	n/a	0.211
X-X, +D+L	1.50	n/a	0.0	1.490	1.490	n/a	n/a	n/a	n/a	0.993
X-X, +D+0.750L	1.50	n/a	0.0	1.196	1.196	n/a	n/a	n/a	n/a	0.797
X-X, +0.60D	1.50	n/a	0.0	0.1898	0.1898	n/a	n/a	n/a	n/a	0.127
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.3164	0.3164	0.3164	0.3164	0.211
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.490	1.490	1.490	1.490	0.993
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.196	1.196	1.196	1.196	0.797
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.1898	0.1898	0.1898	0.1898	0.127

**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	0.0770	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.40D	0.0770	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60L	0.5940	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60L	0.5940	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L	0.2310	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L	0.2310	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D	0.0660	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D	0.0660	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +0.90D	0.04950	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +0.90D	0.04950	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.40D	0.0770	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.40D	0.0770	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60L	0.5940	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60L	0.5940	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L	0.2310	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L	0.2310	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D	0.0660	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK

Project Title:  
 Engineer:  
 Project ID:  
 Project Descr:

**General Footing**

Project File: 23-032.ec6

LIC# : KW-06016495, Build:20.23.08.01

CK Engineering LLC

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**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
Z-Z, +1.20D	0.0660	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +0.90D	0.04950	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +0.90D	0.04950	+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	0.54 psi	0.54 psi	0.54 psi	0.54 psi	0.54 psi	75.00 psi	0.01	OK
+1.20D+1.60L	4.15 psi	4.15 psi	4.15 psi	4.15 psi	4.15 psi	75.00 psi	0.06	OK
+1.20D+0.50L	1.61 psi	1.61 psi	1.61 psi	1.61 psi	1.61 psi	75.00 psi	0.02	OK
+1.20D	0.46 psi	0.46 psi	0.46 psi	0.46 psi	0.46 psi	75.00 psi	0.01	OK
+0.90D	0.35 psi	0.35 psi	0.35 psi	0.35 psi	0.35 psi	75.00 psi	0.00	OK

All units k

**Two-Way "Punching" Shear**

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	2.69 psi	150.00psi	0.01793	OK
+1.20D+1.60L	20.74 psi	150.00psi	0.1383	OK
+1.20D+0.50L	8.07 psi	150.00psi	0.05378	OK
+1.20D	2.31 psi	150.00psi	0.01537	OK
+0.90D	1.73 psi	150.00psi	0.01152	OK