CK Engineering LLC.

19229 38th PL NE
Lake Forest Park, WA 98155

Phone: (206) 417-0670

STRUCTURAL CALCULATIONS

Lateral & Gravity Design
22-021

4/27/2022

HELIX HOMES
6922 SE 33rd ST.
Mercer Island, WA 98040
April 27, 2022

Hazards by Location

Search Information

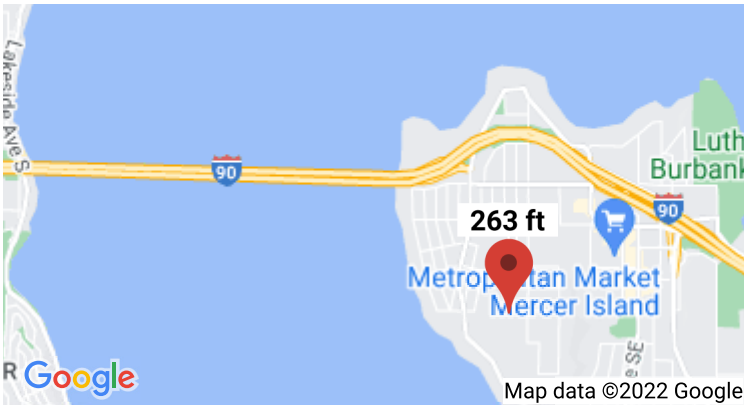
Address: 6922 SE 33rd St, Mercer Island, WA 98040, USA

Coordinates: 47.58136409999999, -122.2448425

Elevation: 263 ft

Timestamp: 2022-04-16T16:20:28.849Z

Hazard Type: Wind



ASCE 7-16

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

ASCE 7-10

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

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

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

Disclaimer

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

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

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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.


SE 27th St
SE 28th St
SE 29th St
68th Ave SE
71 st
72n
73rd A
74th
76
60th Ave SE
61st Ave SE
62nd Ave SE
67th Ave SE
68th Ave SE
69th Ave SE
70th Ave SE
72nd Ave SE
76th Ave SE
77th Ave SE
SE 32nd St
SE 33rd St
SE 34th St
SE Allen St
SE 35th St
74th Pl SE
72nd Pl SE
74th Ave SE
73rd Ave SE
W Mercer Way
76th Pl SE
77th Pl SE
78th Ave SE
SE 37th Pl
77th Ave SE

Hazards by Location

Search Information

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

Coordinates: 47.58136409999999, -122.2448425

Elevation: 263 ft

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

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: I

Site Class: D-default

Basic Parameters

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

* See Section 11.4.8

Additional Information

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

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

* See Section 11.4.8

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Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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Design Criteria

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

Roof Loading

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

Main Floor Loading

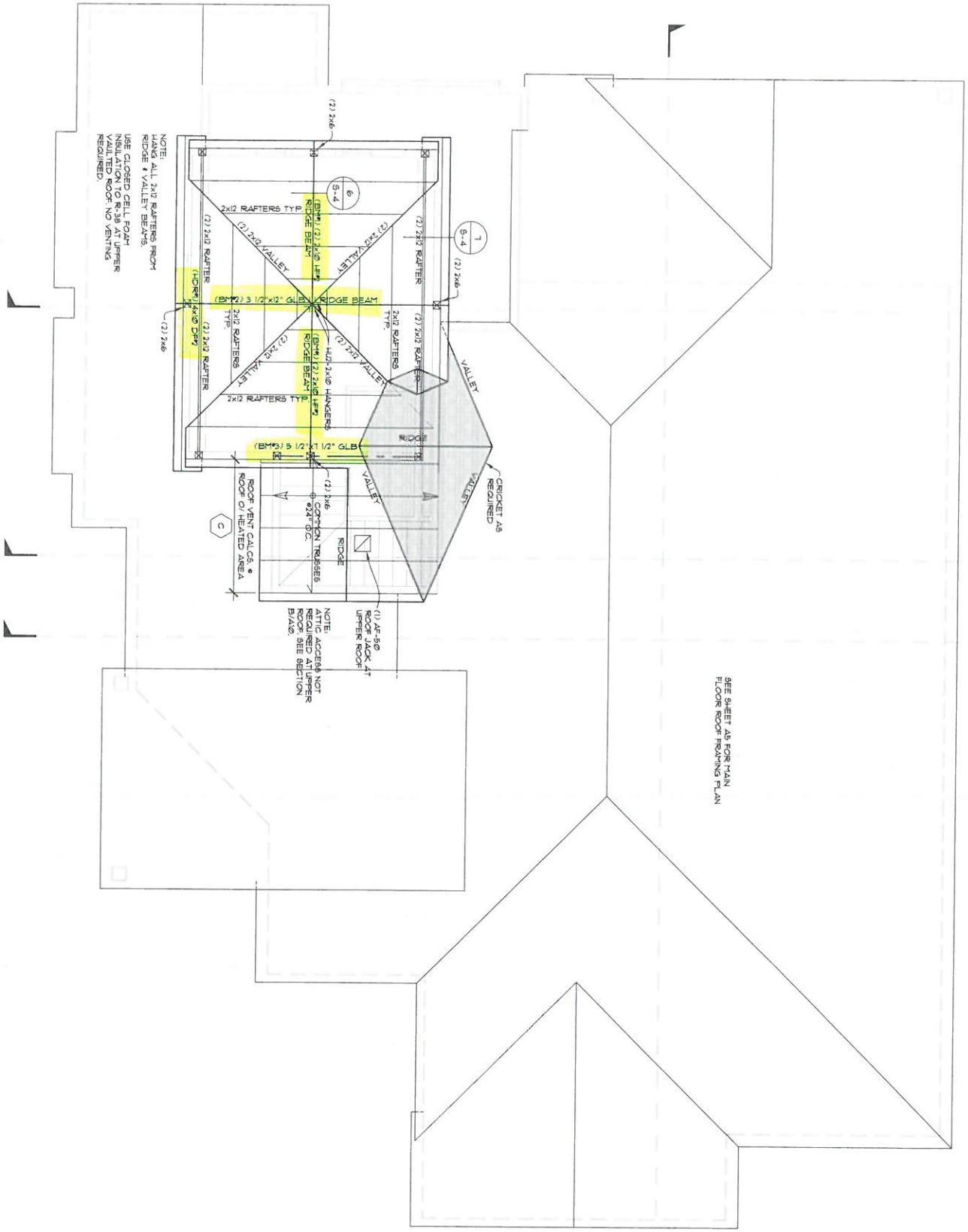
Floor Covering	Carpet/Hardwood/Tile	3.0
Sheathing	3/4" T&G	2.3
Ceiling	1/2" GWB	2.2
Joists	Solid Sawn @ 16" o/c	3.3
Beams		2.8
Miscellaneous	fixtures, mechanical, electrical, etc.	1.4
	TOTAL DEAD LOAD:	15.0 psf
	FLOOR LIVE LOAD:	40.0 psf

Not Used

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

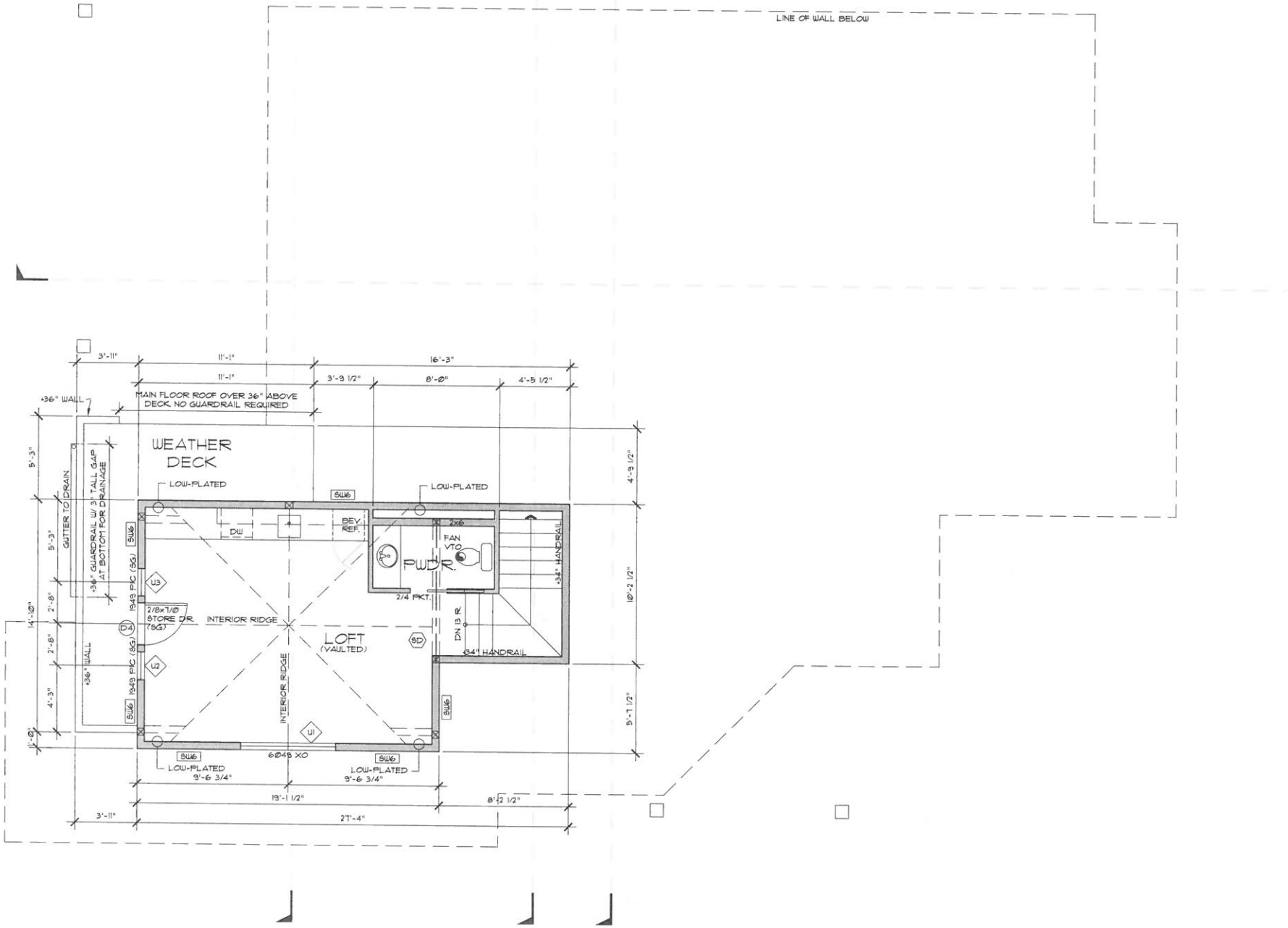
Soil Bearing Capacity:	3000 psf
Frost Depth:	18 in

LATERAL & GRAVITY DESIGN
KEY PLANS



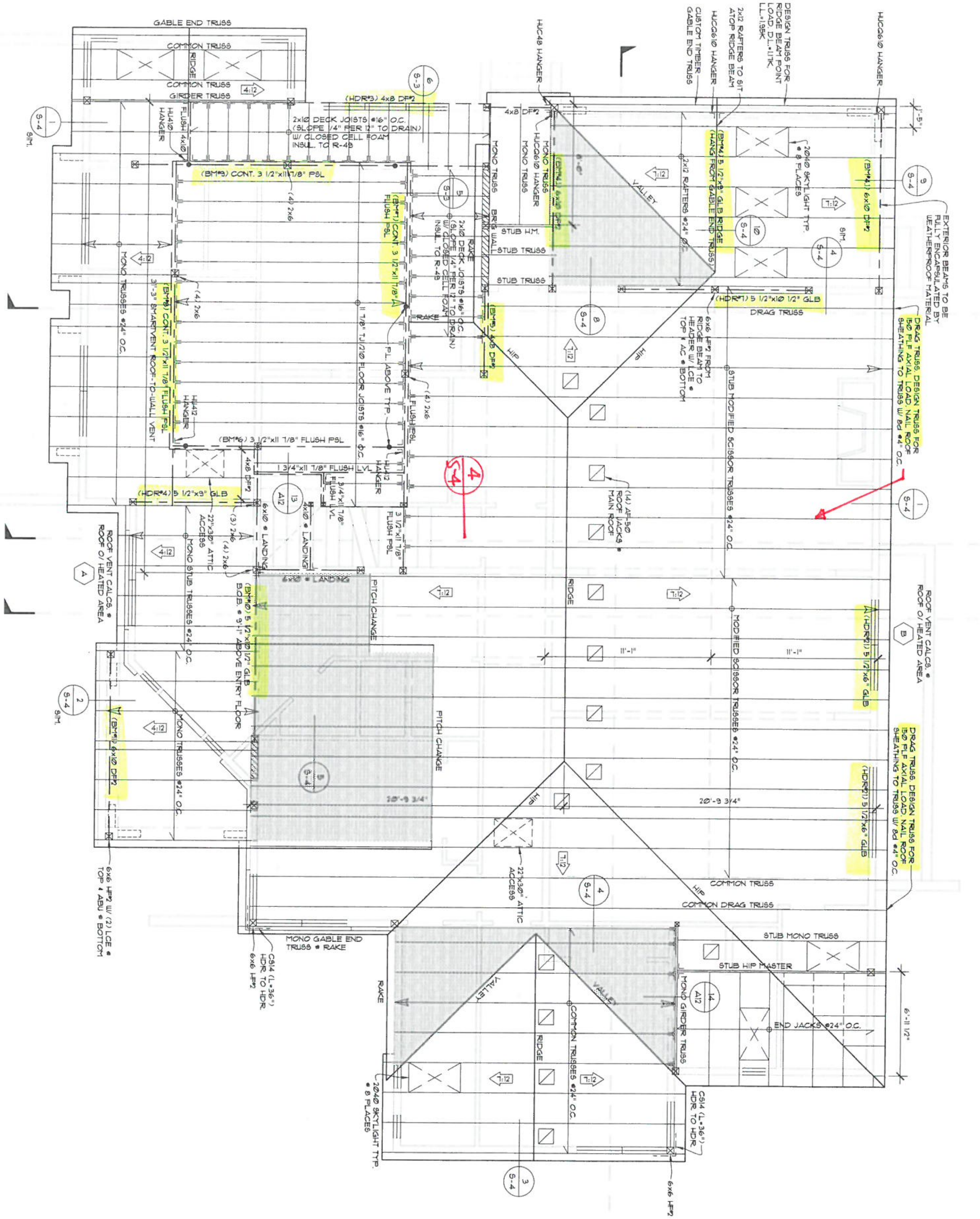
UPPER ROOF FRAMING PLAN

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

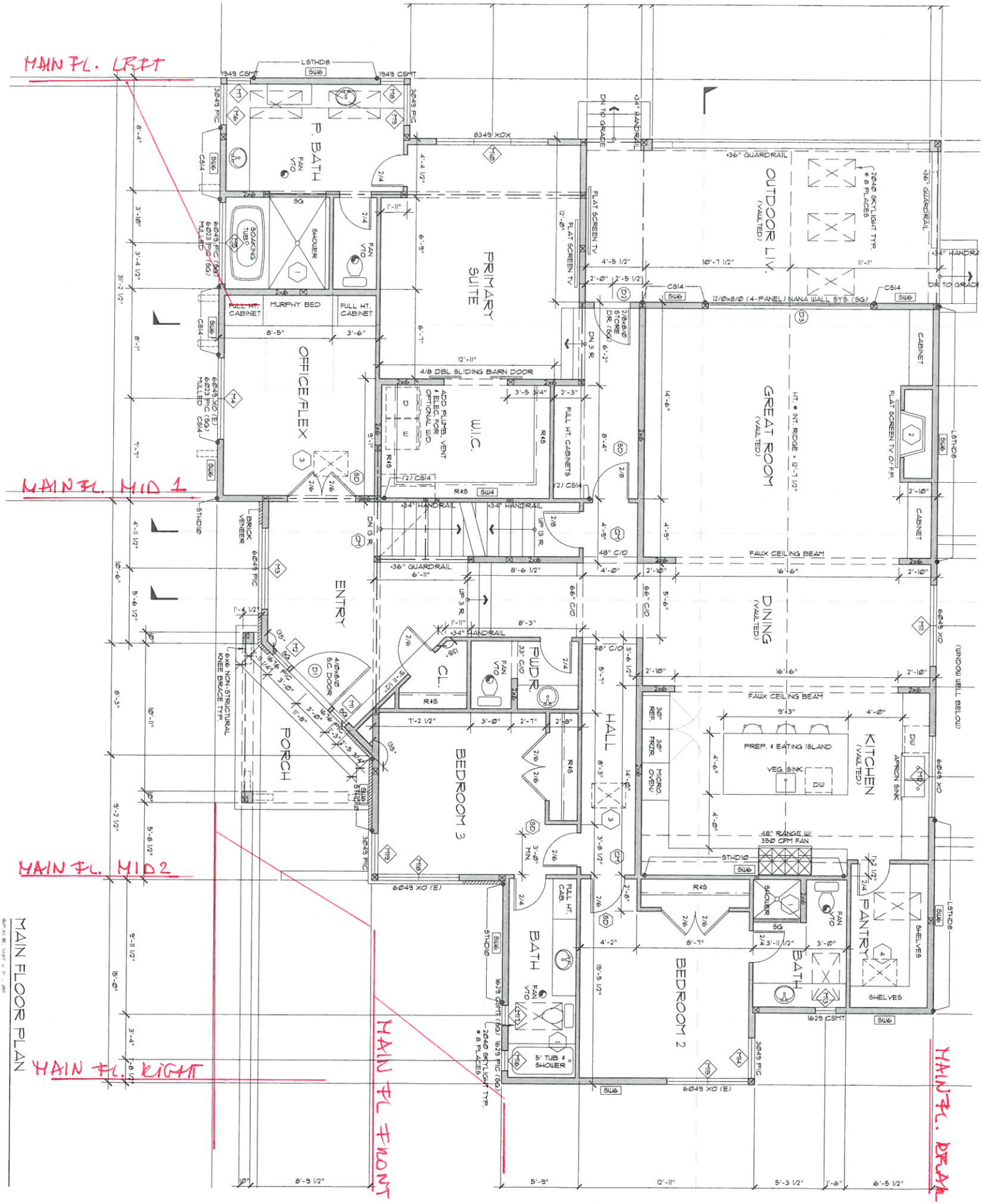


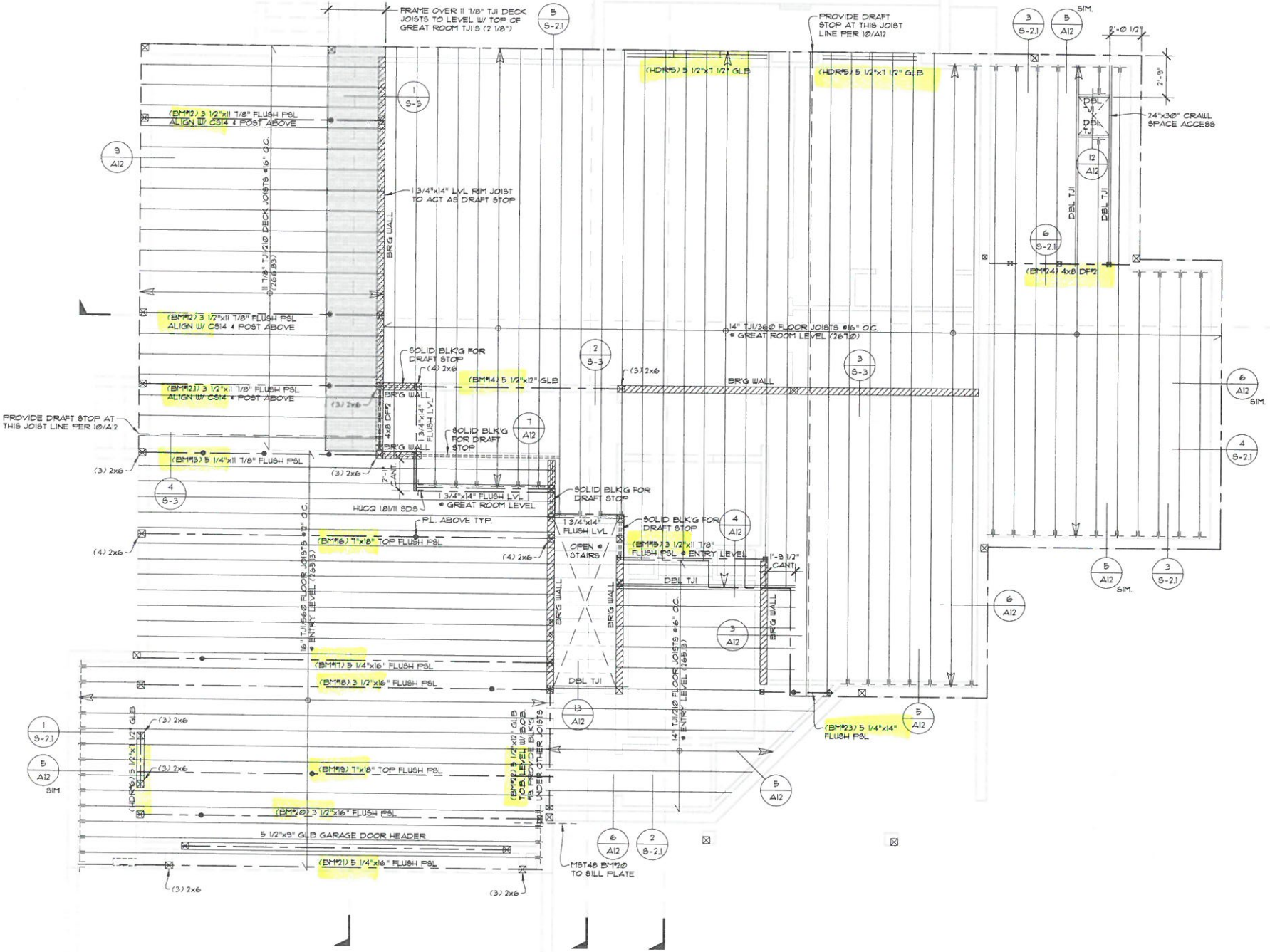
UPPER FLOOR PLAN

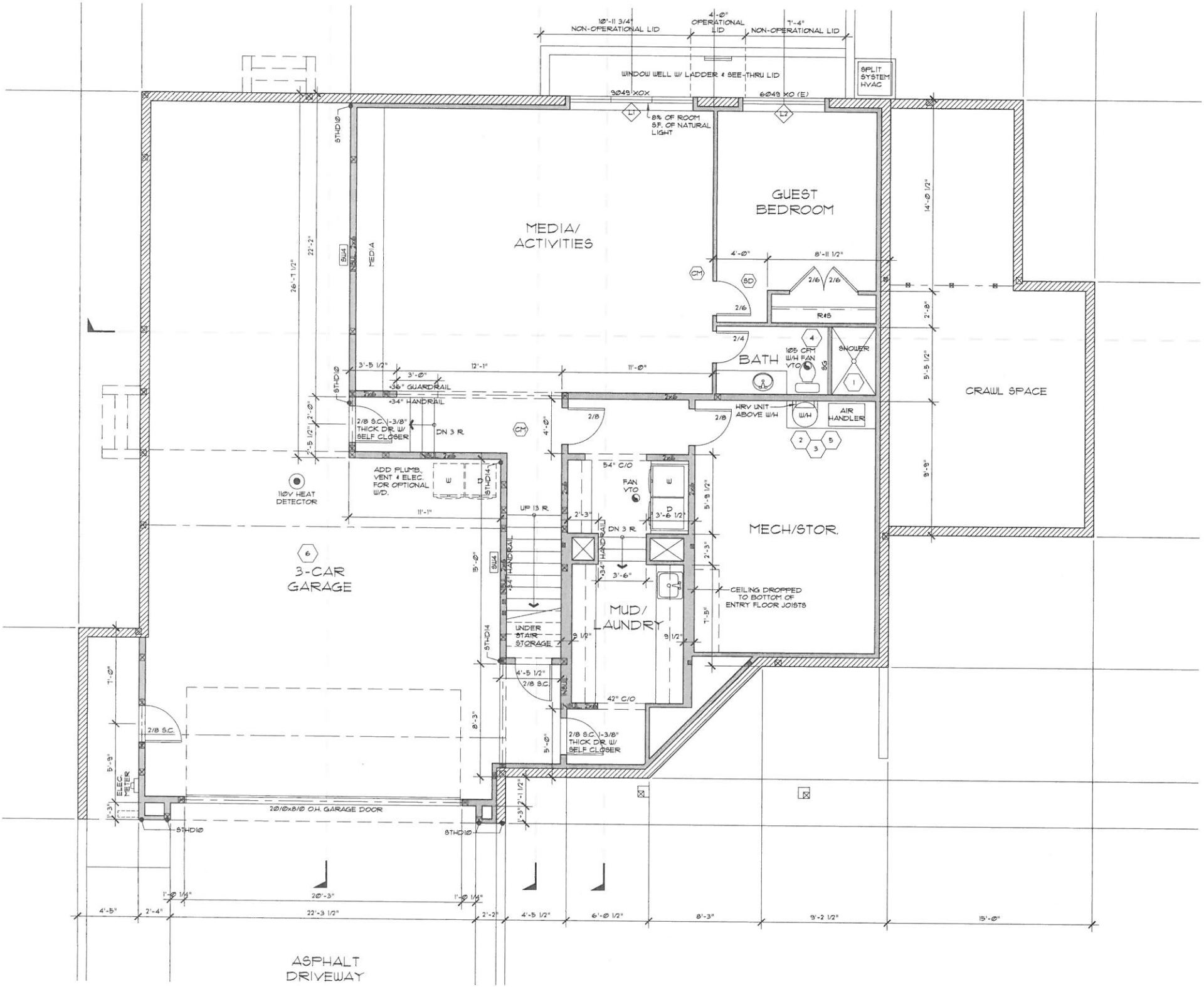
SCALE: 1/4" = 1' - Ø"

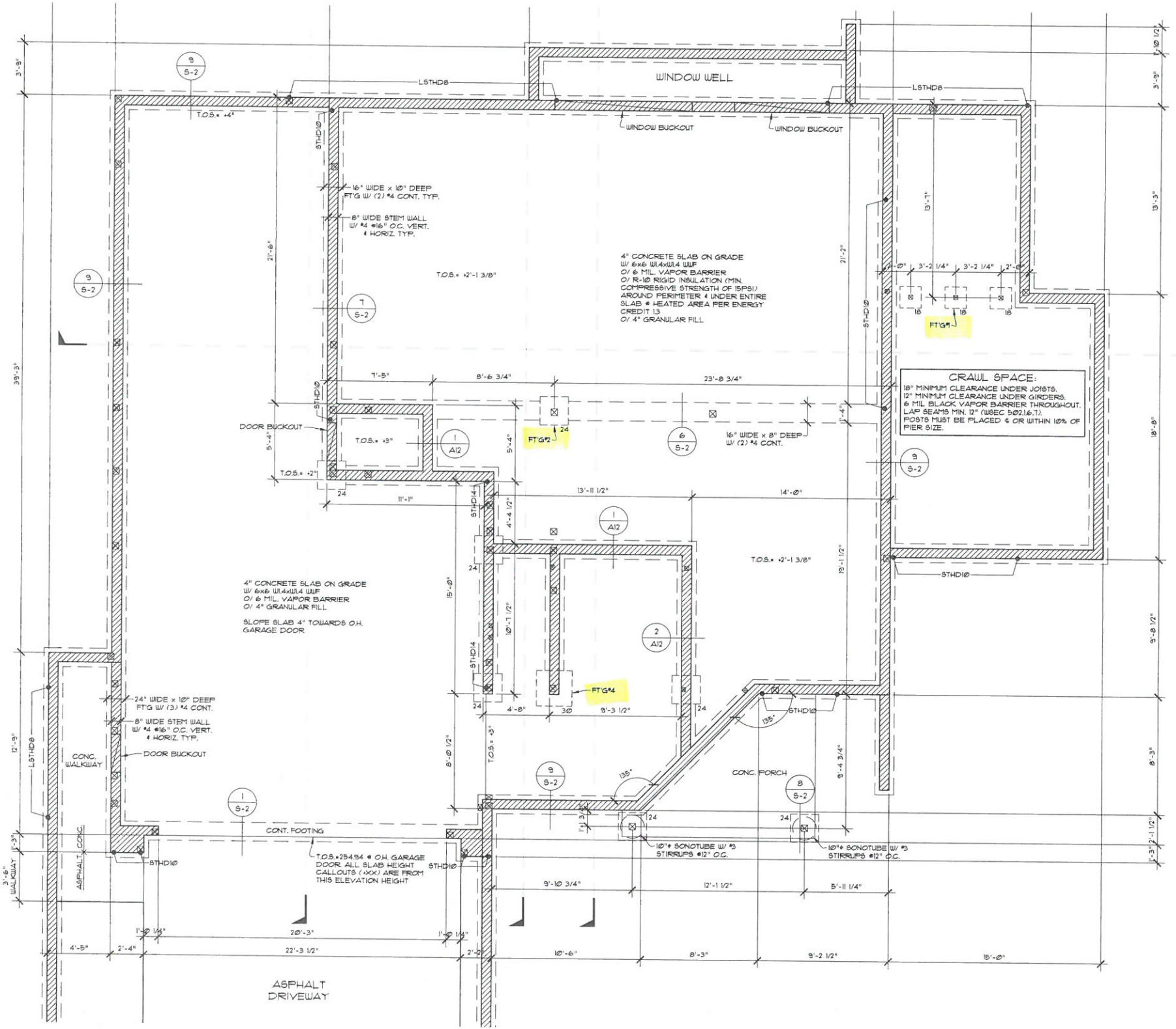


GABLE END TRUSS
COMMON TRUSS
RIDGE
COMMON TRUSS
GIRDER TRUSS
4:12
(HDR#3) 4x8 DF#2
2x10 DECK JOISTS @16" O.C. (SLOPE 1/4" PER 12" TO DRAIN) W/ CLOSED CELL FOAM INSUL. TO R-49
HU410 HANGER
FLUSH 4x10
(BM#3) CONT. 3 1/2"x11 7/8" PSL
(4) 2x6
(BM#1) CONT. 3 1/2"x11 7/8" FLUSH PSL
2x10 DECK JOISTS @16" O.C. (SLOPE 1/4" PER 12" TO DRAIN) W/ CLOSED CELL FOAM INSUL. TO R-49
11 7/8" TJI/210 FLOOR JOISTS @16" O.C.
P.L. ABOVE TYP.
RAKE
MONO TRUSSES @24" O.C.
(BM#2) CONT. 3 1/2"x11 7/8" FLUSH PSL
31'-3" SMARTVENT ROOF-TO-WALL VENT
HU412 HANGER
(BM#5) 3 1/2"x11 7/8" FLUSH PSL
1 3/4"x11 7/8" FLUSH LVL
4x8 DF#2
(HDR#4) 5 1/2"x9" GLB
6x10 @ LANDING
4x10 @ LANDING
22"x30" ATTIC ACCESS
(3) 2x6
(4) 2x6
MONO STUB TRUSSES @24" O.C.
ROOF VENT CALCS. @ ROOF O/ HEATED AREA
6x10 @ LANDING
(BM#10) 5 1/2"x10 1/2" GLB B.O.B. @ 9'-1" ABOVE ENTRY FLOOR
PITCH CHANGE
(BM#11) 6x10 DF#2
MONO TRUSSES @24" O.C.
6x6 HF#2 W/ (2) LCE @ TOP & ABU @ BOTTOM
MONO GABLE END TRUSS @ RAKE
CS14 (L=36") HDR TO HDR
6x6 HF#2
HUC48 HANGER
4x8 DF#2
MONO TRUSS
HUC610 HANGER
MONO TRUSS
(BM#4) 6x10 DF#2
BRG WALL
STUB H.M.
STUB TRUSS
STUB TRUSS
(BM#8) 4x8 DF#2
HIP
VALLEY
2x12 RAFTERS @24" O.C.
(BM#4) 5 1/2"x9" GLB RIDGE (HANG FROM GABLE END TRUSS)
CUSTOM TIMBER GABLE END TRUSS
HUC610 HANGER
2x12 RAFTERS TO SIT ATOP RIDGE BEAM
DESIGN TRUSS FOR RIDGE BEAM POINT LOAD. D.L.=1.1K L.L.=1.95K
HUC610 HANGER
2040 SKYLIGHT TYP. @ 8 PLACES
(BM#1) 6x10 DF#2
EXTERIOR BEAMS TO BE FULLY ENCAPSULATED BY WEATHERPROOF MATERIAL
(HDR#1) 5 1/2"x10 1/2" GLB
DRAG TRUSS
6x6 HF#2 FROM RIDGE BEAM TO HEADER W/ LCE @ TOP & AC @ BOTTOM
DRAG TRUSS, DESIGN TRUSS FOR 150 PLF AXIAL LOAD. NAIL ROOF SHEATHING TO TRUSS W/ 8d @4" O.C.
STUB MODIFIED SCISSOR TRUSSES @24" O.C.
(14) AF50 ROOF JACKS @ MAIN ROOF
4 S-4
7:12
RIDGE
MODIFIED SCISSOR TRUSSES @24" O.C.
11'-1"
ROOF VENT CALCS. @ ROOF O/ HEATED AREA
(HDR#1) 5 1/2"x6" GLB
20'-9 3/4"
22"x30" ATTIC ACCESS
COMMON TRUSS
COMMON DRAG TRUSS
STUB MONO TRUSS
STUB HIP MASTER
END JACKS @24" O.C.
6'-11 1/2"
MONO GIRDER TRUSS
COMMON TRUSSES @24" O.C.
2040 SKYLIGHT TYP. @ 8 PLACES
CS14 (L=36") HDR TO HDR
6x6 HF#2


MAIN FL. LEFT
MAIN FL. MID 1
MAIN FL. MID 2
MAIN FL. RIGHT
MAIN FLOOR PLAN
MAIN FL. FRONT
MAIN FL. REAR
P. BATH
PRIMARY SUITE
OUTDOOR LIV. (VAULTED)
OFFICE/FLEX
GREAT ROOM (VAULTED)
ENTRY
DINING (VAULTED)
KITCHEN (VAULTED)
PWDR.
CL.
HALL
PORCH
BEDROOM 3
BEDROOM 2
BATH
PANTRY
W.I.C.
FAUX CEILING BEAM
FLAT SCREEN TV
FULL HT. CABINETS
MURPHY BED
SOAKING TUB
SHOWER
PREP. & EATING ISLAND
VEG. SINK
APRON SINK
48" RANGE W/ 350 CFM FAN
36" REF.
30" FRZR.
MICRO. OVEN
DW
SHELVES
5' TUB & SHOWER
BRICK VENEER
4/8 DBL SLIDING BARN DOOR
12/0x8/0 (4-PANEL) NANA WALL SYS. (SG)
+36" GUARDRAIL
+34" HANDRAIL
DN TO GRADE
2040 SKYLIGHT TYP. • 8 PLACES
FAN VTO
L6THD8
5THD10
6049 XO (E)
6049 FIC
3049 FIC
1629 CSMT
1849 CSMT
8349 XOX
6049 XO
6023 FIC (SG)
2/8x8/0 STORE DR (SG)
4/10x8/0 S.C. DOOR
6'6" C/O
48" C/O
33" C/O
R45
(2) CS14
CS14
SW6
SG
2x6
2/4
2/6
2/8
(WINDOW WELL BELOW)
6'x6' NON-STRUCTURAL KNEE BRACE TYP.


FRAME OVER 11 7/8" TJI DECK JOISTS TO LEVEL W/ TOP OF GREAT ROOM TJI'S (2 1/8")
PROVIDE DRAFT STOP AT THIS JOIST LINE PER 10/A12
(HDR#5) 5 1/2"x7 1/2" GLB
(BM#2) 3 1/2"x11 7/8" FLUSH PSL ALIGN W/ CS14 & POST ABOVE
11 7/8" TJI/210 DECK JOISTS @16" O.C. (726 LBS)
BR'G WALL
13 3/4"x14" LVL RIM JOIST TO ACT AS DRAFT STOP
(BM#12) 3 1/2"x11 7/8" FLUSH PSL ALIGN W/ CS14 & POST ABOVE
SOLID BLK'G FOR DRAFT STOP
(4) 2x6
(BM#14) 5 1/2"x12" GLB
(3) 2x6
14" TJI/360 FLOOR JOISTS @16" O.C. @ GREAT ROOM LEVEL (267 LBS)
(BM#21) 3 1/2"x11 7/8" FLUSH PSL ALIGN W/ CS14 & POST ABOVE
13 3/4"x14" FLUSH LVL
4x8 DF#2
2'-0" CANT.
SOLID BLK'G FOR DRAFT STOP
PROVIDE DRAFT STOP AT THIS JOIST LINE PER 10/A12
(BM#13) 5 1/4"x11 7/8" FLUSH PSL
(3) 2x6
13 3/4"x14" FLUSH LVL @ GREAT ROOM LEVEL
HUCQ 1.81/11 SDS
P.L. ABOVE TYP.
(BM#6) 7"x18" TOP FLUSH PSL
(4) 2x6
16" TJI/560 FLOOR JOISTS @12" O.C. @ ENTRY LEVEL (765 LBS)
OPEN @ STAIRS
(BM#5) 3 1/2"x11 7/8" FLUSH PSL @ ENTRY LEVEL
1'-9 1/2" CANT.
DBL TJI
(BM#7) 5 1/4"x16" FLUSH PSL
(BM#8) 3 1/2"x16" FLUSH PSL
14" TJI/210 FLOOR JOISTS @16" O.C. @ ENTRY LEVEL (265 LBS)
(BM#23) 5 1/4"x14" FLUSH PSL
(HDR#6) 5 1/2"x12" GLB
(BM#9) 7"x18" TOP FLUSH PSL
(BM#20) 3 1/2"x16" FLUSH PSL
5 1/2"x9" GLB GARAGE DOOR HEADER
(BM#21) 5 1/4"x16" FLUSH PSL
(BM#10) 5 1/2"x12" GLB TOP LEVEL W/ BLK'G @ PROVIDE BLK'G UNDER OTHER JOISTS
MST48 BM#10 TO SILL PLATE
(BM#24) 4x8 DF#2
24"x36" CRAWL SPACE ACCESS
2'-9"
SIM.


10'-11 3/4" NON-OPERATIONAL LID
4'-0" OPERATIONAL LID
7'-4" NON-OPERATIONAL LID
WINDOW WELL W/ LADDER & SEE-THRU LID
SPLIT SYSTEM HVAC
3040 XOX
6040 XO (E)
L1
L2
8% OF ROOM S.F. OF NATURAL LIGHT
MEDIA/ ACTIVITIES
GUEST BEDROOM
BATH
105 CFM W/H FAN VTO
SHOWER
CRAWL SPACE
HRV UNIT ABOVE W/H
W/H
AIR HANDLER
MECH/STOR.
MUD/ LAUNDRY
3-CAR GARAGE
ADD PLUMB., VENT & ELEC. FOR OPTIONAL W/D.
110V HEAT DETECTOR
UP 13 R
DN 3 R
+34" HANDRAIL
+36" GUARDRAIL
2/8 S.C. 1-3/8" THICK DR. W/ SELF CLOSER
54" C/O
42" C/O
FAN VTO
CEILING DROPPED TO BOTTOM OF ENTRY FLOOR JOISTS
UNDER STAIR STORAGE
ELEC. METER
2010x810 O.H. GARAGE DOOR
ASPHALT DRIVEWAY
26'-7 1/2"
22'-2"
14'-0 1/2"
9'-9"
5'-5 1/2"
2'-8"
4'-5"
2'-4"
22'-3 1/2"
20'-3"
2'-2"
4'-5 1/2"
6'-0 1/2"
8'-3"
9'-2 1/2"
15'-0"


WINDOW WELL
WINDOW BUCKOUT
WINDOW BUCKOUT
LSTHD8
LSTHD8
T.O.S.= +4"
5THD10
16" WIDE x 10" DEEP FT'G W/ (2) #4 CONT. TYP.
8" WIDE STEM WALL W/ #4 @16" O.C. VERT. & HORIZ. TYP.
T.O.S.= +2'-1 3/8"
4" CONCRETE SLAB ON GRADE W/ 6x6 W1.4xW1.4 WWF O/ 6 MIL. VAPOR BARRIER O/ R-10 RIGID INSULATION (MIN. COMPRESSIVE STRENGTH OF 15PSI) AROUND PERIMETER & UNDER ENTIRE SLAB @ HEATED AREA PER ENERGY CREDIT 1.3 O/ 4" GRANULAR FILL
CRAWL SPACE:
18" MINIMUM CLEARANCE UNDER JOISTS.
12" MINIMUM CLEARANCE UNDER GIRDERS.
6 MIL BLACK VAPOR BARRIER THROUGHOUT.
LAP SEAMS MIN. 12" (WSEC 502.1.6.1).
POSTS MUST BE PLACED @ OR WITHIN 10% OF PIER SIZE.
FT'G#1
FT'G#2
FT'G#3
FT'G#4
DOOR BUCKOUT
T.O.S.= +3"
T.O.S.= +2"
16" WIDE x 8" DEEP W/ (2) #4 CONT.
5THD14
4" CONCRETE SLAB ON GRADE W/ 6x6 W1.4xW1.4 WWF O/ 6 MIL. VAPOR BARRIER O/ 4" GRANULAR FILL
SLOPE SLAB 4" TOWARDS O.H. GARAGE DOOR
24" WIDE x 10" DEEP FT'G W/ (3) #4 CONT.
8" WIDE STEM WALL W/ #4 @16" O.C. VERT. & HORIZ. TYP.
DOOR BUCKOUT
CONC. WALKWAY
CONC. PORCH
CONT. FOOTING
T.O.S.=254.94 @ O.H. GARAGE DOOR. ALL SLAB HEIGHT CALLOUTS (+XX) ARE FROM THIS ELEVATION HEIGHT
10"ø SONOTUBE W/ #3 STIRRUPS @12" O.C.
10"ø SONOTUBE W/ #3 STIRRUPS @12" O.C.
ASPHALT DRIVEWAY
ASPHALT
CONC.
WALKWAY
135°
135°

Type of construction: NEW
Applicable Building Codes: IBC 2018, ASCE 7/SEI 7-16
Location: 6922 SE 33rd ST.
Mercer Island, WA 98040

Work performed :

Lateral & Gravity Design

WIND DESIGN:

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

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

Roof slope :

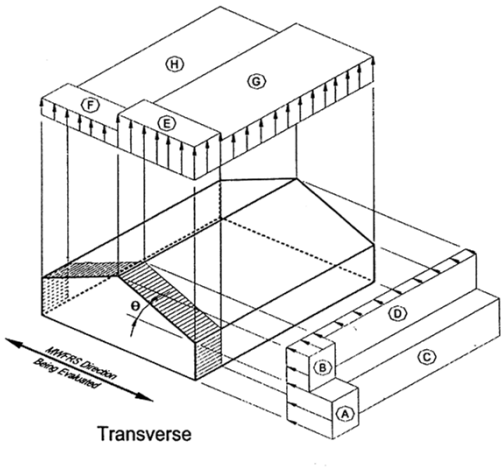
		rise		run		
Front/Rear	$\tan^{-1}$ (	7	/	12	)	= 30.3 degrees
Left/Right	$\tan^{-1}$ (	7	/	12	)	= 30.3 degrees

Number of floors: 1

20 ft Mean Elevation

0

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



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

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

WIND LOAD CALCULATIONS

FRONT ⟶ REAR

ΣV MAIN FLOOR =

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

NOT USED

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

NOT USED

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

WIND LOAD CALCULATIONS

LEFT ⟶ **RIGHT**

ΣV MAIN FLOOR =

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

TOTAL 12,701 lbs

NOT USED

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

TOTAL 0 lbs

NOT USED

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

TOTAL 0 lbs

ρ CALCS:

MAIN FLOOR CALCULATIONS:

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

Tributary Area: 1.0
Total Area: 2.0

ρ = 1.00
ASCE 7-16 12.3.4.2 b

NOT USED:

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

Tributary Area: 1.0
Total Area: 2.0

ρ = NA

NOT USED:

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

Tributary Area: 1.0
Total Area: 2.0

ρ = NA

All loads in pounds per square foot

WALL DEAD LOAD =	10 psf	ROOF DEAD LOAD =	15.0 psf
FLAT ROOF SNOW LOAD =	25 psf	UPPER FLOOR D.L. =	15.0 psf
RED. S.L. (20%*S.L.) =	0	LOWER FLOOR D.L. =	4.8 psf
		FLOOR LIVE LOAD =	40.0 psf

SEISMIC DESIGN:

$E = E_h + E_v$

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

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

$V = 0.7S_{DS}I_EW / R$ $\quad S_{DS} = 2/3\ S_{MS}$ $\quad Ss =$ 140.9% $\quad S_{MS} = 169.1\%$ $\quad V =$ 0.121 W

$V_{max} = S_{D1}I_EW / T_aR$ $\quad S_{MS} = (Fa)(Ss)$ $\quad Fa =$ 1.20 $\quad S_{DS} = 112.7\%$ $\quad E =$ 0.121 W

$T_a = 0.02h_n^{0.75}$ $\quad S_{D1} = 2/3\ S_{M1}$ $\quad S_1 =$ 49.0% $\quad S_{M1} = 73.5\%$

$T_a =$ 0.23 s $\quad S_{M1} = (Fv)(S_1)$ $\quad Fv =$ 1.50 $\quad S_{D1} = 49.0\%$ $\quad Cs =$ 0.121

MAIN FLOOR DIAPHRAGM LOADING:

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
66	33	15.0	32670
54	21	15.0	17010
20	5	15.0	1500
		15.0	0
		15.0	0
Area = 3412		Sub-Total=	51180

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
386	1	15.0	5790
		15.0	0
		15.0	0
		15.0	0
		15.0	0
Area = 386		Sub-Total=	5790

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
200	4.5	10.0	9000
150	4.5	10.0	6750
		10.0	0
		10.0	0
		10.0	0
Area = 1575		Sub-Total=	15750
		TOTAL =	72720 lb

NOT APPLICABLE

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
		15.0	0
		15.0	0
		15.0	0
		15.0	0
		15.0	0
Area = 0		Sub-Total=	0

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
		4.8	0
		4.8	0
		4.8	0
		4.8	0
		4.8	0
Area = 0		Sub-Total=	0

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
		10.0	0
		10.0	0
		10.0	0
		10.0	0
		10.0	0
Area = 0		Sub-Total=	0
		TOTAL =	lb

NOT APPLICABLE

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
		15.0	0
		15.0	0
		15.0	0
		15.0	0
		15.0	0
Area = 0		Sub-Total=	0

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
		15.0	0
		15.0	0
		15.0	0
		15.0	0
		15.0	0
Area = 0		Sub-Total=	0

W (WALL) =

LENGTH	TRIB. HT.	LOAD	TOTAL
		10.0	0
		10.0	0
		10.0	0
		10.0	0
		10.0	0
Area = 0		Sub-Total=	0
		TOTAL =	lb

V (MAIN FLOOR) = .121 x 72720 lb = 8828 lbs

V ( ) = .121 x lb = lbs

V ( ) = .121 x lb = lbs

REDISTRIBUTE:

ΣV x ρ	height	ΣV x height
8828 lb	9	79448
lb		0
lb		0
TOTAL = 8828 lb		TOTAL = 79448

E (MAIN) $= \dfrac{\Sigma V \times \text{height} \times \Sigma V\ \text{TOTAL}}{\Sigma V \times \text{height TOTAL}} =$ 8828 lbs

E ( ) = NOT USED = 0 lbs

E ( ) = NOT USED = 0 lbs

SUMMARY:

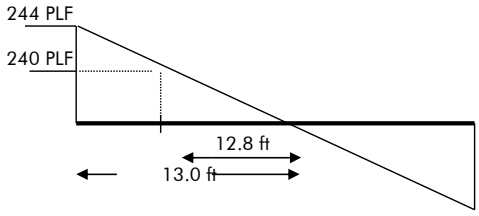
	WIND (front-rear)	WIND (left-right)	SEISMIC
ΣV (MAIN) =	14805 lbs	12701 lbs	8828 lbs
NOT APLICABLE	0 lbs	0 lbs	0 lbs
NOT APPLICABLE	0 lbs	0 lbs	0 lbs
TOTAL =	14805 lbs	12701 lbs	8828 lbs

DIAPHRAGM SHEAR:

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

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

IBC Table 2306.3.1 ⟶ 270 PLF



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

CHORD:

Sub-diaphragm length = 64.0 ft Total-diaphragm length = 64.0 ft
Sub-diaphragm width = 26.0 ft

$$T = \frac{M}{B} = \frac{\Sigma V \times (diaphragm\ length)}{8 \times (diaphragm\ width)} = \frac{12701 \times 64\ ft}{8 \times 26\ ft} = 3908\ lbs$$

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

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

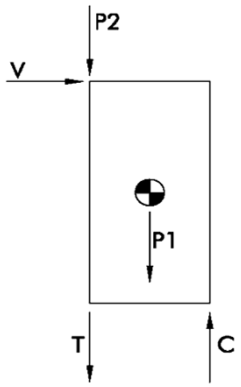
Since T allowable is greater than T applied, OK.

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

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

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

Lateral Calculation Key



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

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

ASD Basic Load Combinations

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

Tension Equations (Uplift)

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

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

Compression Equations

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

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

** Equations include overstrength factor.*

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

MAIN FL. REAR (GREAT RM., PNT.)

SHEARWALL

Floor Info

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

V(from upper) =	12701 lb		8828 lb	Height of Shearwall =	9.0 ft	Weight of Shearwall =	10.0 lbs
V(from main) =	0 lb		0 lb	Length of Shearwall =	14.0 ft	Tributary width for dead load =	1.0 ft
V(from lower) =	0 lb		0 lb	Aspect Ratio OK		Length of adjoining wall =	1.0 ft
Σ (Wind) =	12,701 lb	Σ (Smc) =	8,828 lb	Use alternate R factor for seismic?	No		
v =	192 PLF	v =	134 PLF				

SDPWS, Table 4.3A → 1.4 x 0.93 x 242 = 315 PLF → USE SW6

Wind controls shearwall design

C_{TOTAL} =	(floor above) + (this floor) =		+ 1732 lbs	= 1732 lbs	Wind controls	
T_{TOTAL} =	(floor above) + (this floor) =		+ 1240 lbs	= 1240 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 = 1204 lbs

USE SIMPSON DESIGNED HOLDOWN: CS14

OR AT FOUNDATION / INTERIOR WALLS USE: LSTHD8/RJ

MAIN FL. FRONT (PRIM B., OFFICE)

SHEARWALL

Floor Info

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

V(from upper) =	12701 lb		8828 lb	Height of Shearwall =	9.0 ft	Weight of Shearwall =	10.0 lbs
V(from main) =	0 lb		0 lb	Length of Shearwall =	5.0 ft	Tributary width for dead load =	1.0 ft
V(from lower) =	0 lb		0 lb	Aspect Ratio OK		Length of adjoining wall =	1.0 ft
Σ (Wind) =	12,701 lb	Σ (Smc) =	8,828 lb	Use alternate R factor for seismic?	No		
v =	259 PLF	v =	180 PLF				

SDPWS, Table 4.3A → 1.4 x 0.93 x 242 = 315 PLF → USE SW6

Wind controls shearwall design

C_{TOTAL} =	(floor above) + (this floor) =		+ 2333 lbs	= 2333 lbs	Wind controls	
T_{TOTAL} =	(floor above) + (this floor) =		+ 2118 lbs	= 2118 lbs	Load case 8 controls - Wind	

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1621 lbs

USE SIMPSON DESIGNED HOLDOWN: CS14

OR AT FOUNDATION / INTERIOR WALLS USE: STHD10/RJ

MAIN FL. LEFT (PRIM B., GREAT RM.)

SHEARWALL

Floor Info

		WIND	SEISMIC
		Tributary Width (Main Floor)	Tributary Area (Main Floor)
Main	Floor Level, e.g. Upper, Main, Lower	15.5 tributary width	15.5 tributary area
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear	74.0 total width	74.0 total area
	(For Left Wall, Use Front-Rear Load Direction)	Not Used	Not Used
CDX	Sheathing type	1.0 tributary width	1.0 tributary area
	Values in accordance with AF&PA SDPWS-2015	2.0 total width	2.0 total area
Roof	Resisting Dead Load	Not Used	Not Used
	(e.g. Roof, Upper Floor, Main Floor)	1.0 tributary width	1.0 tributary area
20.00 ft	Total Length of Shearwalls	2.0 total width	2.0 total area

V(from upper) =	14805 lb		8828 lb	Height of Shearwall =	9.0 ft	Weight of Shearwall =	10.0 lbs
V(from main) =	0 lb		0 lb	Length of Shearwall =	5.0 ft	Tributary width for dead load =	1.0 ft
V(from lower) =	0 lb		0 lb	Aspect Ratio OK		Length of adjoining wall =	1.0 ft
Σ (Wind) =	14,805 lb	Σ (Smc) =	8,828 lb	Use alternate R factor for seismic?	No		
v =	155 PLF	v =	92 PLF				

SDPWS, Table 4.3A → 1.4 x 0.93 x 242 = 315 PLF → USE SW6

Wind controls shearwall design

C_{TOTAL} =	(floor above) + (this floor) =		+ 1395 lbs	= 1395 lbs	Wind controls	
T_{TOTAL} =	(floor above) + (this floor) =		+ 1180 lbs	= 1180 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 = 832 lbs

USE SIMPSON DESIGNED HOLDOWN: CS14

OR AT FOUNDATION / INTERIOR WALLS USE: LSTHD8/RJ

MAIN FL. MID 1 (STAIR CASE)

SHEARWALL

Floor Info

		WIND		SEISMIC	
		Tributary Width (Main Floor)		Tributary Area (Main Floor)	
Main	Floor Level, e.g. Upper, Main, Lower	27.0	tributary width	27.0	tributary area
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear	74.0	total width	74.0	total area
	(For Left Wall, Use Front-Rear Load Direction)	Not Used		Not Used	
CDX	Sheathing type	1.0	tributary width	1.0	tributary area
	Values in accordance with AF&PA SDPWS-2015	2.0	total width	2.0	total area
Roof	Resisting Dead Load	Not Used		Not Used	
	(e.g. Roof, Upper Floor, Main Floor)	1.0	tributary width	1.0	tributary area
15.00 ft	Total Length of Shearwalls	2.0	total width	2.0	total area

V(from upper)=	14805 lb	8828 lb	Height of Shearwall =	9.0 ft	Weight of Shearwall = 10.0 lbs
V(from main)=	0 lb	0 lb	Length of Shearwall =	15.0 ft	Tributary width for dead load = 1.0 ft
V(from lower)=	0 lb	0 lb	Aspect Ratio OK		Length of adjoining wall = 1.0 ft
Σ (Wind) =	14,805 lb	Σ (Smc) = 8,828 lb	Use alternate R factor for seismic?	No	
v =	360 PLF	v = 215 PLF			

3x framing required per IBC

SDPWS, Table 4.3A → 1.4 x 0.93 x 353 = 460 PLF → USE SW4

Wind controls shearwall design

C_{TOTAL} =	(floor above) + (this floor) =		+ 3241 lbs	= 3241 lbs	Wind controls
T_{TOTAL} =	(floor above) + (this floor) =		+ 2718 lbs	= 2718 lbs	Load case 8 controls - Wind

Wind controls holdown design

(2) CS14

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E= 1933 lbs

USE SIMPSON DESIGNED HOLDOWN: MST48

OR AT FOUNDATION / INTERIOR WALLS USE: STHD14/RJ

MAIN FL. MID 2 (KIT.)

SHEARWALL

Floor Info

		WIND		SEISMIC	
		Tributary Width (Main Floor)		Tributary Area (Main Floor)	
Main	Floor Level, e.g. Upper, Main, Lower	22.0	tributary width	22.0	tributary area
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear	74.0	total width	74.0	total area
	(For Left Wall, Use Front-Rear Load Direction)	Not Used		Not Used	
CDX	Sheathing type	1.0	tributary width	1.0	tributary area
	Values in accordance with AF&PA SDPWS-2015	2.0	total width	2.0	total area
Roof	Resisting Dead Load	Not Used		Not Used	
	(e.g. Roof, Upper Floor, Main Floor)	1.0	tributary width	1.0	tributary area
15.00 ft	Total Length of Shearwalls	2.0	total width	2.0	total area

V(from upper)=	14805 lb	8828 lb	Height of Shearwall =	9.0 ft	Weight of Shearwall = 10.0 lbs
V(from main)=	0 lb	0 lb	Length of Shearwall =	15.0 ft	Tributary width for dead load = 1.0 ft
V(from lower)=	0 lb	0 lb	Aspect Ratio OK		Length of adjoining wall = 1.0 ft
Σ (Wind) =	14,805 lb	Σ (Smc) = 8,828 lb	Use alternate R factor for seismic?	No	
v =	293 PLF	v = 175 PLF			

SDPWS, Table 4.3A → 1.4 x 0.93 x 242 = 315 PLF → USE SW6

Wind controls shearwall design

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

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E= 1575 lbs

USE SIMPSON DESIGNED HOLDOWN: CS14

OR AT FOUNDATION / INTERIOR WALLS USE: STHD10/RJ

MAIN FL. RIGHT (BDRM 2, B.)

SHEARWALL

Floor Info

		WIND		SEISMIC	
		Tributary Width (Main Floor)		Tributary Area (Main Floor)	
Main	Floor Level, e.g. Upper, Main, Lower	8.0	tributary width	8.0	tributary area
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear	74.0	total width	74.0	total area
	(For Left Wall, Use Front-Rear Load Direction)	Not Used		Not Used	
CDX	Sheathing type	1.0	tributary width	1.0	tributary area
	Values in accordance with AF&PA SDPWS-2015	2.0	total width	2.0	total area
Roof	Resisting Dead Load	Not Used		Not Used	
	(e.g. Roof, Upper Floor, Main Floor)	1.0	tributary width	1.0	tributary area
19.00 ft	Total Length of Shearwalls	2.0	total width	2.0	total area

V(from upper)=	14805 lb	8828 lb	Height of Shearwall =	9.0 ft	Weight of Shearwall = 10.0 lbs
V(from main)=	0 lb	0 lb	Length of Shearwall =	7.0 ft	Tributary width for dead load = 1.0 ft
V(from lower)=	0 lb	0 lb	Aspect Ratio OK		Length of adjoining wall = 1.0 ft
Σ (Wind) =	14,805 lb	Σ (Smc) = 8,828 lb	Use alternate R factor for seismic?	No	
v =	84 PLF	v = 50 PLF			

SDPWS, Table 4.3A → 1.4 x 0.93 x 242 = 315 PLF → USE SW6

Wind controls shearwall design

C_{TOTAL} =	(floor above) + (this floor) =		+ 758 lbs	= 758 lbs	Wind controls
T_{TOTAL} =	(floor above) + (this floor) =		+ 481 lbs	= 481 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= 452 lbs

NO HOLDOWNS REQUIRED: OK

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: STUB HIP MASTER (Reactions ONLY)

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

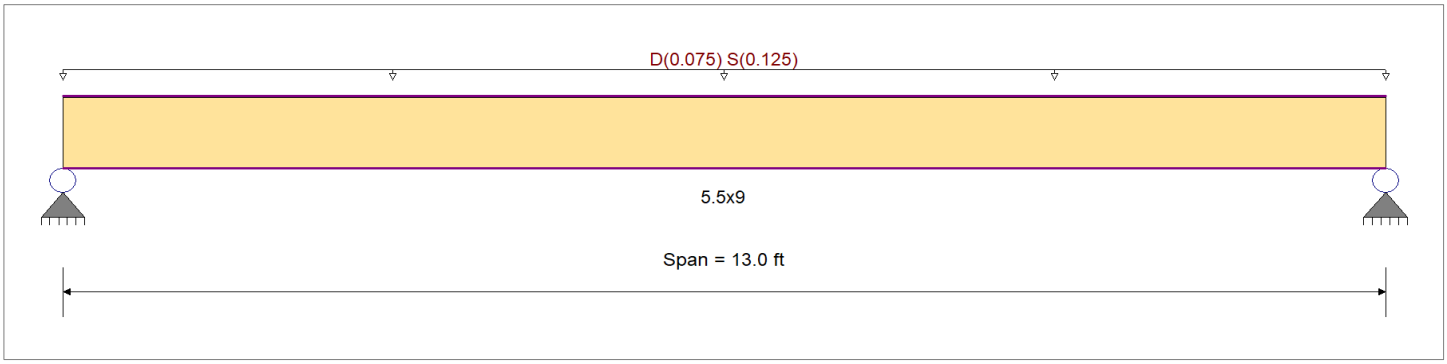
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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 = 5.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.247 : 1	Maximum Shear Stress Ratio	=	0.115 : 1
Section used for this span		5.5x9	Section used for this span		5.5x9
fb: Actual	=	682.83 psi	fv: Actual	=	35.08 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.500 ft	Location of maximum on span	=	12.288 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.134 in	Ratio =	1161 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.215 in	Ratio =	725 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.119	0.055	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.58	256.06	2160.00	0.43	13.16	238.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.247	0.115	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.23	682.83	2760.00	1.16	35.08	304.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.209	0.097	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.56	576.14	2760.00	0.98	29.60	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.040	0.019	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.95	153.64	3840.00	0.26	7.89	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2149	6.547		0.0000	0.000

Wood Beam

DESCRIPTION: STUB HIP MASTER (Reactions ONLY)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.300	1.300
Overall MINimum	0.813	0.813
D Only	0.488	0.488
+D+S	1.300	1.300
+D+0.750S	1.097	1.097
+0.60D	0.293	0.293
S Only	0.813	0.813

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: MONO GIRDER TRUSS (Reactions ONLY)

CODE REFERENCES

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

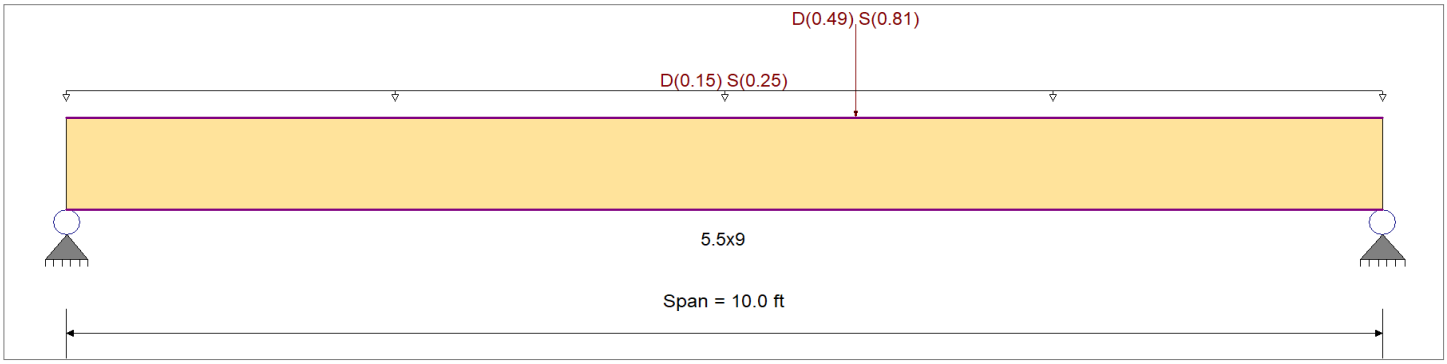
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species :	DF/DF
Wood Grade :	24F-V4
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 10.0 ft, (ROOF)
Point Load : D = 0.490, S = 0.810 k @ 6.0 ft, (S.H.M.)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.471 : 1	Maximum Shear Stress Ratio	=	0.252 : 1
Section used for this span		5.5x9	Section used for this span		5.5x9
fb: Actual	=	1,300.54 psi	fv: Actual	=	76.78 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.985 ft	Location of maximum on span	=	9.270 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.140 in	Ratio =	856	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.229 in	Ratio =	525	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.232	0.125	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.10	501.69	2160.00	0.98	29.71	238.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.471	0.252	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.05	1,300.54	2760.00	2.53	76.78	304.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.399	0.213	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.81	1,100.83	2760.00	2.15	65.01	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.078	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.86	301.01	3840.00	0.59	17.82	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2285	5.109		0.0000	0.000

Wood Beam

DESCRIPTION: MONO GIRDER TRUSS (Reactions ONLY)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.574	2.834
Overall MINimum	1.574	1.736
D Only	1.000	1.098
+D+S	2.574	2.834
+D+0.750S	2.180	2.400
+0.60D	0.600	0.659
S Only	1.574	1.736

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

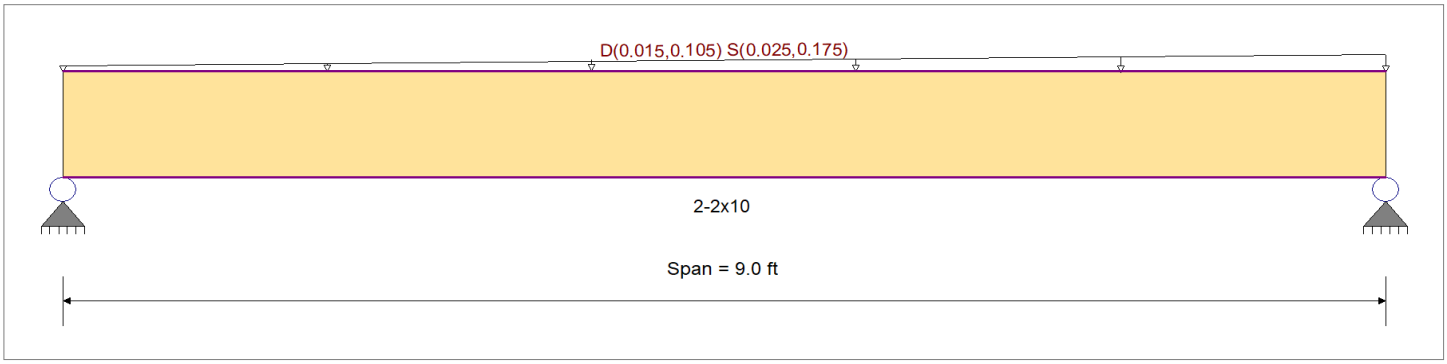
DESCRIPTION: BM#1

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	850 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	850 psi	Ebend- xx	1300 ksi
		Fc - Prll	1300 psi	Eminbend - xx	470 ksi
Wood Species :	Hem-Fir	Fc - Perp	405 psi		
Wood Grade :	No.2	Fv	150 psi		
		Ft	525 psi	Density	26.84 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 NOT internally calculated and added
Load for Span Number 1
Varying Uniform Load : D= 0.0150->0.0150, S= 0.0250->0.0250 ksf, Extent = 0.0 -->> 9.0 ft, Trib Width = 1.0->7.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.429 : 1	Maximum Shear Stress Ratio	=	0.218 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
fb: Actual	=	461.29 psi	fv: Actual	=	37.63 psi
Fb: Allowable	=	1,075.25 psi	Fv: Allowable	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	5.026 ft	Location of maximum on span	=	8.245 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.058 in	Ratio =	1869 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.092 in	Ratio =	1168 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.206	0.105	0.90	1.100	1.00	1.00	1.00	1.00	1.00	0.62	172.98	841.50	0.26	14.11	135.00
+D+S					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.429	0.218	1.15	1.100	1.00	1.00	1.00	1.00	1.00	1.64	461.29	1075.25	0.70	37.63	172.50
+D+0.750S					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.362	0.184	1.15	1.100	1.00	1.00	1.00	1.00	1.00	1.39	389.22	1075.25	0.59	31.75	172.50
+0.60D					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.069	0.035	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.37	103.79	1496.00	0.16	8.47	240.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: BM#1

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0924	4.631		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.540	0.900
Overall MINimum	0.338	0.563
D Only	0.203	0.338
+D+S	0.540	0.900
+D+0.750S	0.456	0.759
+0.60D	0.122	0.203
S Only	0.338	0.563

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 | CK Engineering LLC | (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#2

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

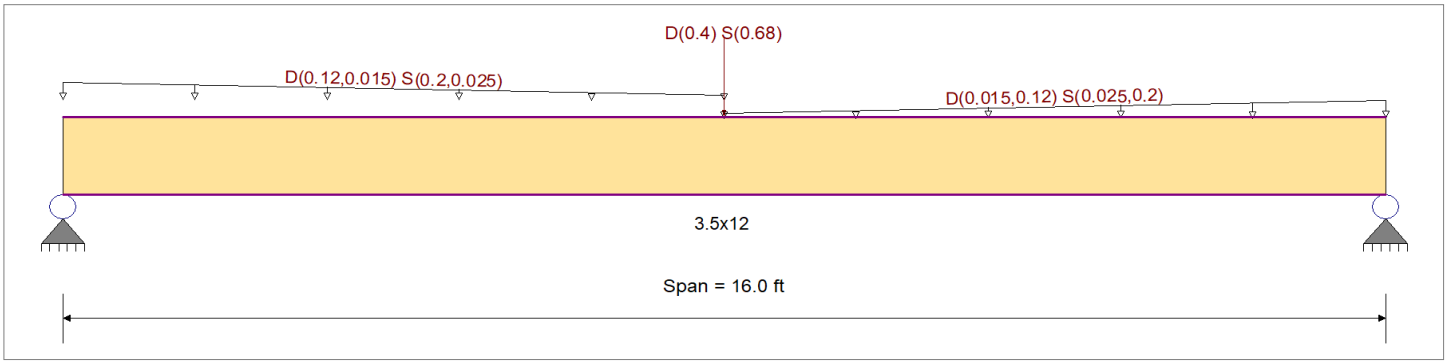
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1

Varying Uniform Load : D= 0.0150->0.0150, S= 0.0250->0.0250 ksf, Extent = 8.0 -->> 16.0 ft, Trib Width = 1.0->8.0 ft, (ROOF)

Varying Uniform Load : D= 0.0150->0.0150, S= 0.0250->0.0250 ksf, Extent = 0.0 -->> 8.0 ft, Trib Width = 8.0->1.0 ft, (ROOF)

Point Load : D = 0.40, S = 0.680 k @ 8.0 ft, (BM#1)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.444 : 1	Maximum Shear Stress Ratio	=	0.197 : 1
Section used for this span		3.5x12	Section used for this span		3.5x12
fb: Actual	=	1,226.67 psi	fv: Actual	=	59.99 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	8.000 ft	Location of maximum on span	=	15.007 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.255 in	Ratio =	752 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.407 in	Ratio =	472 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.212	0.094	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.20	457.14	2160.00	0.63	22.41	238.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.444	0.197	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.59	1,226.67	2760.00	1.68	59.99	304.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.375	0.166	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.24	1,034.29	2760.00	1.42	50.59	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.071	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.92	274.29	3840.00	0.38	13.44	424.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4067	8.058		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.980	1.980
Overall MINimum	1.240	1.240
D Only	0.740	0.740
+D+S	1.980	1.980
+D+0.750S	1.670	1.670
+0.60D	0.444	0.444
S Only	1.240	1.240

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: BM#3

CODE REFERENCES

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

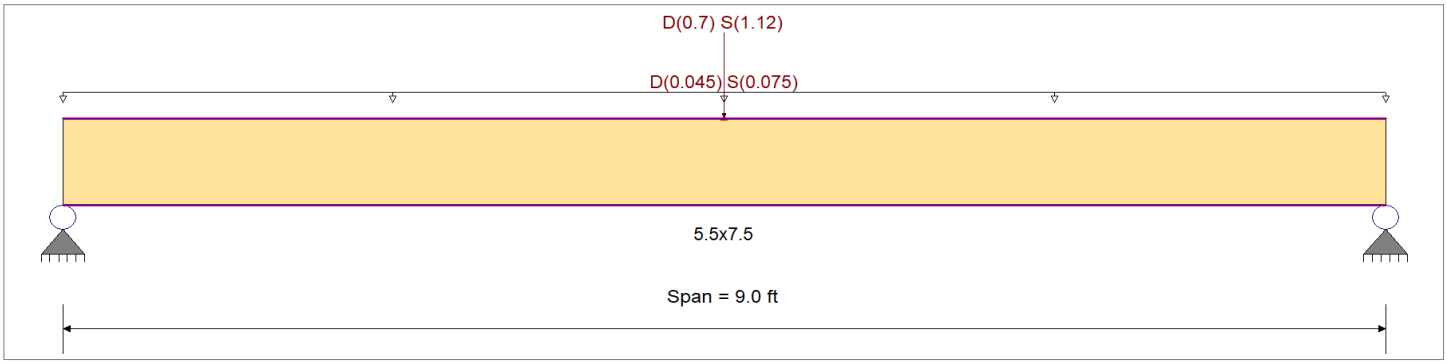
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species :	DF/DF
Wood Grade :	24F-V4
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 3.0 ft, (ROOF)
Point Load : D = 0.70, S = 1.120 k @ 4.50 ft, (BM#1)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.448 : 1	Maximum Shear Stress Ratio	=	0.164 : 1
Section used for this span		5.5x7.5	Section used for this span		5.5x7.5
fb: Actual	=	1,235.78 psi	fv: Actual	=	50.00 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.500 ft	Location of maximum on span	=	8.376 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.117 in	Ratio =	923 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.189 in	Ratio =	570 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.219	0.080	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.03	472.58	2160.00	0.52	19.07	238.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.448	0.164	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.31	1,235.78	2760.00	1.38	50.00	304.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.379	0.139	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.49	1,044.98	2760.00	1.16	42.27	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.074	0.027	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.22	283.55	3840.00	0.31	11.44	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1892	4.533		0.0000	0.000

Wood Beam

DESCRIPTION: BM#3

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.450	1.450
Overall MINimum	0.898	0.898
D Only	0.553	0.553
+D+S	1.450	1.450
+D+0.750S	1.226	1.226
+0.60D	0.332	0.332
S Only	0.898	0.898

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#4

CODE REFERENCES

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

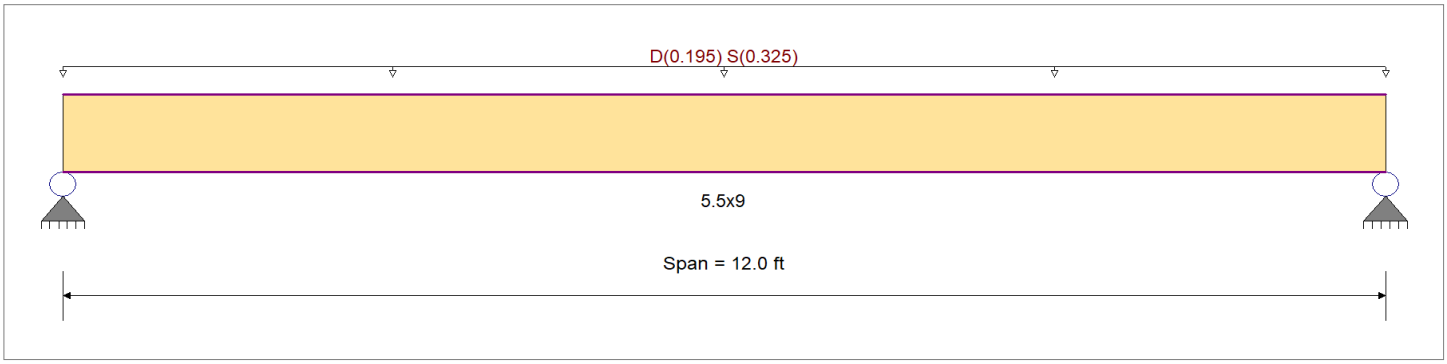
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species :	DF/DF
Wood Grade :	24F-V4
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 13.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.548 : 1	Maximum Shear Stress Ratio	=	0.272 : 1
Section used for this span		5.5x9	Section used for this span		5.5x9
fb: Actual	=	1,512.73 psi	fv: Actual	=	82.81 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.254 in	Ratio =	567 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.406 in	Ratio =	354 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.263	0.130	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.51	567.27	2160.00	1.02	31.06	238.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.548	0.272	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.36	1,512.73	2760.00	2.73	82.81	304.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.462	0.229	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.90	1,276.36	2760.00	2.31	69.87	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.089	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.11	340.36	3840.00	0.61	18.63	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4057	6.044		0.0000	0.000

Wood Beam

DESCRIPTION: BM#4

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.120	3.120
Overall MINimum	1.950	1.950
D Only	1.170	1.170
+D+S	3.120	3.120
+D+0.750S	2.633	2.633
+0.60D	0.702	0.702
S Only	1.950	1.950

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

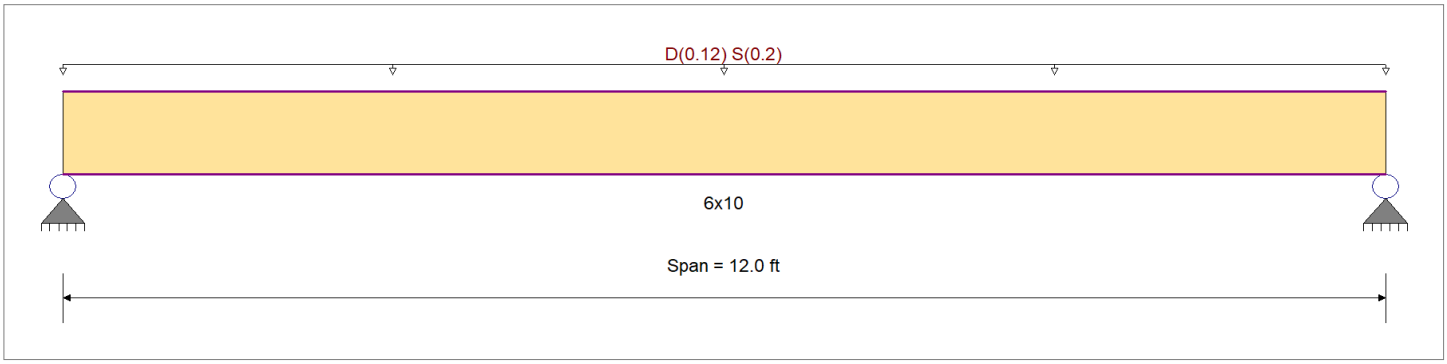
DESCRIPTION: BM#4.1

CODE REFERENCES

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

Material Properties

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

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.830 : 1	Maximum Shear Stress Ratio	=	0.245 : 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	835.50 psi	fv: Actual	=	47.88 psi
Fb: Allowable	=	1,006.25 psi	Fv: Allowable	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.184 in	Ratio =	783 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.294 in	Ratio =	489 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.398	0.117	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.16	313.31	787.50	0.63	17.95	153.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.830	0.245	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.76	835.50	1006.25	1.67	47.88	195.50
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.701	0.207	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.86	704.95	1006.25	1.41	40.40	195.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.134	0.040	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.30	187.99	1400.00	0.38	10.77	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2940	6.044		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: BM#4.1

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.920	1.920
Overall MINimum	1.200	1.200
D Only	0.720	0.720
+D+S	1.920	1.920
+D+0.750S	1.620	1.620
+0.60D	0.432	0.432
S Only	1.200	1.200

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: BM#5

CODE REFERENCES

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

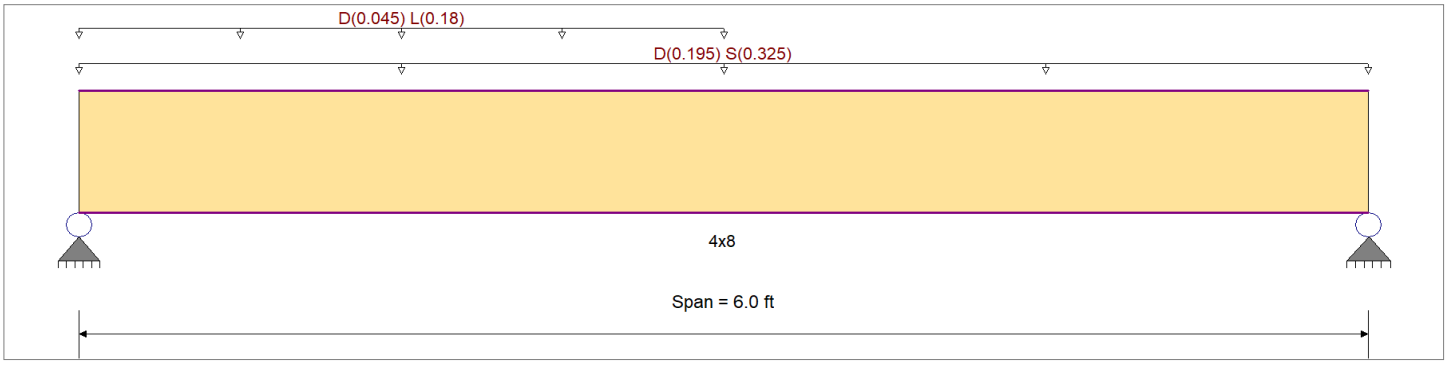
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species :	Douglas Fir-Larch (North)
Wood Grade :	No.2
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

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

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 13.0 ft, (ROOF)
Uniform Load : D = 0.0150, L = 0.060 ksf, Extent = 0.0 -->> 3.0 ft, Tributary Width = 3.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.738 : 1	Maximum Shear Stress Ratio	=	0.414 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	965.31 psi	fv: Actual	=	80.89 psi
Fb: Allowable	=	1,308.13 psi	Fv: Allowable	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	2.934 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.066 in	Ratio =	1091 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.111 in	Ratio =	647 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.384	0.215	0.90	1.300	1.00	1.00	1.00	1.00	1.00	1.01	393.45	1023.75	0.56	32.95	153.00
+D+L					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.496	0.298	1.00	1.300	1.00	1.00	1.00	1.00	1.00	1.44	564.15	1137.50	0.86	50.60	170.00
+D+S					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.738	0.405	1.15	1.300	1.00	1.00	1.00	1.00	1.00	2.47	965.31	1308.13	1.34	79.22	195.50
+D+0.750L					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.366	0.217	1.25	1.300	1.00	1.00	1.00	1.00	1.00	1.33	520.80	1421.88	0.78	46.18	212.50
+D+0.750L+0.750S					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.723	0.414	1.15	1.300	1.00	1.00	1.00	1.00	1.00	2.42	946.42	1308.13	1.37	80.89	195.50
+0.60D					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.130	0.073	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.60	236.07	1820.00	0.33	19.77	272.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: BM#5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1112	3.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.737	1.610
Overall MINimum	0.975	0.975
D Only	0.702	0.635
+D+L	1.107	0.770
+D+S	1.677	1.610
+D+0.750L	1.006	0.736
+D+0.750L+0.750S	1.737	1.467
+0.60D	0.421	0.381
L Only	0.405	0.135
S Only	0.975	0.975

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#6

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

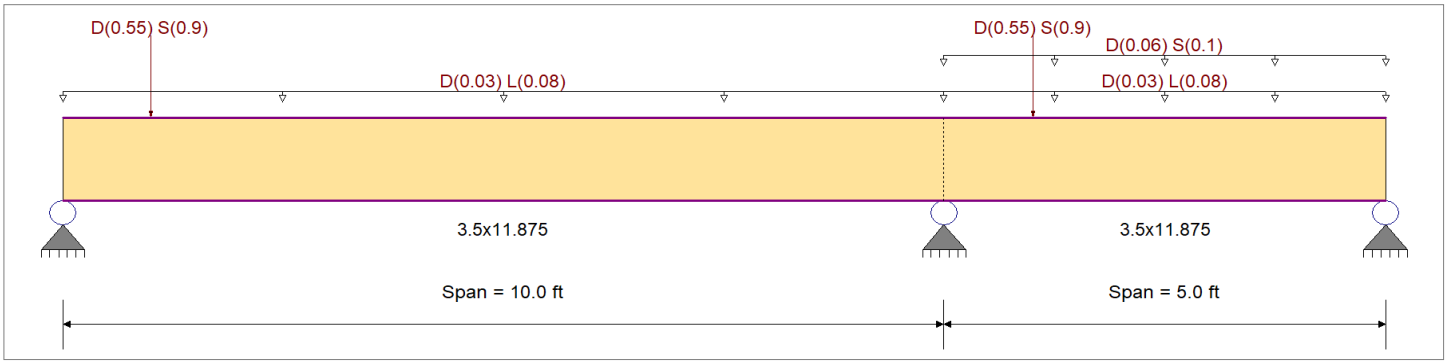
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

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

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 2.0 ft, (FLOOR)
Point Load : D = 0.550, S = 0.90 k @ 1.0 ft, (BM#3)
Load for Span Number 2
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 2.0 ft, (FLOOR)
Point Load : D = 0.550, S = 0.90 k @ 1.0 ft, (BM#3)
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 4.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.079 : 1	Maximum Shear Stress Ratio	=	0.189 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
fb: Actual	=	263.25 psi	fv: Actual	=	63.10 psi
Fb: Allowable	=	3,335.00 psi	Fv: Allowable	=	333.50 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+S
Location of maximum on span	=	10.000 ft	Location of maximum on span	=	10.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.010 in	Ratio =	11567 >=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.001 in	Ratio =	56214 >=360	Span: 2 : L Only
Max Downward Total Deflection	0.019 in	Ratio =	6446 >=240	Span: 2 : +D+S
Max Upward Total Deflection	-0.001 in	Ratio =	89835 >=240	Span: 2 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.044	0.104	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.78	113.67	2610.00	0.75	27.16	261.00
Length = 5.0 ft	2	0.044	0.104	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.78	113.67	2610.00	0.75	27.16	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.077	0.127	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.53	223.08	2900.00	1.02	36.97	290.00
Length = 5.0 ft	2	0.077	0.127	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.53	223.08	2900.00	1.02	36.97	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#6

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
Length = 10.0 ft	**1**	0.061	0.189	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.40	203.70	3335.00	1.75	63.10	333.50
Length = 5.0 ft	**2**	0.061	0.189	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.40	203.70	3335.00	1.75	63.10	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	**1**	0.054	0.095	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.34	195.73	3625.00	0.96	34.52	362.50
Length = 5.0 ft	**2**	0.054	0.095	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.34	195.73	3625.00	0.96	34.52	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	**1**	0.079	0.184	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.80	263.25	3335.00	1.70	61.47	333.50
Length = 5.0 ft	**2**	0.079	0.184	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.80	263.25	3335.00	1.70	61.47	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	**1**	0.015	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.47	68.20	4640.00	0.45	16.30	464.00
Length = 5.0 ft	**2**	0.015	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.47	68.20	4640.00	0.45	16.30	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0186	3.966		0.0000	0.000
+D+S	2	0.0029	2.570	L Only	-0.0005	0.419

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.437	2.754	0.518
Overall MINimum	0.748	1.245	0.307
D Only	0.632	1.201	0.212
+D+L	0.957	2.026	0.262
+D+S	1.380	2.446	0.518
+D+0.750L	0.876	1.820	0.249
+D+0.750L+0.750S	1.437	2.754	0.479
+0.60D	0.379	0.721	0.127
L Only	0.325	0.825	0.050
S Only	0.748	1.245	0.307

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#7

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

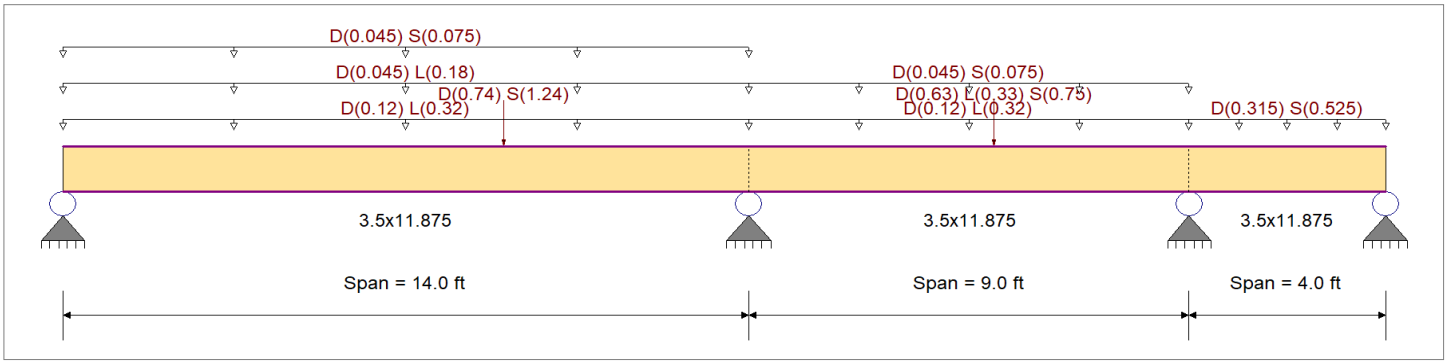
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

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

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
- Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLOOR)
- Point Load : D = 0.740, S = 1.240 k @ 9.0 ft, (BM#2)
- Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 3.0 ft, (DECK)
- Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 3.0 ft, (ROOF)

Load for Span Number 2
- Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLOOR)
- Point Load : D = 0.630, L = 0.330, S = 0.750 k @ 5.0 ft, (BM#6)
- Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 3.0 ft, (ROOF)

Load for Span Number 3
- Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 21.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.734 : 1	Maximum Shear Stress Ratio	=	0.734 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
fb: Actual	=	2,128.15 psi	fv: Actual	=	212.87 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	14.000 ft	Location of maximum on span	=	13.059 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.254 in	Ratio =	662 >=360	Span: 3 : S Only
Max Upward Transient Deflection	-0.029 in	Ratio =	3737 >=360	Span: 2 : L Only
Max Downward Total Deflection	0.409 in	Ratio =	410 >=240	Span: 3 : +D+0.750L+0.750S
Max Upward Total Deflection	-0.045 in	Ratio =	2374 >=240	Span: 2 : +D+0.750L+0.750S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 14.0 ft	1	0.311	0.308	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.56	811.31	2610.00	2.22	80.27	261.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: BM#7

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 9.0 ft	**2**	0.311	0.308	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.56	811.31	2610.00	1.49	80.27	261.00
Length = 4.0 ft	**3**	0.029	0.308	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.52	76.47	2610.00	0.41	80.27	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.0 ft	**1**	0.734	0.734	1.00	1.000	1.00	1.00	1.00	1.00	1.00	14.59	2,128.15	2900.00	5.90	212.87	290.00
Length = 9.0 ft	**2**	0.734	0.734	1.00	1.000	1.00	1.00	1.00	1.00	1.00	14.59	2,128.15	2900.00	3.82	212.87	290.00
Length = 4.0 ft	**3**	0.038	0.734	1.00	1.000	1.00	1.00	1.00	1.00	1.00	0.76	111.50	2900.00	0.39	212.87	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.0 ft	**1**	0.409	0.405	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.36	1,364.91	3335.00	3.75	135.22	333.50
Length = 9.0 ft	**2**	0.409	0.405	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.36	1,364.91	3335.00	2.46	135.22	333.50
Length = 4.0 ft	**3**	0.060	0.405	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.37	199.71	3335.00	1.05	135.22	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.0 ft	**1**	0.496	0.496	1.25	1.000	1.00	1.00	1.00	1.00	1.00	12.33	1,798.94	3625.00	4.98	179.72	362.50
Length = 9.0 ft	**2**	0.496	0.496	1.25	1.000	1.00	1.00	1.00	1.00	1.00	12.33	1,798.94	3625.00	3.24	179.72	362.50
Length = 4.0 ft	**3**	0.028	0.496	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.70	102.12	3625.00	0.36	179.72	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.0 ft	**1**	0.664	0.662	1.15	1.000	1.00	1.00	1.00	1.00	1.00	15.18	2,214.13	3335.00	6.12	220.93	333.50
Length = 9.0 ft	**2**	0.664	0.662	1.15	1.000	1.00	1.00	1.00	1.00	1.00	15.18	2,214.13	3335.00	3.97	220.93	333.50
Length = 4.0 ft	**3**	0.058	0.662	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.33	193.59	3335.00	0.80	220.93	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.0 ft	**1**	0.105	0.104	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.34	486.79	4640.00	1.33	48.16	464.00
Length = 9.0 ft	**2**	0.105	0.104	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.34	486.79	4640.00	0.90	48.16	464.00
Length = 4.0 ft	**3**	0.010	0.104	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.31	45.88	4640.00	0.24	48.16	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.4090	6.588		0.0000	0.000
	2	0.0000	6.588	+D+0.750L+0.750S	-0.0455	2.420
+D+0.750L+0.750S	3	0.0039	2.050		0.0000	2.420

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	4.283	11.172	2.828	1.528
Overall MINimum	0.697	2.638	1.539	0.942
D Only	1.428	4.102	1.290	0.586
+D+L	4.283	10.891	1.734	0.708
+D+S	2.125	6.740	2.828	1.528
+D+0.750L	3.570	9.193	1.623	0.678
+D+0.750L+0.750S	4.092	11.172	2.777	1.384
+0.60D	0.857	2.461	0.774	0.352
L Only	2.855	6.788	0.445	0.122
S Only	0.697	2.638	1.539	0.942

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#8

CODE REFERENCES

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

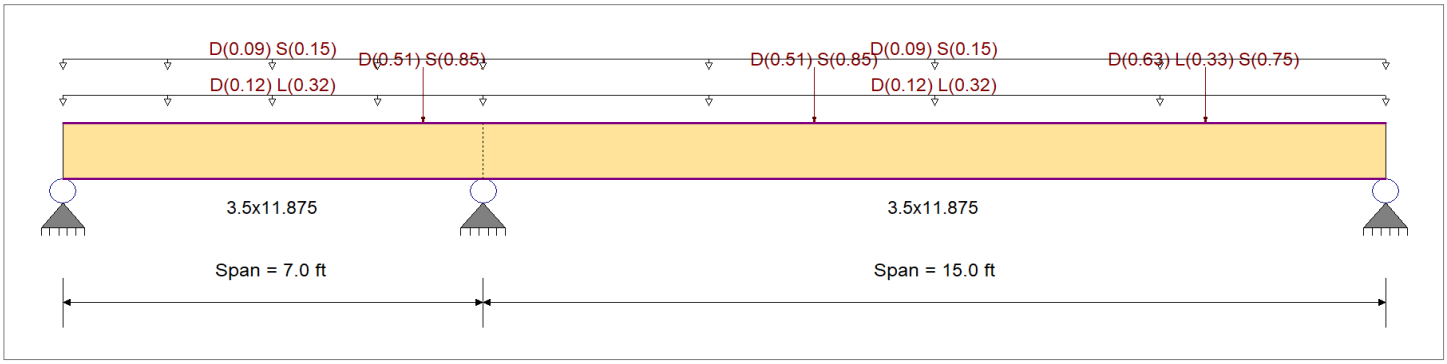
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species	: iLevel Truss Joist
Wood Grade	: Parallam PSL 2.0E
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
- Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLOOR)
- Point Load : D = 0.510, S = 0.850 k @ 6.0 ft, (HDR#1)
- Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 6.0 ft, (ROOF)

Load for Span Number 2
- Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLOOR)
- Point Load : D = 0.510, S = 0.850 k @ 5.50 ft, (HDR#1)
- Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 6.0 ft, (ROOF)
- Point Load : D = 0.630, L = 0.330, S = 0.750 k @ 12.0 ft, (BM#6)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.704 : 1	Maximum Shear Stress Ratio	=	0.636 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
fb: Actual	=	2,346.88 psi	fv: Actual	=	211.96 psi
Fb: Allowable	=	3,335.00 psi	Fv: Allowable	=	333.50 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	7.000 ft	Location of maximum on span	=	7.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.225 in	Ratio =	801	>=360	Span: 2 : L Only
Max Upward Transient Deflection	-0.023 in	Ratio =	3693	>=360	Span: 1 : L Only
Max Downward Total Deflection	0.511 in	Ratio =	352	>=240	Span: 2 : +D+0.750L+0.750S
Max Upward Total Deflection	-0.053 in	Ratio =	1576	>=240	Span: 1 : +D+0.750L+0.750S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.360	0.324	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.45	940.63	2610.00	2.35	84.66	261.00
Length = 15.0 ft	2	0.360	0.324	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.45	940.63	2610.00	2.35	84.66	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.681	0.621	1.00	1.000	1.00	1.00	1.00	1.00	1.00	13.53	1,974.05	2900.00	4.99	180.06	290.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#8

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 15.0 ft	**2**	0.681	0.621	1.00	1.000	1.00	1.00	1.00	1.00	1.00	13.53	1,974.05	2900.00	4.99	180.06	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	**1**	0.534	0.477	1.15	1.000	1.00	1.00	1.00	1.00	1.00	12.22	1,782.22	3335.00	4.41	159.00	333.50
Length = 15.0 ft	**2**	0.534	0.477	1.15	1.000	1.00	1.00	1.00	1.00	1.00	12.22	1,782.22	3335.00	4.41	159.00	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	**1**	0.473	0.431	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.76	1,715.69	3625.00	4.33	156.21	362.50
Length = 15.0 ft	**2**	0.473	0.431	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.76	1,715.69	3625.00	4.33	156.21	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	**1**	0.704	0.636	1.15	1.000	1.00	1.00	1.00	1.00	1.00	16.09	2,346.88	3335.00	5.87	211.96	333.50
Length = 15.0 ft	**2**	0.704	0.636	1.15	1.000	1.00	1.00	1.00	1.00	1.00	16.09	2,346.88	3335.00	5.87	211.96	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	**1**	0.122	0.109	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.87	564.38	4640.00	1.41	50.80	464.00
Length = 15.0 ft	**2**	0.122	0.109	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.87	564.38	4640.00	1.41	50.80	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+0.750L+0.750S	-0.0533	4.419
+D+0.750L+0.750S	2	0.5106	8.296		0.0000	4.419

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.245	11.700	4.817
Overall MINimum	0.108	4.276	1.652
D Only	-0.068	4.690	1.934
+D+L	0.040	9.761	4.125
+D+S	-0.245	8.966	3.586
+D+0.750L	0.013	8.493	3.578
+D+0.750L+0.750S	-0.120	11.700	4.817
+0.60D	-0.041	2.814	1.160
L Only	0.108	5.070	2.192
S Only	-0.178	4.276	1.652

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#9

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

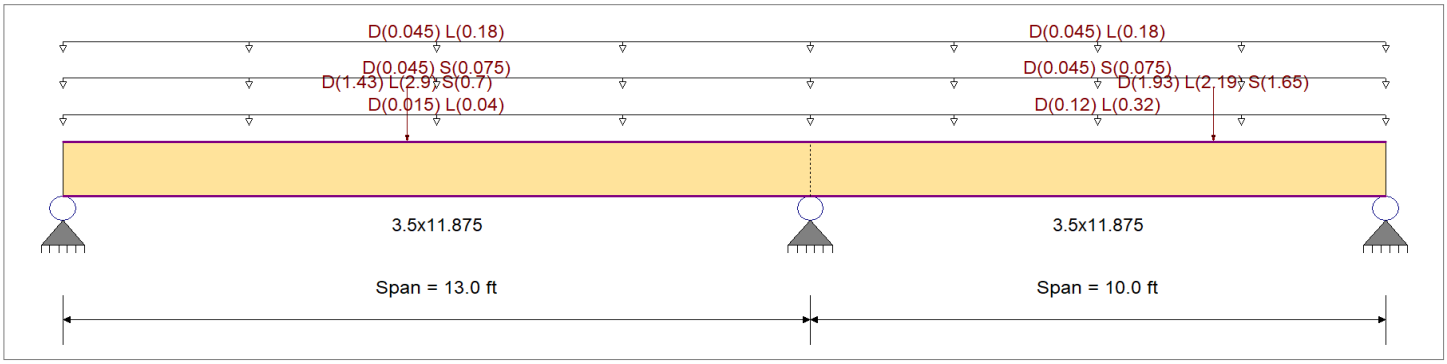
Wood Species : iLevel Truss Joist
Wood Grade : Parallam PSL 2.0E

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

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
- Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.0 ft, (FLOOR)
- Point Load : D = 1.430, L = 2.90, S = 0.70 k @ 6.0 ft, (BM#7)
- Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 3.0 ft, (ROOF)
- Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 3.0 ft, (DECK)

Load for Span Number 2
- Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 8.0 ft, (FLOOR)
- Point Load : D = 1.930, L = 2.190, S = 1.650 k @ 7.0 ft, (BM#8)
- Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 3.0 ft, (ROOF)
- Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 3.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.814 : 1	Maximum Shear Stress Ratio	=	0.720 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
fb: Actual	=	2,361.60 psi	fv: Actual	=	208.72 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	13.000 ft	Location of maximum on span	=	13.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.188 in	Ratio =	829 >=360	Span: 2 : L Only
Max Upward Transient Deflection	-0.002 in	Ratio =	65818 >=360	Span: 2 : L Only
Max Downward Total Deflection	0.278 in	Ratio =	560 >=240	Span: 2 : +D+0.750L+0.750S
Max Upward Total Deflection	-0.002 in	Ratio =	69183 >=240	Span: 2 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.317	0.283	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.67	827.83	2610.00	2.05	73.97	261.00
Length = 10.0 ft	2	0.317	0.283	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.67	827.83	2610.00	2.05	73.97	261.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#9

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	**1**	0.814	0.720	1.00	1.000	1.00	1.00	1.00	1.00	1.00	16.19	2,361.60	2900.00	5.78	208.72	290.00
Length = 10.0 ft	**2**	0.814	0.720	1.00	1.000	1.00	1.00	1.00	1.00	1.00	16.19	2,361.60	2900.00	5.78	208.72	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	**1**	0.389	0.343	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.89	1,297.05	3335.00	3.17	114.41	333.50
Length = 10.0 ft	**2**	0.389	0.343	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.89	1,297.05	3335.00	3.17	114.41	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	**1**	0.546	0.483	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.56	1,978.16	3625.00	4.85	175.03	362.50
Length = 10.0 ft	**2**	0.546	0.483	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.56	1,978.16	3625.00	4.85	175.03	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	**1**	0.699	0.616	1.15	1.000	1.00	1.00	1.00	1.00	1.00	15.97	2,330.07	3335.00	5.69	205.36	333.50
Length = 10.0 ft	**2**	0.699	0.616	1.15	1.000	1.00	1.00	1.00	1.00	1.00	15.97	2,330.07	3335.00	5.69	205.36	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	**1**	0.107	0.096	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.40	496.70	4640.00	1.23	44.38	464.00
Length = 10.0 ft	**2**	0.107	0.096	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.40	496.70	4640.00	1.23	44.38	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2783	5.737		0.0000	0.000
+D+0.750L+0.750S	2	0.1257	6.201	L Only	-0.0018	0.447

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	3.283	11.911	5.041
Overall MINimum	0.617	2.250	1.208
D Only	1.101	4.125	1.899
+D+L	3.283	11.911	4.880
+D+S	1.718	6.375	3.107
+D+0.750L	2.738	9.964	4.135
+D+0.750L+0.750S	3.200	11.652	5.041
+0.60D	0.660	2.475	1.139
L Only	2.183	7.786	2.982
S Only	0.617	2.250	1.208

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#10

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

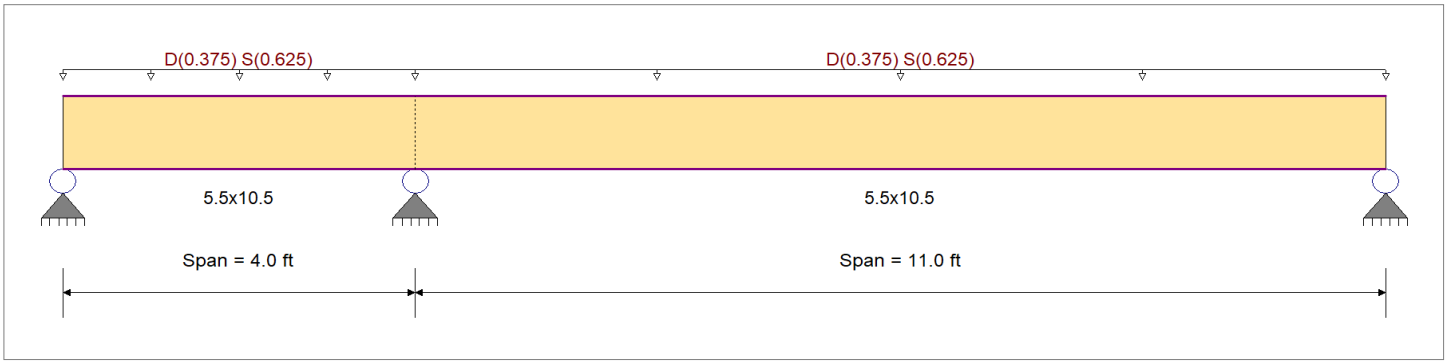
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 25.0 ft, (ROOF)
Load for Span Number 2
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 25.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.649 : 1	Maximum Shear Stress Ratio	=	0.486 : 1
Section used for this span		5.5x10.5	Section used for this span		5.5x10.5
fb: Actual	=	1,380.33 psi	fv: Actual	=	147.96 psi
Fb: Allowable	=	2,127.50 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	4.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.118 in	Ratio =	1115 >=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.010 in	Ratio =	4829 >=360	Span: 1 : S Only
Max Downward Total Deflection	0.189 in	Ratio =	697 >=240	Span: 2 : +D+S
Max Upward Total Deflection	-0.016 in	Ratio =	3018 >=240	Span: 1 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.311	0.233	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.36	517.63	1665.00	2.14	55.49	238.50
Length = 11.0 ft	2	0.311	0.233	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.36	517.63	1665.00	2.14	55.49	238.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.649	0.486	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.62	1,380.33	2127.50	5.70	147.96	304.75
Length = 11.0 ft	2	0.649	0.486	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.62	1,380.33	2127.50	5.70	147.96	304.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.547	0.410	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.81	1,164.66	2127.50	4.81	124.84	304.75
Length = 11.0 ft	2	0.547	0.410	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.81	1,164.66	2127.50	4.81	124.84	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#10

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
Length = 4.0 ft	**1**	0.105	0.079	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.62	310.58	2960.00	1.28	33.29	424.00
Length = 11.0 ft	**2**	0.105	0.079	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.62	310.58	2960.00	1.28	33.29	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.0159	2.436
+D+S	2	0.1893	6.084		0.0000	2.436

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.906	11.463	4.443
Overall MINimum	-0.340	7.164	2.777
D Only	-0.340	4.299	1.666
+D+S	-0.906	11.463	4.443
+D+0.750S	-0.765	9.672	3.749
+0.60D	-0.204	2.579	1.000
S Only	-0.566	7.164	2.777

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

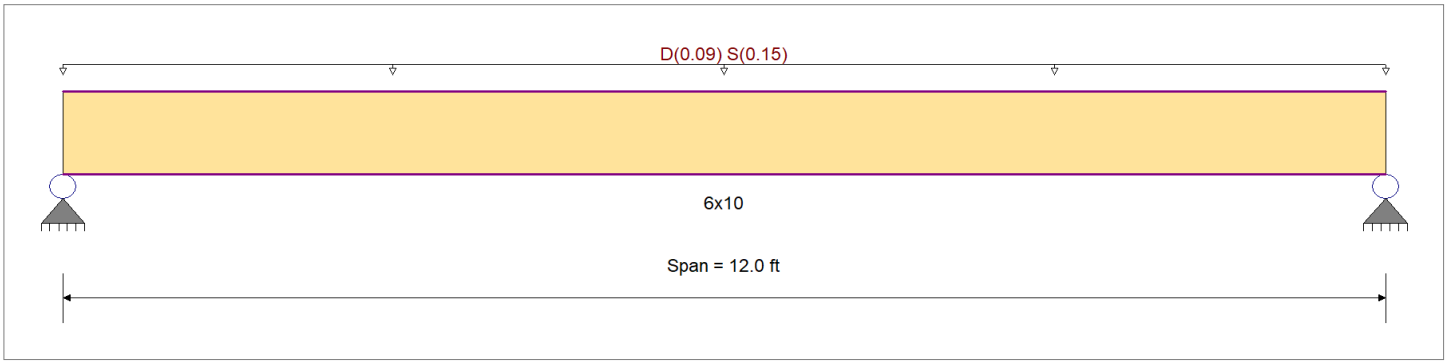
DESCRIPTION: BM#11

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	875 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	875 psi	Ebend- xx	1300 ksi
		Fc - Prll	600 psi	Eminbend - xx	470 ksi
Wood Species :	Douglas Fir-Larch (North)	Fc - Perp	625 psi		
Wood Grade :	No.2	Fv	170 psi		
		Ft	425 psi	Density	30.59 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 NOT internally calculated and added
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 6.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.623 : 1	Maximum Shear Stress Ratio	=	0.184 : 1
Section used for this span		6x10	Section used for this span		6x10
fb: Actual	=	626.62 psi	fv: Actual	=	35.91 psi
Fb: Allowable	=	1,006.25 psi	Fv: Allowable	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.138 in	Ratio =	1045 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.220 in	Ratio =	653 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.298	0.088	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.62	234.98	787.50	0.47	13.47	153.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.623	0.184	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.32	626.62	1006.25	1.25	35.91	195.50
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.525	0.155	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.65	528.71	1006.25	1.06	30.30	195.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.101	0.030	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.97	140.99	1400.00	0.28	8.08	272.00

Overall Maximum Deflections

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

Wood Beam

DESCRIPTION: BM#11

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

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

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#12

CODE REFERENCES

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

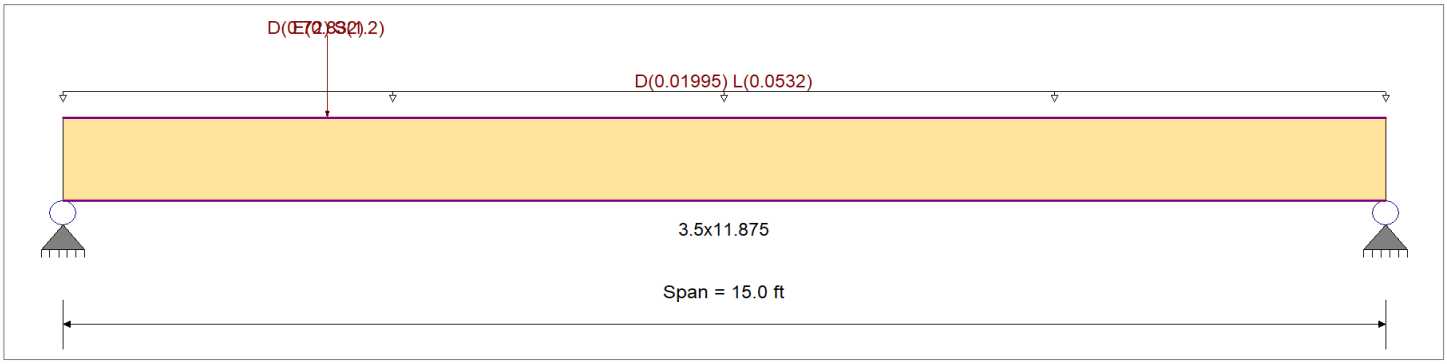
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species :	iLevel Truss Joist
Wood Grade :	Parallam PSL 2.0E
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.330 ft, (FLOOR)
Point Load : D = 0.720, S = 1.20 k @ 3.0 ft, (BM#4.1)
Point Load : E = 0.8320 k @ 3.0 ft, (SW6)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.388 : 1	Maximum Shear Stress Ratio	=	0.323 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
fb: Actual	=	1,801.74 psi	fv: Actual	=	150.10 psi
Fb: Allowable	=	4,640.00 psi	Fv: Allowable	=	464.00 psi
Load Combination		+1.148D+0.750L+0.750S+3.413E	Load Combination		+1.148D+0.750L+0.750S+3.413E
Location of maximum on span	=	3.011 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.087 in	Ratio =	2066	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.234 in	Ratio =	770	>=240	Span: 1 : +D+0.750L+0.750S+0.5250E
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.130	0.109	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.32	338.67	2610.00	0.79	28.54	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.182	0.142	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.62	528.60	2900.00	1.14	41.04	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.227	0.189	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.20	758.38	3335.00	1.75	63.18	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.132	0.105	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.27	477.24	3625.00	1.05	37.92	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.227	0.192	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.20	758.51	3335.00	1.77	63.90	333.50
+1.197D+4.550E					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#12

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 15.0 ft	1	0.373	0.309	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.86	1,729.61	4640.00	3.98	143.46	464.00
+1.148D+0.750L+0.750S+3.4					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.388	0.323	1.60	1.000	1.00	1.00	1.00	1.00	1.00	12.35	1,801.74	4640.00	4.16	150.10	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.044	0.037	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	203.20	4640.00	0.47	17.12	464.00
+0.4027D+4.550E					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.315	0.260	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.01	1,460.56	4640.00	3.35	120.79	464.00

Overall Maximum Deflections

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

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

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

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

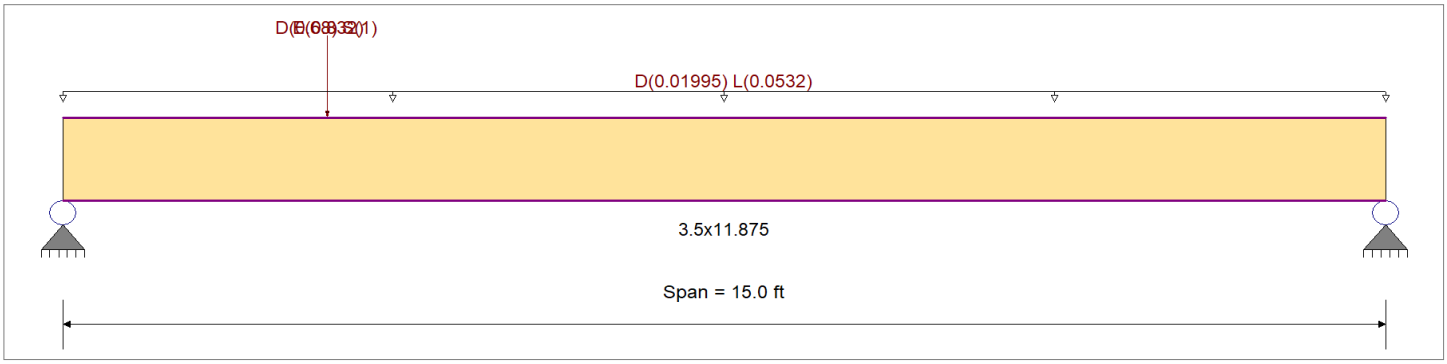
DESCRIPTION: BM#12.1

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,900.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290.0 psi		
		Ft	2,025.0 psi	Density	45.070 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 = 1.330 ft, (FLOOR)
Point Load : D = 0.680, S = 1.0 k @ 3.0 ft, (HDR#7)
Point Load : E = 0.8320 k @ 3.0 ft, (SW6)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.374 : 1	Maximum Shear Stress Ratio	=	0.311 : 1
Section used for this span		**3.5x11.875**	Section used for this span		**3.5x11.875**
fb: Actual	=	1,733.21 psi	fv: Actual	=	144.44 psi
Fb: Allowable	=	4,640.00 psi	Fv: Allowable	=	464.00 psi
Load Combination		+1.148D+0.750L+0.750S+3.413E	Load Combination		+1.148D+0.750L+0.750S+3.413E
Location of maximum on span	=	3.011 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.073 in	Ratio =	2480	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.220 in	Ratio =	818	>=240	Span: 1 : +D+0.750L+0.750S+0.5250E
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.125	0.105	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.23	324.96	2610.00	0.76	27.38	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.179	0.138	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.55	517.95	2900.00	1.11	39.89	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.202	0.169	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.62	674.43	3335.00	1.56	56.25	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.129	0.101	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.20	466.24	3625.00	1.02	36.76	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.208	0.175	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.76	693.73	3335.00	1.62	58.42	333.50
+1.197D+4.550E					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#12.1

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 15.0 ft	1	0.369	0.306	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.74	1,712.86	4640.00	3.94	142.08	464.00
+1.148D+0.750L+0.750S+3.4					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.374	0.311	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.88	1,733.21	4640.00	4.00	144.44	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.042	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.34	194.97	4640.00	0.46	16.43	464.00
+0.4027D+4.550E					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.314	0.259	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.97	1,454.92	4640.00	3.33	120.33	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E	1	0.2199	6.953		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.040	0.920
Overall MINimum	0.666	0.166
D Only	0.791	0.383
+D+L	1.190	0.782
+D+S	1.591	0.583
+D+0.750L	1.090	0.682
+D+0.750L+0.750S	1.690	0.832
+D+0.70E	1.257	0.500
+D+0.750L+0.750S+0.5250E	2.040	0.920
+0.60D	0.475	0.230
+0.60D+0.70E	0.941	0.346
L Only	0.399	0.399
S Only	0.800	0.200
E Only	0.666	0.166

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

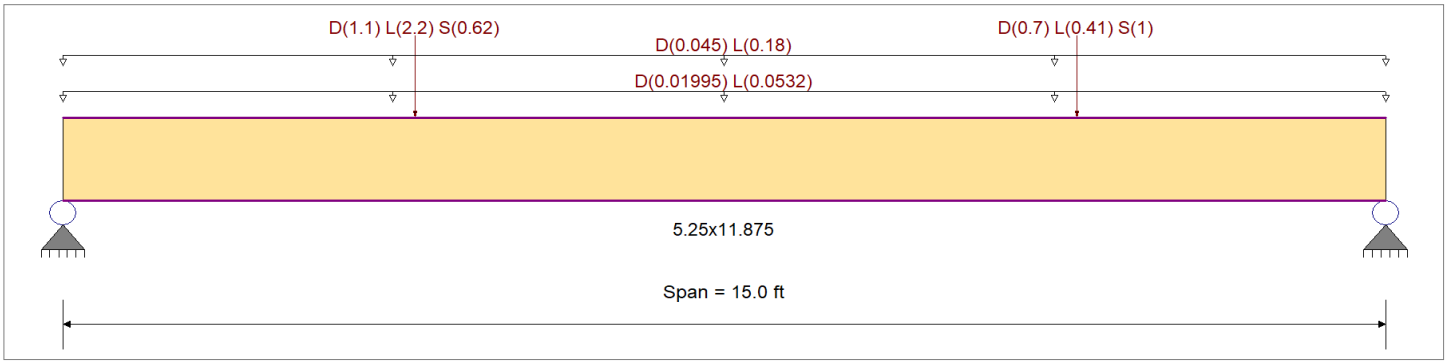
DESCRIPTION: BM#13

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,900.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290.0 psi		
		Ft	2,025.0 psi	Density	45.070 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 = 1.330 ft, (FLOOR)
Point Load : D = 1.10, L = 2.20, S = 0.620 k @ 4.0 ft, (BM#9)
Point Load : D = 0.70, L = 0.410, S = 1.0 k @ 11.50 ft, (BM#5)
Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 3.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.606 : 1	Maximum Shear Stress Ratio	=	0.394 : 1
Section used for this span		5.25x11.875	Section used for this span		5.25x11.875
fb: Actual	=	1,758.71 psi	fv: Actual	=	114.25 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.529 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.338 in	Ratio =	532 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.508 in	Ratio =	353 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.220	0.140	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.90	573.85	2610.00	1.52	36.58	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.606	0.394	1.00	1.000	1.00	1.00	1.00	1.00	1.00	18.08	1,758.71	2900.00	4.75	114.25	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.257	0.167	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.81	857.12	3335.00	2.31	55.63	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.403	0.262	1.25	1.000	1.00	1.00	1.00	1.00	1.00	15.04	1,462.33	3625.00	3.94	94.83	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	1	0.501	0.322	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.19	1,671.37	3335.00	4.46	107.25	333.50

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#13

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	**1**	0.148	0.094	1.60	1.000	1.00	1.00	1.00	1.00	1.00	7.06	687.05	4640.00	1.82	43.79	464.00
+1.148D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	**1**	0.379	0.243	1.60	1.000	1.00	1.00	1.00	1.00	1.00	18.06	1,756.26	4640.00	4.68	112.66	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	**1**	0.074	0.047	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.54	344.31	4640.00	0.91	21.95	464.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 15.0 ft	**1**	0.050	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.38	231.11	4640.00	0.61	14.73	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.5085	7.281		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.061	4.150
Overall MINimum	0.688	0.932
D Only	1.603	1.463
+D+L	5.061	4.113
+D+S	2.291	2.395
+D+0.750L	4.197	3.451
+D+0.750L+0.750S	4.713	4.150
+0.60D	0.962	0.878
L Only	3.458	2.650
S Only	0.688	0.932

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#14

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

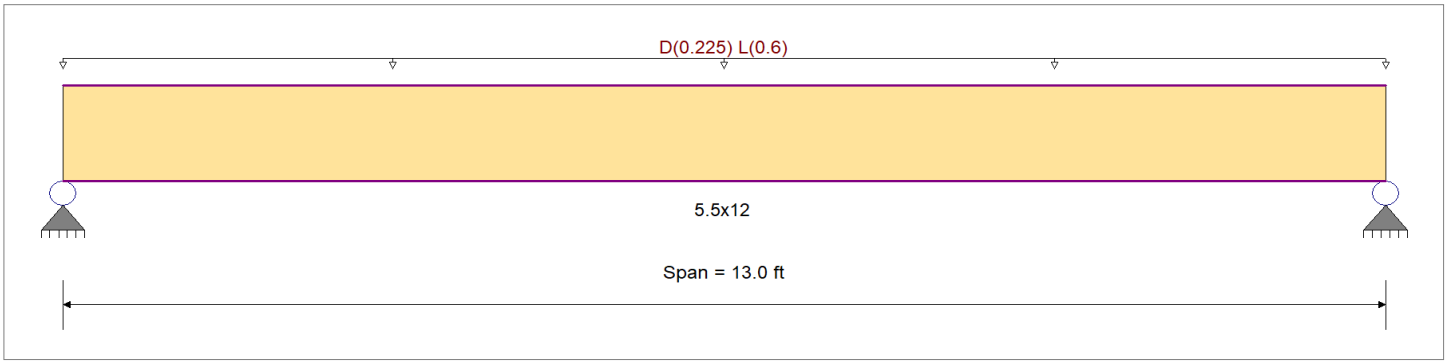
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 15.0 ft, (FLOOR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.672 : 1	Maximum Shear Stress Ratio	=	0.396 : 1
Section used for this span		5.5x12	Section used for this span		5.5x12
fb: Actual	=	1,611.85 psi	fv: Actual	=	104.98 psi
Fb: Allowable	=	2,400.00 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.500 ft	Location of maximum on span	=	12.004 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.272 in	Ratio =	573	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.381 in	Ratio =	409	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.213	0.126	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.06	459.57	2160.00	1.32	29.93	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.672	0.396	1.00	1.000	1.00	1.00	1.00	1.00	1.00	17.73	1,611.85	2400.00	4.62	104.98	265.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.441	0.260	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.56	1,323.78	3000.00	3.79	86.22	331.25
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.143	0.085	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.05	550.23	3840.00	1.58	35.84	424.00
+1.148D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.362	0.214	1.60	1.000	1.00	1.00	1.00	1.00	1.00	15.31	1,391.77	3840.00	3.99	90.65	424.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.072	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.03	275.74	3840.00	0.79	17.96	424.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#14

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
Length = 13.0 ft	**1**	0.048	0.028	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.04	185.09	3840.00	0.53	12.06	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3805	6.547		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.455	5.455
Overall MINimum	3.900	3.900
D Only	1.555	1.555
+D+L	5.455	5.455
+D+0.750L	4.480	4.480
+0.60D	0.933	0.933
L Only	3.900	3.900

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

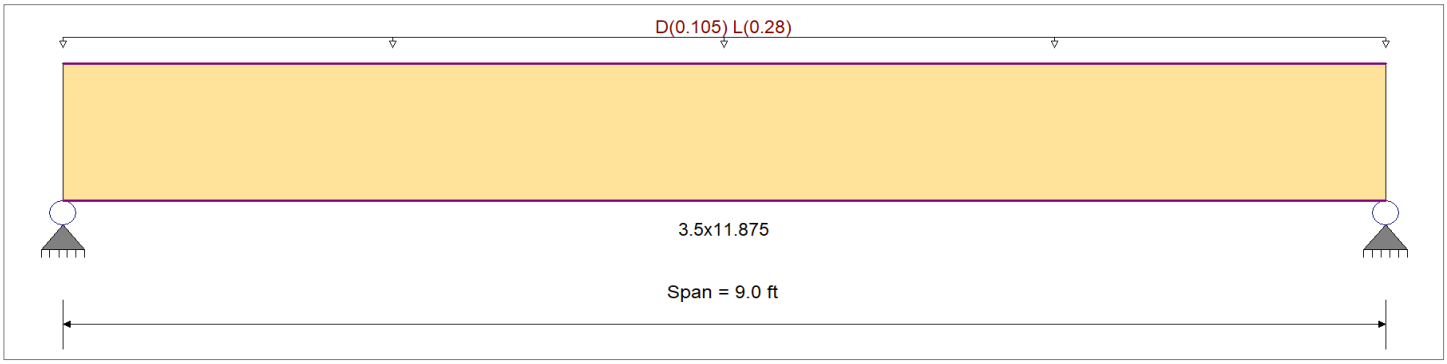
DESCRIPTION: BM#15

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2900 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	2900 psi	Ebend- xx	2000 ksi
		Fc - Prll	2900 psi	Eminbend - xx	1016.535 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290 psi		
		Ft	2025 psi	Density	45.07 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 = 7.0 ft, (FLOOR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.203 : 1	Maximum Shear Stress Ratio	=	0.174 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
fb: Actual	=	587.87 psi	fv: Actual	=	50.48 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.500 ft	Location of maximum on span	=	8.015 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.043 in	Ratio =	2537 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.061 in	Ratio =	1785 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.067	0.057	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.19	174.30	2610.00	0.41	14.97	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.203	0.174	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.03	587.87	2900.00	1.40	50.48	290.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.134	0.115	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.32	484.48	3625.00	1.15	41.61	362.50
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.045	0.039	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.43	208.69	4640.00	0.50	17.92	464.00
+1.148D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.110	0.094	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.50	510.27	4640.00	1.21	43.82	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.023	0.019	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.72	104.58	4640.00	0.25	8.98	464.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#15

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
Length = 9.0 ft	**1**	0.015	0.013	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.48	70.20	4640.00	0.17	6.03	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0605	4.533		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.791	1.791
Overall MINimum	1.260	1.260
D Only	0.531	0.531
+D+L	1.791	1.791
+D+0.750L	1.476	1.476
+0.60D	0.319	0.319
L Only	1.260	1.260

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#16

CODE REFERENCES

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

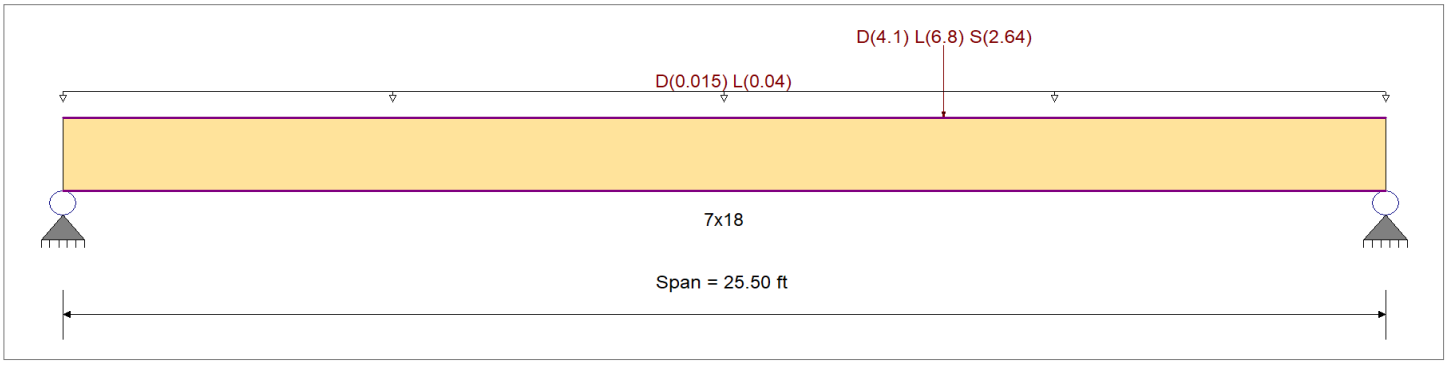
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species	: iLevel Truss Joist
Wood Grade	: Parallam PSL 2.0E
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.0 ft, (FLOOR)
Point Load : D = 4.10, L = 6.80, S = 2.640 k @ 17.0 ft, (BM#7)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.749 : 1	Maximum Shear Stress Ratio	=	0.342 : 1
Section used for this span		7x18	Section used for this span		7x18
fb: Actual	=	2,171.08 psi	fv: Actual	=	99.17 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	16.938 ft	Location of maximum on span	=	24.011 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.572 in	Ratio =	535 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.966 in	Ratio =	316 >=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.330	0.153	0.90	1.000	1.00	1.00	1.00	1.00	1.00	27.10	860.18	2610.00	3.35	39.84	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.749	0.342	1.00	1.000	1.00	1.00	1.00	1.00	1.00	68.39	2,171.08	2900.00	8.33	99.17	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.400	0.182	1.15	1.000	1.00	1.00	1.00	1.00	1.00	42.00	1,333.37	3335.00	5.11	60.79	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.509	0.233	1.25	1.000	1.00	1.00	1.00	1.00	1.00	58.07	1,843.36	3625.00	7.08	84.34	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.659	0.300	1.15	1.000	1.00	1.00	1.00	1.00	1.00	69.24	2,198.25	3335.00	8.40	100.05	333.50
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.222	0.103	1.60	1.000	1.00	1.00	1.00	1.00	1.00	32.44	1,029.86	4640.00	4.01	47.70	464.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#16

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.148D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	**1**	0.501	0.228	1.60	1.000	1.00	1.00	1.00	1.00	1.00	73.25	2,325.51	4640.00	8.90	105.94	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	**1**	0.111	0.052	1.60	1.000	1.00	1.00	1.00	1.00	1.00	16.26	516.11	4640.00	2.01	23.90	464.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	**1**	0.075	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.91	346.43	4640.00	1.35	16.04	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.9657	13.774		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.837	8.530
Overall MINimum	0.880	1.760
D Only	2.061	3.427
+D+L	4.837	8.471
+D+S	2.941	5.187
+D+0.750L	4.143	7.210
+D+0.750L+0.750S	4.803	8.530
+0.60D	1.236	2.056
L Only	2.777	5.043
S Only	0.880	1.760

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 | CK Engineering LLC | (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#17

CODE REFERENCES

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

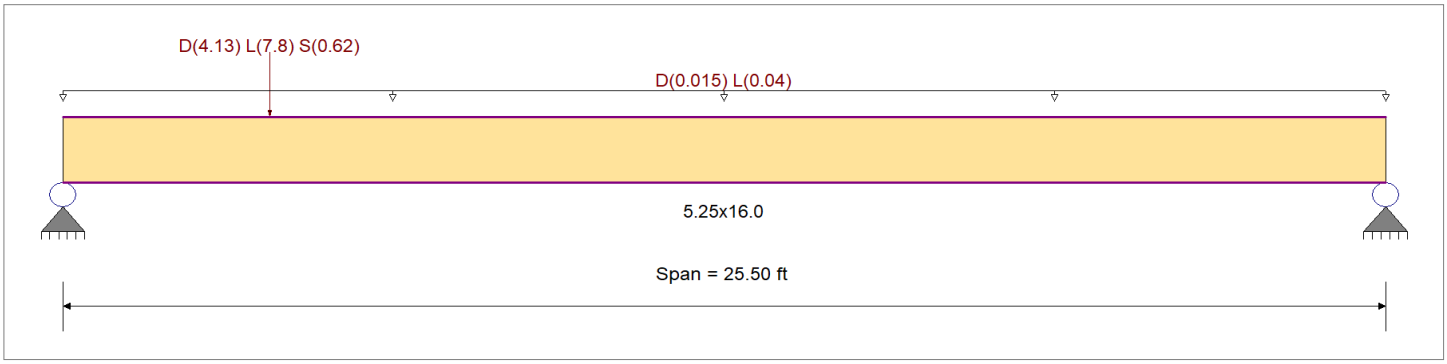
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species	: iLevel Truss Joist
Wood Grade	: Parallam PSL 2.0E
Beam Bracing	: Beam is Fully Braced against lateral-torsional buckling

Fb +	2,900.0 psi
Fb -	2,900.0 psi
Fc - Prll	2,900.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 1.0 ft, (FLOOR)
Point Load : D = 4.130, L = 7.80, S = 0.620 k @ 4.0 ft, (BM#9)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.808 : 1	Maximum Shear Stress Ratio	=	0.677 : 1
Section used for this span		5.25x16.0	Section used for this span		5.25x16.0
fb: Actual	=	2,342.57 psi	fv: Actual	=	196.24 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.002 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.714 in	Ratio =	428	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	1.145 in	Ratio =	267	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.322	0.271	0.90	1.000	1.00	1.00	1.00	1.00	1.00	15.70	841.26	2610.00	3.95	70.62	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.808	0.677	1.00	1.000	1.00	1.00	1.00	1.00	1.00	43.73	2,342.57	2900.00	10.99	196.24	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.286	0.240	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.79	953.27	3335.00	4.48	79.96	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.543	0.455	1.25	1.000	1.00	1.00	1.00	1.00	1.00	36.72	1,967.24	3625.00	9.23	164.83	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.615	0.515	1.15	1.000	1.00	1.00	1.00	1.00	1.00	38.29	2,051.25	3335.00	9.62	171.83	333.50
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	1	0.217	0.182	1.60	1.000	1.00	1.00	1.00	1.00	1.00	18.80	1,007.21	4640.00	4.73	84.55	464.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#17

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.148D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	**1**	0.469	0.393	1.60	1.000	1.00	1.00	1.00	1.00	1.00	40.61	2,175.71	4640.00	10.21	182.28	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	**1**	0.109	0.091	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.42	504.76	4640.00	2.37	42.37	464.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 25.50 ft	**1**	0.073	0.061	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.32	338.81	4640.00	1.59	28.44	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	1.1446	11.354		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	11.095	2.908
Overall MINimum	0.523	0.097
D Only	4.009	1.174
+D+L	11.095	2.908
+D+S	4.531	1.272
+D+0.750L	9.323	2.474
+D+0.750L+0.750S	9.716	2.547
+0.60D	2.405	0.705
L Only	7.086	1.734
S Only	0.523	0.097

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

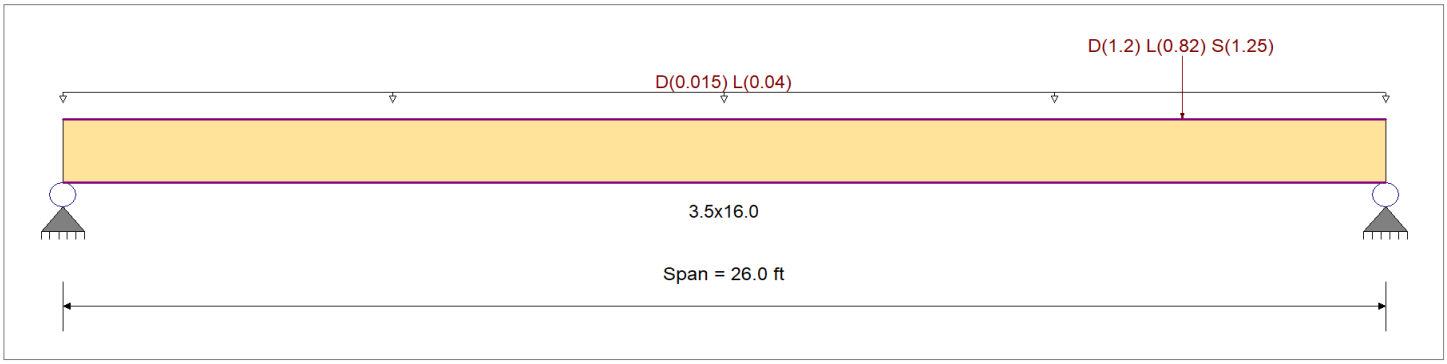
DESCRIPTION: BM#18

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,900.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290.0 psi		
		Ft	2,025.0 psi	Density	45.070 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 = 1.0 ft, (FLOOR)
Point Load : D = 1.20, L = 0.820, S = 1.250 k @ 22.0 ft, (BM#6)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.300 : 1	Maximum Shear Stress Ratio	=	0.246 : 1
Section used for this span		3.5x16.0	Section used for this span		3.5x16.0
fb: Actual	=	870.62 psi	fv: Actual	=	81.93 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	333.50 psi
Load Combination		+D+L	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	17.270 ft	Location of maximum on span	=	24.672 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.271 in	Ratio =	1149	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.602 in	Ratio =	518	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.175	0.143	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.67	455.82	2610.00	1.40	37.37	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.300	0.236	1.00	1.000	1.00	1.00	1.00	1.00	1.00	10.83	870.62	2900.00	2.56	68.46	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.234	0.197	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.72	780.80	3335.00	2.45	65.70	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.211	0.167	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.54	766.37	3625.00	2.27	60.68	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.295	0.246	1.15	1.000	1.00	1.00	1.00	1.00	1.00	12.22	982.16	3335.00	3.06	81.93	333.50
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.118	0.096	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.79	545.74	4640.00	1.67	44.74	464.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#18

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.148D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.226	0.188	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.06	1,049.38	4640.00	3.27	87.46	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.059	0.048	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.40	273.49	4640.00	0.84	22.42	464.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.040	0.032	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.28	183.58	4640.00	0.56	15.05	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.6019	14.044		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.254	3.142
Overall MINimum	0.192	1.058
D Only	0.607	1.438
+D+L	1.254	2.652
+D+S	0.800	2.496
+D+0.750L	1.092	2.349
+D+0.750L+0.750S	1.236	3.142
+0.60D	0.364	0.863
L Only	0.646	1.214
S Only	0.192	1.058

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

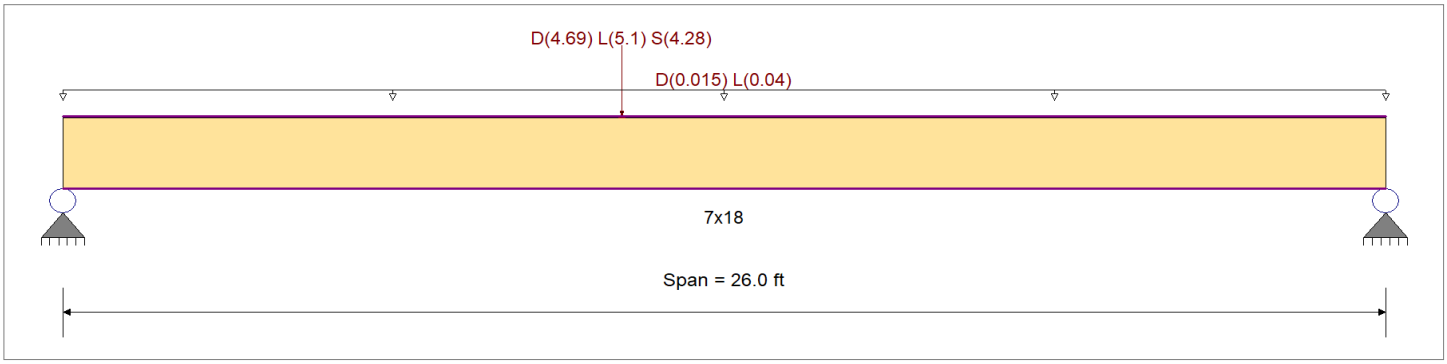
DESCRIPTION: BM#19

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,900.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290.0 psi		
		Ft	2,025.0 psi	Density	45.070 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 = 1.0 ft, (FLOOR)
Point Load : D = 4.690, L = 5.10, S = 4.280 k @ 11.0 ft, (BM#8)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.774 : 1	Maximum Shear Stress Ratio	=	0.277 : 1
Section used for this span		7x18	Section used for this span		7x18
fb: Actual	=	2,582.21 psi	fv: Actual	=	80.25 psi
Fb: Allowable	=	3,335.00 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+L
Location of maximum on span	=	11.007 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.523 in	Ratio =	596	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	1.191 in	Ratio =	261	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.416	0.152	0.90	1.000	1.00	1.00	1.00	1.00	1.00	34.24	1,087.01	2610.00	3.34	39.71	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.765	0.277	1.00	1.000	1.00	1.00	1.00	1.00	1.00	69.89	2,218.76	2900.00	6.74	80.25	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.584	0.207	1.15	1.000	1.00	1.00	1.00	1.00	1.00	61.39	1,948.86	3335.00	5.81	69.11	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.534	0.193	1.25	1.000	1.00	1.00	1.00	1.00	1.00	60.98	1,935.82	3625.00	5.89	70.12	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.774	0.276	1.15	1.000	1.00	1.00	1.00	1.00	1.00	81.34	2,582.21	3335.00	7.74	92.17	333.50
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.280	0.102	1.60	1.000	1.00	1.00	1.00	1.00	1.00	41.00	1,301.43	4640.00	3.99	47.55	464.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#19

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.148D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.591	0.211	1.60	1.000	1.00	1.00	1.00	1.00	1.00	86.41	2,743.03	4640.00	8.24	98.04	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.141	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	20.54	652.20	4640.00	2.00	23.83	464.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.094	0.034	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.79	437.78	4640.00	1.34	15.99	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	1.1909	12.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	7.862	6.058
Overall MINimum	2.469	1.811
D Only	3.413	2.692
+D+L	6.876	5.370
+D+S	5.883	4.503
+D+0.750L	6.010	4.700
+D+0.750L+0.750S	7.862	6.058
+0.60D	2.048	1.615
L Only	3.462	2.678
S Only	2.469	1.811

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

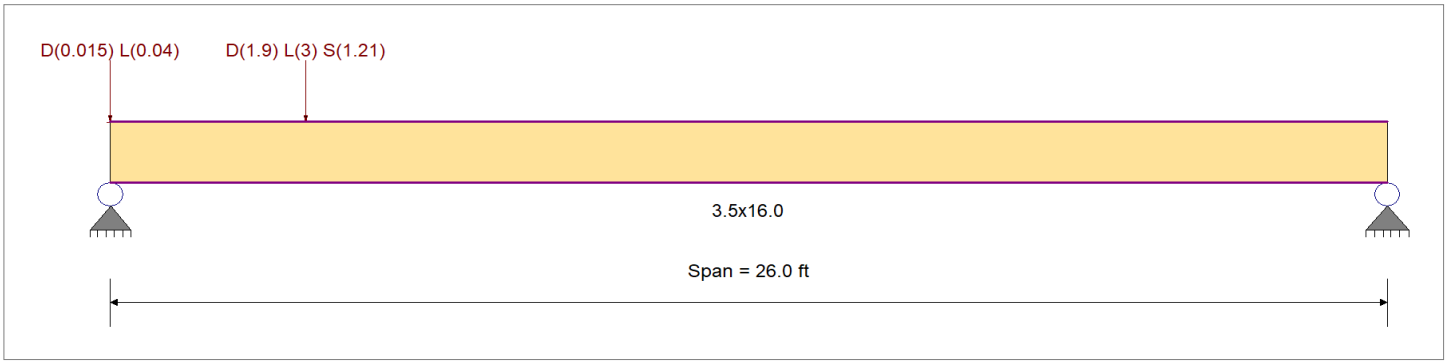
DESCRIPTION: BM#20

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,900.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290.0 psi		
		Ft	2,025.0 psi	Density	45.070 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
Point Load : D = 0.0150, L = 0.040 k @ 0.0 ft, (FLOOR)
Point Load : D = 1.90, L = 3.0, S = 1.210 k @ 4.0 ft, (BM#9)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.480 : 1	Maximum Shear Stress Ratio	=	0.402 : 1
Section used for this span		3.5x16.0	Section used for this span		3.5x16.0
fb: Actual	=	1,390.81 psi	fv: Actual	=	116.54 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.080 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.366 in	Ratio =	852	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.691 in	Ratio =	451	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.221	0.186	0.90	1.000	1.00	1.00	1.00	1.00	1.00	7.19	577.86	2610.00	1.81	48.54	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.480	0.402	1.00	1.000	1.00	1.00	1.00	1.00	1.00	17.31	1,390.81	2900.00	4.35	116.54	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.272	0.228	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.27	905.75	3335.00	2.84	75.97	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.328	0.275	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.78	1,187.57	3625.00	3.72	99.54	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.430	0.360	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.84	1,433.49	3335.00	4.48	120.11	333.50
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.149	0.125	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.61	691.84	4640.00	2.17	58.12	464.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#20

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.148D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.327	0.274	1.60	1.000	1.00	1.00	1.00	1.00	1.00	18.90	1,518.98	4640.00	4.75	127.29	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.075	0.063	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.31	346.71	4640.00	1.09	29.13	464.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	**1**	0.050	0.042	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.90	232.73	4640.00	0.73	19.55	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.6911	11.387		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.552	1.006
Overall MINimum	1.024	0.186
D Only	1.851	0.520
+D+L	4.429	0.982
+D+S	2.874	0.706
+D+0.750L	3.784	0.866
+D+0.750L+0.750S	4.552	1.006
+0.60D	1.110	0.312
L Only	2.578	0.462
S Only	1.024	0.186

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

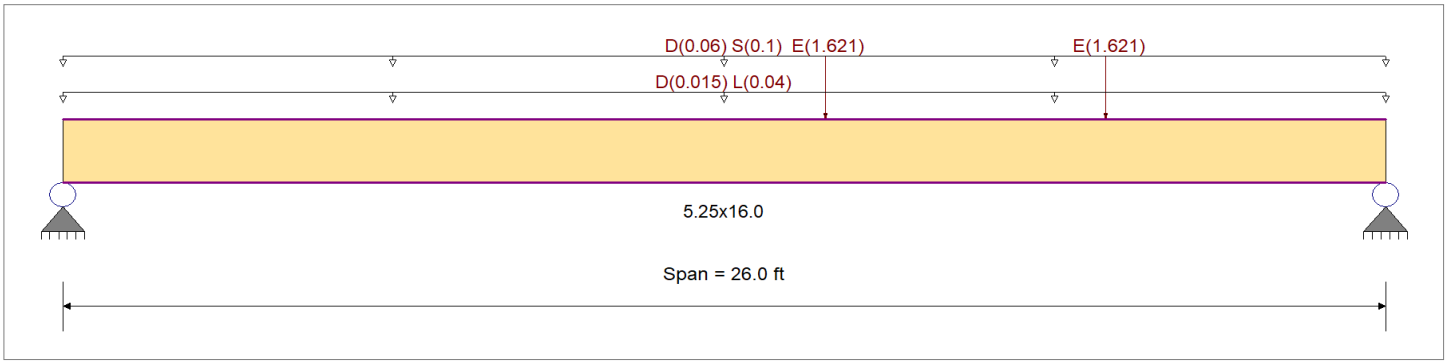
DESCRIPTION: BM#21

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,900.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	2,900.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,900.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	Parallam PSL 2.0E	Fv	290.0 psi		
		Ft	2,025.0 psi	Density	45.070 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 = 1.0 ft, (FLOOR)
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 4.0 ft, (ROOF)
Point Load : E = 1.621 k @ 15.0 ft, (SW6)
Point Load : E = 1.621 k @ 20.50 ft, (SW6)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.926 : 1	Maximum Shear Stress Ratio	=	0.442 : 1
Section used for this span		5.25x16.0	Section used for this span		5.25x16.0
fb: Actual	=	4,295.47 psi	fv: Actual	=	205.11 psi
Fb: Allowable	=	4,640.00 psi	Fv: Allowable	=	464.00 psi
Load Combination		+1.197D+4.550E	Load Combination		+1.197D+4.550E
Location of maximum on span	=	14.993 ft	Location of maximum on span	=	24.672 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.453 in	Ratio =	689 >=360	Span: 1 : E Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.832 in	Ratio =	375 >=240	Span: 1 : +D+0.750L+0.750S+0.5250E
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.176	0.081	0.90	1.000	1.00	1.00	1.00	1.00	1.00	8.56	458.52	2610.00	1.18	21.11	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.221	0.102	1.00	1.000	1.00	1.00	1.00	1.00	1.00	11.94	639.59	2900.00	1.65	29.45	290.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.273	0.126	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.01	911.20	3335.00	2.35	41.95	333.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.164	0.075	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.09	594.33	3625.00	1.53	27.36	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.280	0.129	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.43	933.83	3335.00	2.41	43.00	333.50

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#21

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.197D+4.550E					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.926	0.442	1.60	1.000	1.00	1.00	1.00	1.00	1.00	80.18	4,295.47	4640.00	11.49	205.11	464.00
+1.148D+0.750L+0.750S+3.4					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.818	0.390	1.60	1.000	1.00	1.00	1.00	1.00	1.00	70.89	3,797.68	4640.00	10.14	180.99	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.059	0.027	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.14	275.11	4640.00	0.71	12.67	464.00
+0.4027D+4.550E					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.849	0.406	1.60	1.000	1.00	1.00	1.00	1.00	1.00	73.54	3,939.72	4640.00	10.55	188.33	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S+0.5250E	1	0.8318	13.380		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.222	3.844
Overall MINimum	1.029	2.213
D Only	1.317	1.317
+D+L	1.837	1.837
+D+S	2.617	2.617
+D+0.750L	1.707	1.707
+D+0.750L+0.750S	2.682	2.682
+D+0.70E	2.037	2.866
+D+0.750L+0.750S+0.5250E	3.222	3.844
+0.60D	0.790	0.790
+0.60D+0.70E	1.510	2.339
L Only	0.520	0.520
S Only	1.300	1.300
E Only	1.029	2.213

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#22

CODE REFERENCES

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

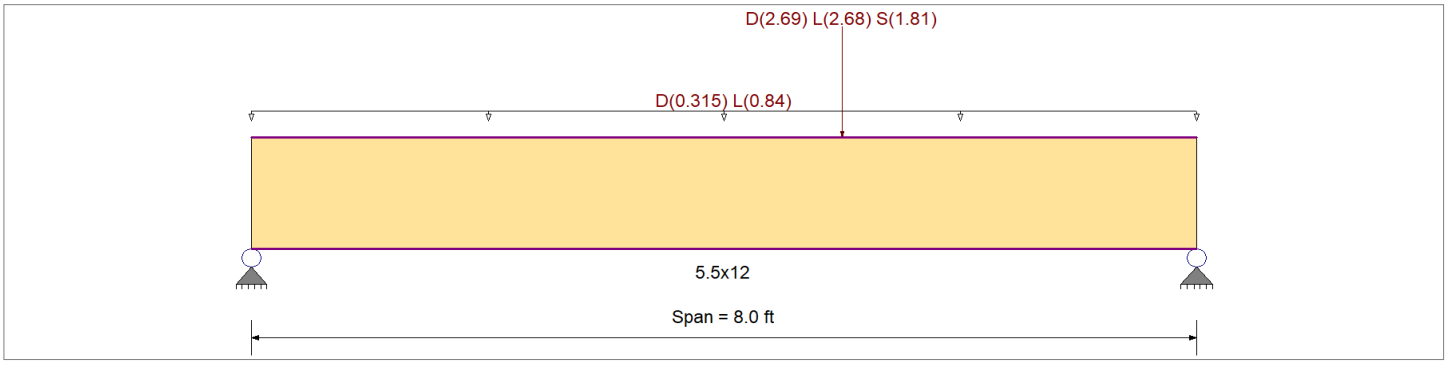
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species :	DF/DF
Wood Grade :	24F-V4
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 21.0 ft, (FLOOR)
Point Load : D = 2.690, L = 2.680, S = 1.810 k @ 5.0 ft, (BM#19)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.713 : 1	Maximum Shear Stress Ratio	=	0.589 : 1
Section used for this span		5.5x12	Section used for this span		5.5x12
fb: Actual	=	1,712.03 psi	fv: Actual	=	156.20 psi
Fb: Allowable	=	2,400.00 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.993 ft	Location of maximum on span	=	7.007 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.087 in	Ratio =	1109	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.140 in	Ratio =	685	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.316	0.255	0.90	1.000	1.00	1.00	1.00	1.00	1.00	7.51	682.60	2160.00	2.67	60.72	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.713	0.589	1.00	1.000	1.00	1.00	1.00	1.00	1.00	18.83	1,712.03	2400.00	6.87	156.20	265.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.359	0.284	1.15	1.000	1.00	1.00	1.00	1.00	1.00	10.90	990.67	2760.00	3.80	86.43	304.75
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.485	0.399	1.25	1.000	1.00	1.00	1.00	1.00	1.00	16.00	1,454.67	3000.00	5.82	132.33	331.25
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.611	0.497	1.15	1.000	1.00	1.00	1.00	1.00	1.00	18.54	1,685.73	2760.00	6.67	151.61	304.75
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.213	0.171	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.99	817.25	3840.00	3.20	72.69	424.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#22

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.148D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	**1**	0.465	0.379	1.60	1.000	1.00	1.00	1.00	1.00	1.00	19.65	1,786.71	3840.00	7.07	160.59	424.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	**1**	0.107	0.086	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.51	409.56	3840.00	1.60	36.43	424.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	**1**	0.072	0.058	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.02	274.91	3840.00	1.08	24.45	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1400	4.146		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.691	8.033
Overall MINimum	0.679	1.131
D Only	2.326	2.998
+D+L	6.691	8.033
+D+S	3.005	4.130
+D+0.750L	5.600	6.775
+D+0.750L+0.750S	6.109	7.623
+0.60D	1.396	1.799
L Only	4.365	5.035
S Only	0.679	1.131

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: BM#23

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

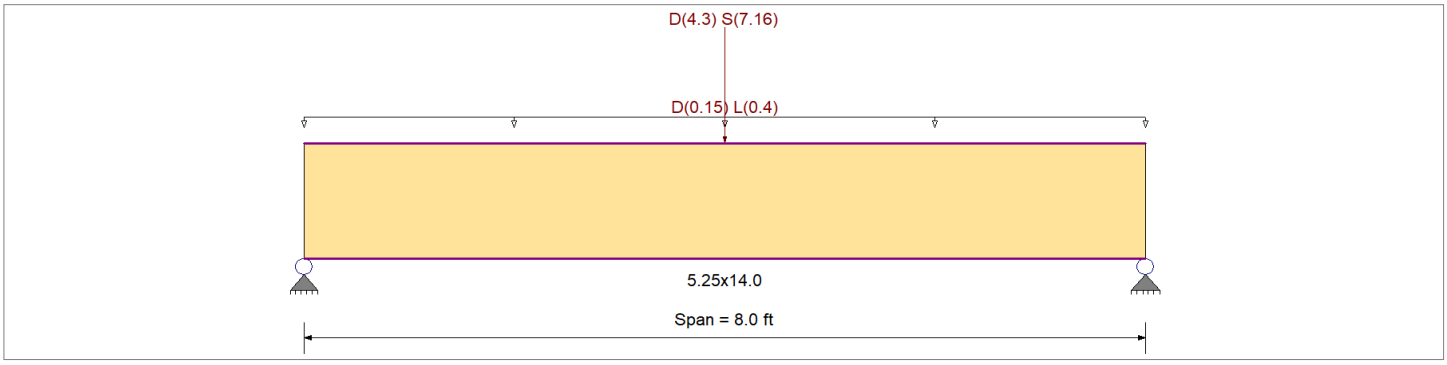
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 10.0 ft, (FLOOR)
Point Load : D = 4.30, S = 7.160 k @ 4.0 ft, (BM#10)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.615 : 1	Maximum Shear Stress Ratio	=	0.416 : 1
Section used for this span		5.25x14.0	Section used for this span		5.25x14.0
fb: Actual	=	1,696.61 psi	fv: Actual	=	126.63 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	6.861 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.061 in	Ratio =	1563	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.105 in	Ratio =	910	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.322	0.225	0.90	1.000	1.00	1.00	1.00	1.00	1.00	9.93	694.63	2160.00	2.62	53.57	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.383	0.290	1.00	1.000	1.00	1.00	1.00	1.00	1.00	13.13	918.54	2400.00	3.77	76.92	265.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.615	0.416	1.15	1.000	1.00	1.00	1.00	1.00	1.00	24.25	1,696.61	2760.00	6.20	126.63	304.75
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.288	0.215	1.25	1.000	1.00	1.00	1.00	1.00	1.00	12.33	862.56	3000.00	3.48	71.09	331.25
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.585	0.413	1.15	1.000	1.00	1.00	1.00	1.00	1.00	23.07	1,614.05	2760.00	6.17	125.88	304.75
+1.197D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.217	0.151	1.60	1.000	1.00	1.00	1.00	1.00	1.00	11.89	831.65	3840.00	3.14	64.13	424.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#23

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+1.148D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	**1**	0.447	0.316	1.60	1.000	1.00	1.00	1.00	1.00	1.00	24.54	1,716.82	3840.00	6.56	133.81	424.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	**1**	0.109	0.076	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.96	416.78	3840.00	1.57	32.14	424.00
+0.4027D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	**1**	0.073	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.00	279.76	3840.00	1.06	21.57	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1054	4.029		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.699	6.699
Overall MINimum	3.580	3.580
D Only	2.814	2.814
+D+L	4.414	4.414
+D+S	6.394	6.394
+D+0.750L	4.014	4.014
+D+0.750L+0.750S	6.699	6.699
+0.60D	1.688	1.688
L Only	1.600	1.600
S Only	3.580	3.580

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

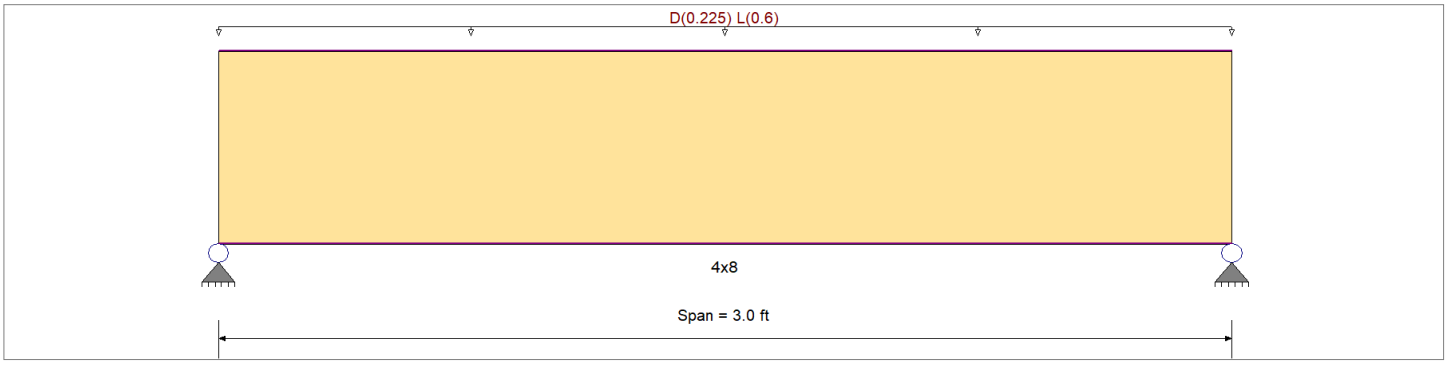
DESCRIPTION: BM#24

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	875.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	875.0 psi	Ebend- xx	1,300.0 ksi
		Fc - Prll	600.0 psi	Eminbend - xx	470.0 ksi
Wood Species :	Douglas Fir-Larch (North)	Fc - Perp	625.0 psi		
Wood Grade :	No.2	Fv	170.0 psi		
		Ft	425.0 psi	Density	30.590 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 NOT internally calculated and added
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 15.0 ft, (FLOOR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.319 : 1	Maximum Shear Stress Ratio	=	0.258 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	363.24 psi	fv: Actual	=	43.78 psi
Fb: Allowable	=	1,137.50 psi	Fv: Allowable	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	1.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.008 in	Ratio =	4729	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.010 in	Ratio =	3439	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.097	0.078	0.90	1.300	1.00	1.00	1.00	1.00	1.00	0.25	99.07	1023.75	0.20	11.94	153.00
+D+L					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.319	0.258	1.00	1.300	1.00	1.00	1.00	1.00	1.00	0.93	363.24	1137.50	0.74	43.78	170.00
+D+0.750L					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.209	0.169	1.25	1.300	1.00	1.00	1.00	1.00	1.00	0.76	297.20	1421.88	0.61	35.82	212.50
+0.60D					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.033	0.026	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.15	59.44	1820.00	0.12	7.16	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0105	1.511		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: BM#24

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.238	1.238
Overall MINimum	0.900	0.900
D Only	0.338	0.338
+D+L	1.238	1.238
+D+0.750L	1.013	1.013
+0.60D	0.203	0.203
L Only	0.900	0.900

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

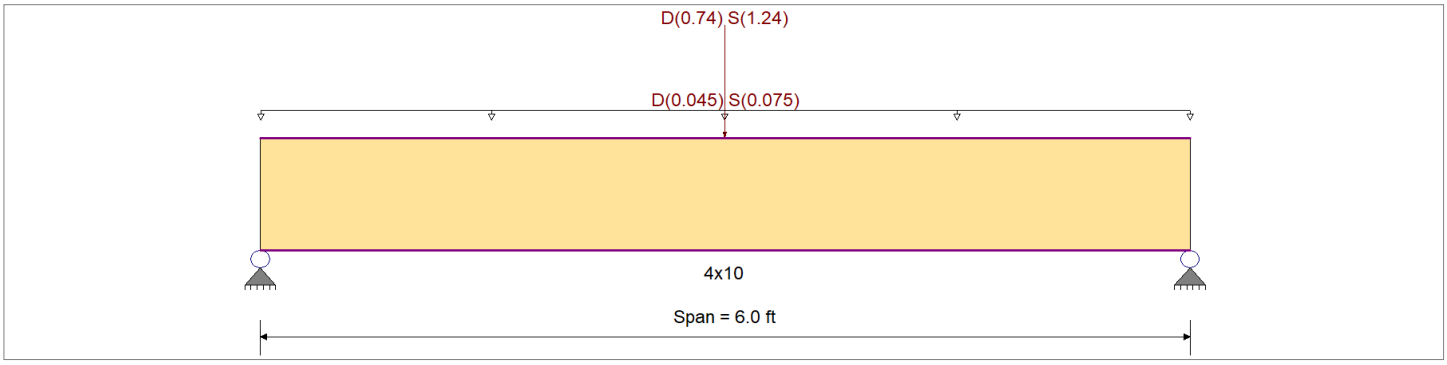
DESCRIPTION: HDR#1

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	875 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	875 psi	Ebend- xx	1300 ksi
		Fc - Prll	600 psi	Eminbend - xx	470 ksi
Wood Species	: Douglas Fir-Larch (North)	Fc - Perp	625 psi		
Wood Grade	: No.2	Fv	170 psi		
		Ft	425 psi	Density	30.59 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 NOT internally calculated and added
Uniform Load : D = 0.0150, S = 0.0250 ksf, Tributary Width = 3.0 ft, (ROOF)
Point Load : D = 0.740, S = 1.240 k @ 3.0 ft, (BM#2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.699 : 1	Maximum Shear Stress Ratio	=	0.298 : 1
Section used for this span		4x10	Section used for this span		4x10
fb: Actual	=	843.89 psi	fv: Actual	=	58.29 psi
Fb: Allowable	=	1,207.50 psi	Fv: Allowable	=	195.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.040 in	Ratio =	1816	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.063 in	Ratio =	1137	>=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.334	0.142	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.31	315.56	945.00	0.47	21.80	153.00
+D+S					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.699	0.298	1.15	1.200	1.00	1.00	1.00	1.00	1.00	3.51	843.89	1207.50	1.26	58.29	195.50
+D+0.750S					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.589	0.251	1.15	1.200	1.00	1.00	1.00	1.00	1.00	2.96	711.81	1207.50	1.06	49.17	195.50
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.113	0.048	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.79	189.34	1680.00	0.28	13.08	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0633	3.022		0.0000	0.000

Wood Beam

DESCRIPTION: HDR#1

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.350	1.350
Overall MINimum	0.845	0.845
D Only	0.505	0.505
+D+S	1.350	1.350
+D+0.750S	1.139	1.139
+0.60D	0.303	0.303
S Only	0.845	0.845

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: HDR#2

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

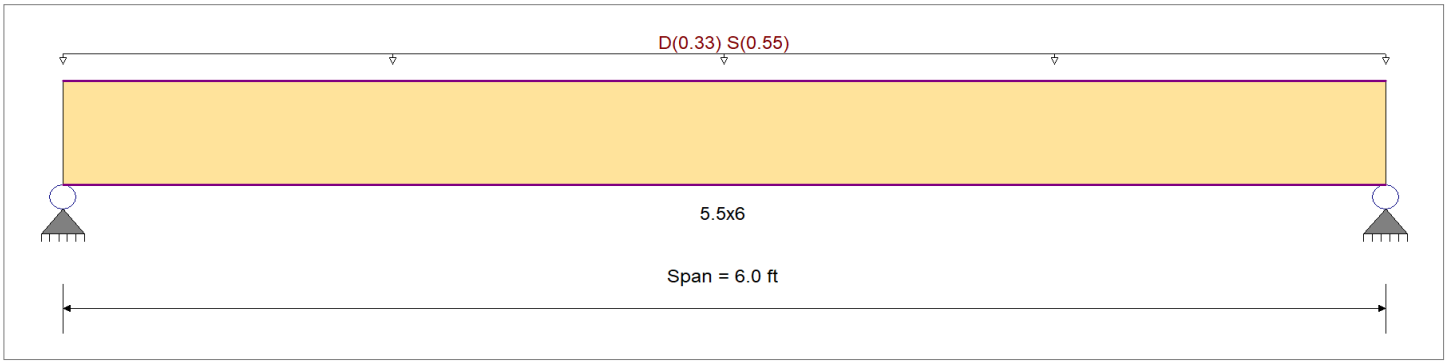
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



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 = 22.0 ft, (ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.522 : 1	Maximum Shear Stress Ratio	=	0.331 : 1
Section used for this span		5.5x6	Section used for this span		5.5x6
fb: Actual	=	1,440.00 psi	fv: Actual	=	100.73 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	3.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.091 in	Ratio =	795 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.145 in	Ratio =	497 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.250	0.158	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.49	540.00	2160.00	0.83	37.77	238.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.522	0.331	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.96	1,440.00	2760.00	2.22	100.73	304.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.440	0.279	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.34	1,215.00	2760.00	1.87	84.99	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.084	0.053	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.89	324.00	3840.00	0.50	22.66	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1448	3.022		0.0000	0.000

Wood Beam

DESCRIPTION: HDR#2

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.640	2.640
Overall MINimum	1.650	1.650
D Only	0.990	0.990
+D+S	2.640	2.640
+D+0.750S	2.228	2.228
+0.60D	0.594	0.594
S Only	1.650	1.650

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 | CK Engineering LLC | (c) ENERCALC INC 1983-2022

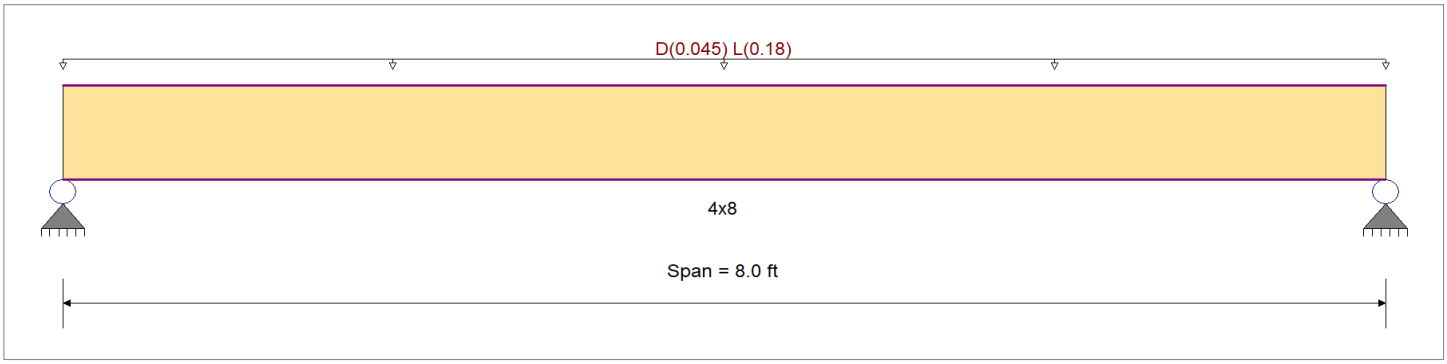
DESCRIPTION: HDR#3

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	875 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2018	Fb -	875 psi	Ebend- xx	1300 ksi
		Fc - Prll	600 psi	Eminbend - xx	470 ksi
Wood Species :	Douglas Fir-Larch (North)	Fc - Perp	625 psi		
Wood Grade :	No.2	Fv	170 psi		
		Ft	425 psi	Density	30.59 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 NOT internally calculated and added
Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 3.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.619 : 1	Maximum Shear Stress Ratio	=	0.267 : 1
Section used for this span		4x8	Section used for this span		4x8
fb: Actual	=	704.47 psi	fv: Actual	=	45.44 psi
Fb: Allowable	=	1,137.50 psi	Fv: Allowable	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	7.416 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.115 in	Ratio =	831 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.144 in	Ratio =	665 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.138	0.059	0.90	1.300	1.00	1.00	1.00	1.00	1.00	0.36	140.89	1023.75	0.15	9.09	153.00
+D+L					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.619	0.267	1.00	1.300	1.00	1.00	1.00	1.00	1.00	1.80	704.47	1137.50	0.77	45.44	170.00
+D+0.750L					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.396	0.171	1.25	1.300	1.00	1.00	1.00	1.00	1.00	1.44	563.57	1421.88	0.61	36.35	212.50
+0.60D					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.046	0.020	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.22	84.54	1820.00	0.09	5.45	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1443	4.029		0.0000	0.000

Wood Beam

DESCRIPTION: HDR#3

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.900	0.900
Overall MINimum	0.720	0.720
D Only	0.180	0.180
+D+L	0.900	0.900
+D+0.750L	0.720	0.720
+0.60D	0.108	0.108
L Only	0.720	0.720

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: HDR#4

CODE REFERENCES

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

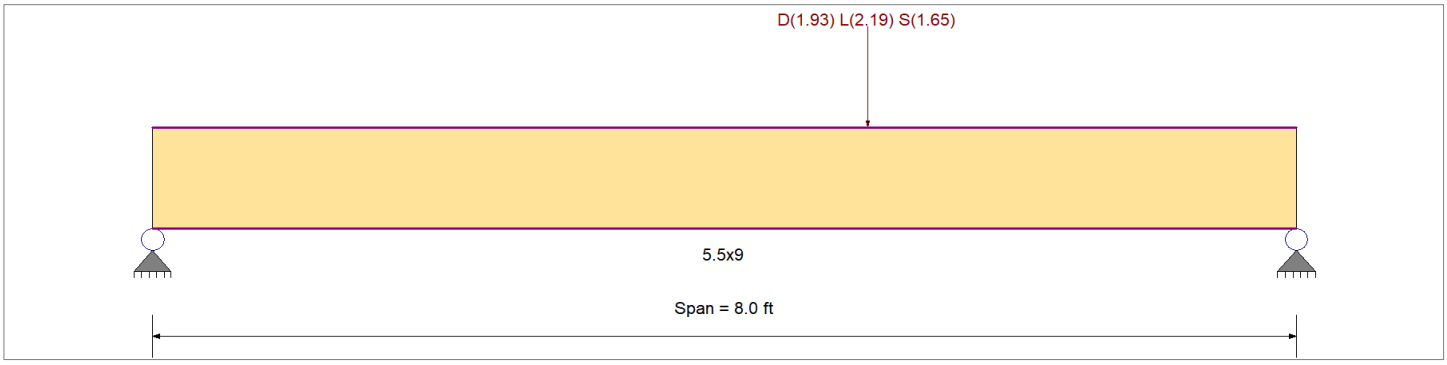
Material Properties

Analysis Method :	Allowable Stress Design
Load Combination	IBC 2018
Wood Species :	DF/DF
Wood Grade :	24F-V4
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling

Fb +	2400 psi
Fb -	1850 psi
Fc - Prll	1650 psi
Fc - Perp	650 psi
Fv	265 psi
Ft	1100 psi

E : Modulus of Elasticity

Ebend- xx	1800 ksi
Eminbend - xx	950 ksi
Ebend- yy	1600 ksi
Eminbend - yy	850 ksi
Density	31.21 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Point Load : D = 1.930, L = 2.190, S = 1.650 k @ 5.0 ft, (BM#8)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.527 : 1	Maximum Shear Stress Ratio	=	0.299 : 1
Section used for this span		5.5x9	Section used for this span		5.5x9
fb: Actual	=	1,455.45 psi	fv: Actual	=	91.10 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	4.993 ft	Location of maximum on span	=	5.022 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.062 in	Ratio =	1546 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.136 in	Ratio =	704 >=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.270	0.153	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.61	583.99	2160.00	1.21	36.55	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.519	0.294	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.71	1,246.66	2400.00	2.58	78.03	265.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.392	0.222	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.70	1,083.26	2760.00	2.24	67.80	304.75
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.360	0.204	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.69	1,081.00	3000.00	2.23	67.66	331.25
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.527	0.299	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.01	1,455.45	2760.00	3.01	91.10	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.091	0.052	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.17	350.40	3840.00	0.72	21.93	424.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: HDR#4

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1363	4.292		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.804	3.006
Overall MINimum	0.619	1.031
D Only	0.724	1.206
+D+L	1.545	2.575
+D+S	1.343	2.238
+D+0.750L	1.340	2.233
+D+0.750L+0.750S	1.804	3.006
+0.60D	0.434	0.724
L Only	0.821	1.369
S Only	0.619	1.031

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 | CK Engineering LLC | (c) ENERCALC INC 1983-2022

DESCRIPTION: HDR#5

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

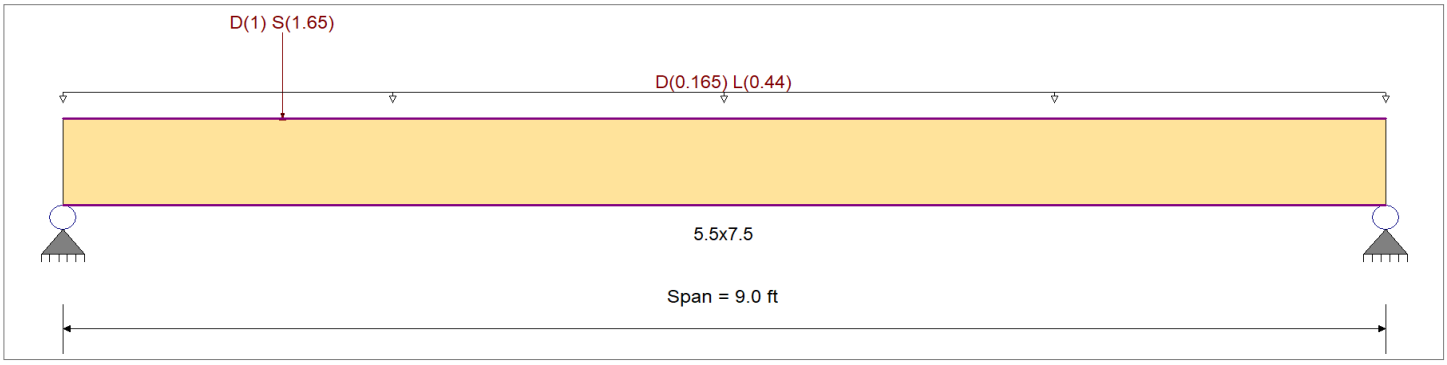
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 11.0 ft, (FLOOR)
Point Load : D = 1.0, S = 1.650 k @ 1.50 ft, (HDR#2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.678 : 1	Maximum Shear Stress Ratio	=	0.456 : 1
Section used for this span		5.5x7.5	Section used for this span		5.5x7.5
fb: Actual	=	1,626.47 psi	fv: Actual	=	138.83 psi
Fb: Allowable	=	2,400.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+L	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	4.237 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.188 in	Ratio =	575	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.299 in	Ratio =	361	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.279	0.230	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.59	602.99	2160.00	1.51	54.82	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.678	0.441	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.99	1,626.47	2400.00	3.21	116.83	265.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.363	0.344	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.31	1,002.91	2760.00	2.88	104.82	304.75
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.456	0.306	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.88	1,368.43	3000.00	2.79	101.33	331.25
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.583	0.456	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.92	1,610.11	2760.00	3.82	138.83	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.094	0.078	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.55	361.80	3840.00	0.90	32.89	424.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: HDR#5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2986	4.434		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.132	2.929
Overall MINimum	1.375	0.275
D Only	1.616	0.949
+D+L	3.596	2.929
+D+S	2.991	1.224
+D+0.750L	3.101	2.434
+D+0.750L+0.750S	4.132	2.641
+0.60D	0.970	0.570
L Only	1.980	1.980
S Only	1.375	0.275

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 | CK Engineering LLC | (c) ENERCALC INC 1983-2022

DESCRIPTION: HDR#6

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

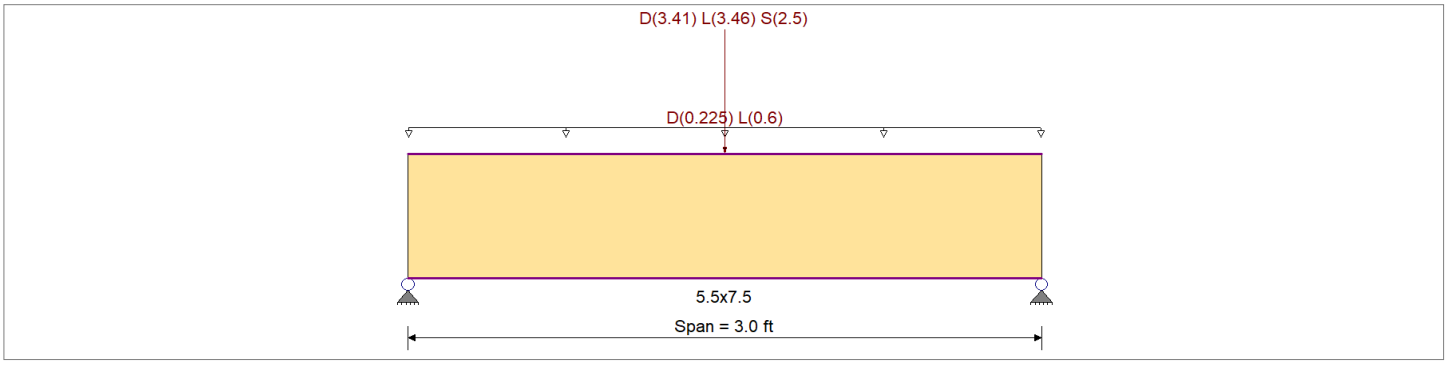
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 15.0 ft, (FLOOR)
Point Load : D = 3.410, L = 3.460, S = 2.50 k @ 1.50 ft, (BM#19)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.591 : 1	Maximum Shear Stress Ratio	=	0.572 : 1
Section used for this span		5.5x7.5	Section used for this span		5.5x7.5
fb: Actual	=	1,417.47 psi	fv: Actual	=	151.47 psi
Fb: Allowable	=	2,400.00 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	1.500 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.013 in	Ratio =	2795 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.026 in	Ratio =	1399 >=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.304	0.291	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.82	656.45	2160.00	1.91	69.45	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.591	0.572	1.00	1.000	1.00	1.00	1.00	1.00	1.00	6.09	1,417.47	2400.00	4.17	151.47	265.00
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.396	0.377	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.70	1,092.81	2760.00	3.16	114.91	304.75
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.409	0.395	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.27	1,227.21	3000.00	3.60	130.97	331.25
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.563	0.542	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.68	1,554.49	2760.00	4.54	165.06	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.103	0.098	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.69	393.87	3840.00	1.15	41.67	424.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: HDR#6

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0257	1.511		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.966	4.966
Overall MINimum	1.250	1.250
D Only	2.056	2.056
+D+L	4.686	4.686
+D+S	3.306	3.306
+D+0.750L	4.028	4.028
+D+0.750L+0.750S	4.966	4.966
+0.60D	1.234	1.234
L Only	2.630	2.630
S Only	1.250	1.250

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: HDR#7

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

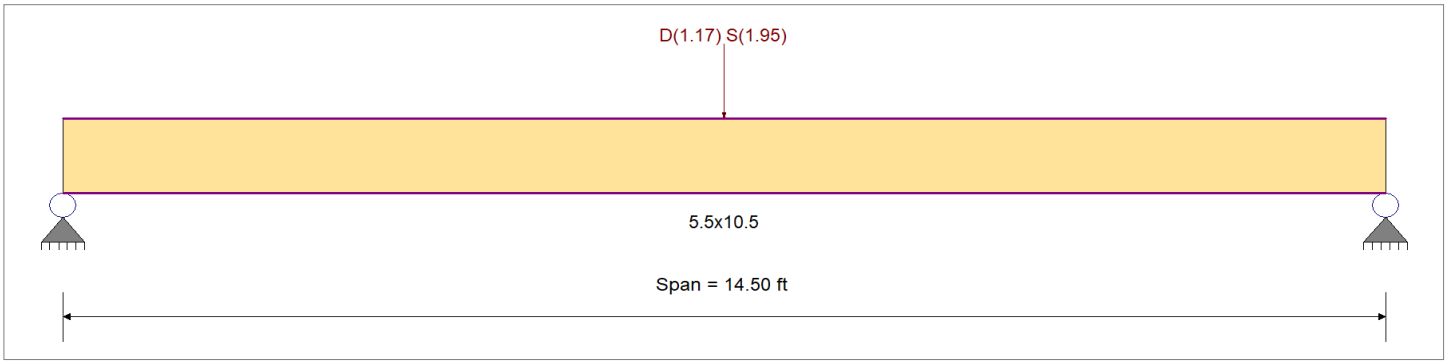
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

Ebend- xx	1,800.0 ksi
Eminbend - xx	950.0 ksi
Ebend- yy	1,600.0 ksi
Eminbend - yy	850.0 ksi
Density	31.210 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Point Load : D = 1.170, S = 1.950 k @ 7.250 ft, (BM#4)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.501 : 1	Maximum Shear Stress Ratio	=	0.140 : 1
Section used for this span		5.5x10.5	Section used for this span		5.5x10.5
fb: Actual	=	1,381.99 psi	fv: Actual	=	42.60 psi
Fb: Allowable	=	2,760.00 psi	Fv: Allowable	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	7.250 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.225 in	Ratio =	772 >=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.374 in	Ratio =	465 >=240	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.251	0.072	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.57	542.66	2160.00	0.67	17.28	238.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.501	0.140	1.15	1.000	1.00	1.00	1.00	1.00	1.00	11.64	1,381.99	2760.00	1.64	42.60	304.75
+D+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.425	0.119	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.87	1,172.16	2760.00	1.40	36.27	304.75
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.085	0.024	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.74	325.59	3840.00	0.40	10.37	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.3736	7.303		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22-021.ec6

DESCRIPTION: HDR#7

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.651	1.651
Overall MINimum	0.975	0.975
D Only	0.676	0.676
+D+S	1.651	1.651
+D+0.750S	1.407	1.407
+0.60D	0.405	0.405
S Only	0.975	0.975

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#1

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Material Properties

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

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

Soil Design Values

Allowable Soil Bearing	=	3.0	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	150.0	pcf
Soil/Concrete Friction Coeff.	=	0.250	

Increases based on footing Depth

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

Increases based on footing plan dimension

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

Dimensions

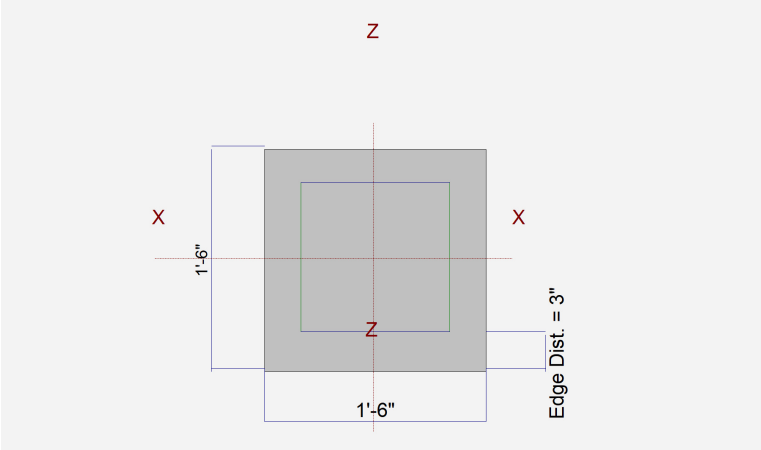
Width parallel to X-X Axis	=	1.50 ft
Length parallel to Z-Z Axis	=	1.50 ft
Footing Thickness	=	10.0 in

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

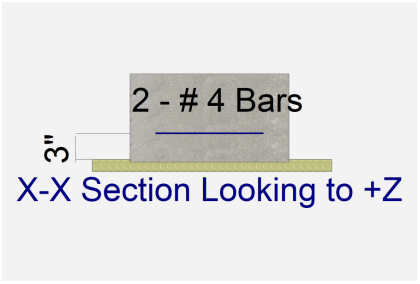


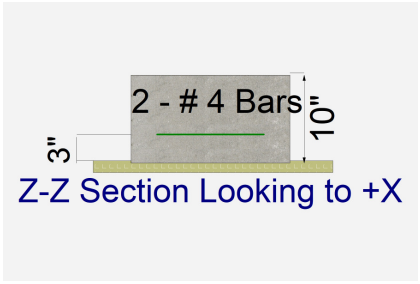
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		2
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		2
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	=	0.70		2.0					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

DESCRIPTION: FTNG#1

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4403	Soil Bearing	1.321 ksf	3.0 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	0.09296	Z Flexure (+X)	0.5050 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L
PASS	0.09296	Z Flexure (-X)	0.5050 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L
PASS	0.09296	X Flexure (+Z)	0.5050 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L
PASS	0.09296	X Flexure (-Z)	0.5050 k-ft/ft	5.433 k-ft/ft	+1.20D+1.60L
PASS	0.04703	1-way Shear (+X)	3.527 psi	75.0 psi	+1.20D+1.60L
PASS	0.04703	1-way Shear (-X)	3.527 psi	75.0 psi	+1.20D+1.60L
PASS	0.04703	1-way Shear (+Z)	3.527 psi	75.0 psi	+1.20D+1.60L
PASS	0.04703	1-way Shear (-Z)	3.527 psi	75.0 psi	+1.20D+1.60L
PASS	0.1176	2-way Punching	17.636 psi	150.0 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	3.0	n/a	0.0	0.4319	0.4319	n/a	n/a	0.144
X-X, +D+L	3.0	n/a	0.0	1.321	1.321	n/a	n/a	0.440
X-X, +D+0.750L	3.0	n/a	0.0	1.099	1.099	n/a	n/a	0.366
X-X, +0.60D	3.0	n/a	0.0	0.2592	0.2592	n/a	n/a	0.086
Z-Z, D Only	3.0	0.0	n/a	n/a	n/a	0.4319	0.4319	0.144
Z-Z, +D+L	3.0	0.0	n/a	n/a	n/a	1.321	1.321	0.440
Z-Z, +D+0.750L	3.0	0.0	n/a	n/a	n/a	1.099	1.099	0.366
Z-Z, +0.60D	3.0	0.0	n/a	n/a	n/a	0.2592	0.2592	0.086

Overturning Stability

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

Sliding Stability

All units k

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

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1225	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.40D	0.1225	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60L	0.5050	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+1.60L	0.5050	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L	0.230	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D+0.50L	0.230	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D	0.1050	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +1.20D	0.1050	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +0.90D	0.07875	+Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
X-X, +0.90D	0.07875	-Z	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.40D	0.1225	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.40D	0.1225	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60L	0.5050	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+1.60L	0.5050	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L	0.230	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D+0.50L	0.230	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +1.20D	0.1050	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

DESCRIPTION: FTNG#1

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D	0.1050	+X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +0.90D	0.07875	-X	Bottom	0.2160	AsMin	0.2667	5.433	OK
Z-Z, +0.90D	0.07875	+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	0.86 psi	0.86 psi	0.86 psi	0.86 psi	0.86 psi	75.00 psi	0.01	OK
+1.20D+1.60L	3.53 psi	3.53 psi	3.53 psi	3.53 psi	3.53 psi	75.00 psi	0.05	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	0.73 psi	0.73 psi	0.73 psi	0.73 psi	0.73 psi	75.00 psi	0.01	OK
+0.90D	0.55 psi	0.55 psi	0.55 psi	0.55 psi	0.55 psi	75.00 psi	0.01	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	4.28 psi	150.00 psi	0.02852	OK
+1.20D+1.60L	17.64 psi	150.00 psi	0.1176	OK
+1.20D+0.50L	8.03 psi	150.00 psi	0.05355	OK
+1.20D	3.67 psi	150.00 psi	0.02445	OK
+0.90D	2.75 psi	150.00 psi	0.01833	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

DESCRIPTION: FTNG#2

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Material Properties

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

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

Soil Design Values

Allowable Soil Bearing	=	3.0	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	150.0	pcf
Soil/Concrete Friction Coeff.	=	0.250	

Increases based on footing Depth

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

Increases based on footing plan dimension

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

Dimensions

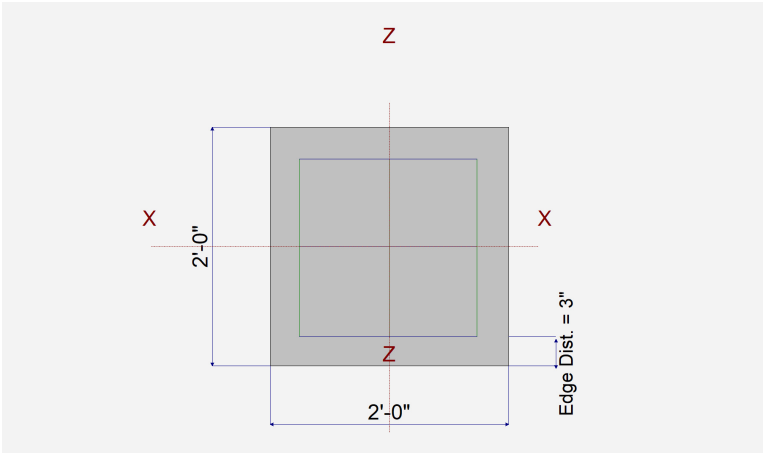
Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.0 ft
Footing Thickness	=	10.0 in

Pedestal dimensions...

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

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

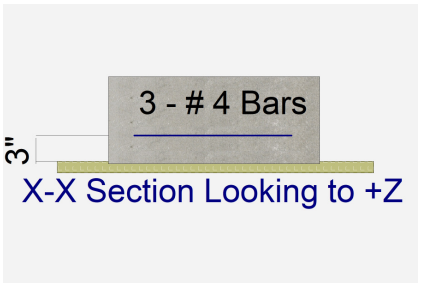


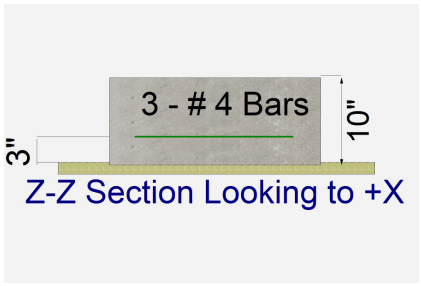
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		3
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		3
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

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





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.60		3.90					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#2

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4987	Soil Bearing	1.496 ksf	3.0 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	0.1675	Z Flexure (+X)	1.020 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L
PASS	0.1675	Z Flexure (-X)	1.020 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L
PASS	0.1675	X Flexure (+Z)	1.020 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L
PASS	0.1675	X Flexure (-Z)	1.020 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L
PASS	0.1360	1-way Shear (+X)	10.20 psi	75.0 psi	+1.20D+1.60L
PASS	0.1360	1-way Shear (-X)	10.20 psi	75.0 psi	+1.20D+1.60L
PASS	0.1360	1-way Shear (+Z)	10.20 psi	75.0 psi	+1.20D+1.60L
PASS	0.1360	1-way Shear (-Z)	10.20 psi	75.0 psi	+1.20D+1.60L
PASS	0.2526	2-way Punching	37.886 psi	150.0 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	3.0	n/a	0.0	0.5208	0.5208	n/a	n/a	0.174
X-X, +D+L	3.0	n/a	0.0	1.496	1.496	n/a	n/a	0.499
X-X, +D+0.750L	3.0	n/a	0.0	1.252	1.252	n/a	n/a	0.417
X-X, +0.60D	3.0	n/a	0.0	0.3125	0.3125	n/a	n/a	0.104
Z-Z, D Only	3.0	0.0	n/a	n/a	n/a	0.5208	0.5208	0.174
Z-Z, +D+L	3.0	0.0	n/a	n/a	n/a	1.496	1.496	0.499
Z-Z, +D+0.750L	3.0	0.0	n/a	n/a	n/a	1.252	1.252	0.417
Z-Z, +0.60D	3.0	0.0	n/a	n/a	n/a	0.3125	0.3125	0.104

Overturning Stability

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

Sliding Stability

All units k

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

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.280	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.40D	0.280	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	1.020	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	1.020	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.4838	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.4838	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.240	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.240	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.180	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.180	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.280	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.280	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	1.020	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	1.020	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.4838	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.4838	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.240	-X	Bottom	0.2160	AsMin	0.30	6.088	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

DESCRIPTION: FTNG#2

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D	0.240	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.180	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.180	+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	2.80 psi	2.80 psi	2.80 psi	2.80 psi	2.80 psi	75.00 psi	0.04	OK
+1.20D+1.60L	10.20 psi	10.20 psi	10.20 psi	10.20 psi	10.20 psi	75.00 psi	0.14	OK
+1.20D+0.50L	4.84 psi	4.84 psi	4.84 psi	4.84 psi	4.84 psi	75.00 psi	0.06	OK
+1.20D	2.40 psi	2.40 psi	2.40 psi	2.40 psi	2.40 psi	75.00 psi	0.03	OK
+0.90D	1.80 psi	1.80 psi	1.80 psi	1.80 psi	1.80 psi	75.00 psi	0.02	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	10.40 psi	150.00 psi	0.06933	OK
+1.20D+1.60L	37.89 psi	150.00 psi	0.2526	OK
+1.20D+0.50L	17.97 psi	150.00 psi	0.1198	OK
+1.20D	8.91 psi	150.00 psi	0.05943	OK
+0.90D	6.69 psi	150.00 psi	0.04457	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#3

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Material Properties

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

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

Soil Design Values

Allowable Soil Bearing	=	3.0	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	150.0	pcf
Soil/Concrete Friction Coeff.	=	0.250	

Increases based on footing Depth

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

Increases based on footing plan dimension

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

Dimensions

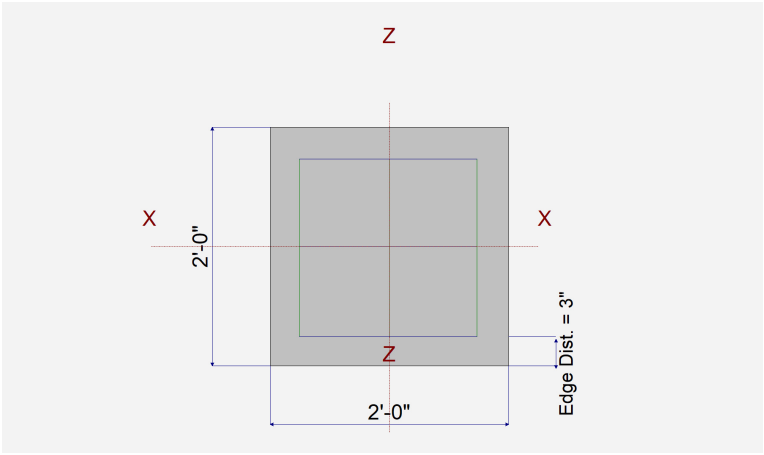
Width parallel to X-X Axis	=	2.0 ft
Length parallel to Z-Z Axis	=	2.0 ft
Footing Thickness	=	10.0 in

Pedestal dimensions...

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

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

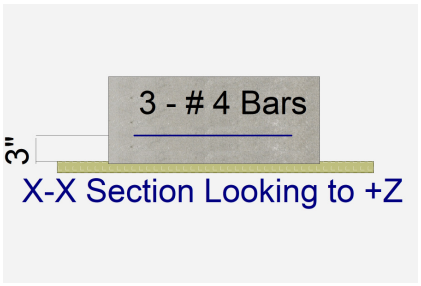


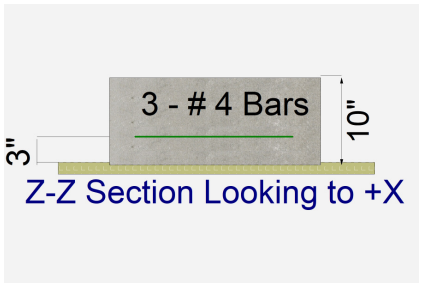
Reinforcing

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

Bandwidth Distribution Check (ACI 15.4.4.2)

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





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	3.430		5.10	1.760				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#3

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7550	Soil Bearing	2.265 ksf	3.0 ksf	+D+0.750L+0.750S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.2701	Z Flexure (+X)	1.645 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2701	Z Flexure (-X)	1.645 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2701	X Flexure (+Z)	1.645 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2701	X Flexure (-Z)	1.645 k-ft/ft	6.088 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2193	1-way Shear (+X)	16.445 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2193	1-way Shear (-X)	16.445 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2193	1-way Shear (+Z)	16.445 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.2193	1-way Shear (-Z)	16.445 psi	75.0 psi	+1.20D+1.60L+0.50S
PASS	0.4072	2-way Punching	61.081 psi	150.0 psi	+1.20D+1.60L+0.50S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	3.0	n/a	0.0	0.9783	0.9783	n/a	n/a	0.326
X-X, +D+L	3.0	n/a	0.0	2.253	2.253	n/a	n/a	0.751
X-X, +D+S	3.0	n/a	0.0	1.418	1.418	n/a	n/a	0.473
X-X, +D+0.750L	3.0	n/a	0.0	1.935	1.935	n/a	n/a	0.645
X-X, +D+0.750L+0.750S	3.0	n/a	0.0	2.265	2.265	n/a	n/a	0.755
X-X, +0.60D	3.0	n/a	0.0	0.5870	0.5870	n/a	n/a	0.196
Z-Z, D Only	3.0	0.0	n/a	n/a	n/a	0.9783	0.9783	0.326
Z-Z, +D+L	3.0	0.0	n/a	n/a	n/a	2.253	2.253	0.751
Z-Z, +D+S	3.0	0.0	n/a	n/a	n/a	1.418	1.418	0.473
Z-Z, +D+0.750L	3.0	0.0	n/a	n/a	n/a	1.935	1.935	0.645
Z-Z, +D+0.750L+0.750S	3.0	0.0	n/a	n/a	n/a	2.265	2.265	0.755
Z-Z, +0.60D	3.0	0.0	n/a	n/a	n/a	0.5870	0.5870	0.196

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	0.6003	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.40D	0.6003	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	1.535	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L	1.535	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	1.645	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60L+0.50S	1.645	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.8333	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L	0.8333	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.5145	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D	0.5145	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	1.185	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+1.60S	1.185	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+1.60S	0.8665	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

DESCRIPTION: FTNG#3

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.20D+1.60S	0.8665	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	0.9433	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.50S	0.9433	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	0.9873	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +1.20D+0.50L+0.70S	0.9873	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.3859	+Z	Bottom	0.2160	AsMin	0.30	6.088	OK
X-X, +0.90D	0.3859	-Z	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.6003	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.40D	0.6003	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	1.535	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L	1.535	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	1.645	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60L+0.50S	1.645	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.8333	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L	0.8333	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.5145	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D	0.5145	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	1.185	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+1.60S	1.185	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.8665	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+1.60S	0.8665	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	0.9433	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.50S	0.9433	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	0.9873	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +1.20D+0.50L+0.70S	0.9873	+X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.3859	-X	Bottom	0.2160	AsMin	0.30	6.088	OK
Z-Z, +0.90D	0.3859	+X	Bottom	0.2160	AsMin	0.30	6.088	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	6.00 psi	6.00 psi	6.00 psi	6.00 psi	6.00 psi	75.00 psi	0.08	OK
+1.20D+1.60L	15.35 psi	15.35 psi	15.35 psi	15.35 psi	15.35 psi	75.00 psi	0.20	OK
+1.20D+1.60L+0.50S	16.45 psi	16.45 psi	16.45 psi	16.45 psi	16.45 psi	75.00 psi	0.22	OK
+1.20D+0.50L	8.33 psi	8.33 psi	8.33 psi	8.33 psi	8.33 psi	75.00 psi	0.11	OK
+1.20D	5.15 psi	5.15 psi	5.15 psi	5.15 psi	5.15 psi	75.00 psi	0.07	OK
+1.20D+0.50L+1.60S	11.85 psi	11.85 psi	11.85 psi	11.85 psi	11.85 psi	75.00 psi	0.16	OK
+1.20D+1.60S	8.67 psi	8.67 psi	8.67 psi	8.67 psi	8.67 psi	75.00 psi	0.12	OK
+1.20D+0.50L+0.50S	9.43 psi	9.43 psi	9.43 psi	9.43 psi	9.43 psi	75.00 psi	0.13	OK
+1.20D+0.50L+0.70S	9.87 psi	9.87 psi	9.87 psi	9.87 psi	9.87 psi	75.00 psi	0.13	OK
+0.90D	3.86 psi	3.86 psi	3.86 psi	3.86 psi	3.86 psi	75.00 psi	0.05	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	22.30 psi	150.00 psi	0.1486	OK
+1.20D+1.60L	57.00 psi	150.00 psi	0.38	OK
+1.20D+1.60L+0.50S	61.08 psi	150.00 psi	0.4072	OK
+1.20D+0.50L	30.95 psi	150.00 psi	0.2063	OK
+1.20D	19.11 psi	150.00 psi	0.1274	OK
+1.20D+0.50L+1.60S	44.02 psi	150.00 psi	0.2935	OK
+1.20D+1.60S	32.18 psi	150.00 psi	0.2146	OK
+1.20D+0.50L+0.50S	35.04 psi	150.00 psi	0.2336	OK
+1.20D+0.50L+0.70S	36.67 psi	150.00 psi	0.2445	OK
+0.90D	14.33 psi	150.00 psi	0.09555	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#4

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Material Properties

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

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

Soil Design Values

Allowable Soil Bearing	=	3.0	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	150.0	pcf
Soil/Concrete Friction Coeff.	=	0.250	

Increases based on footing Depth

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

Increases based on footing plan dimension

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

Dimensions

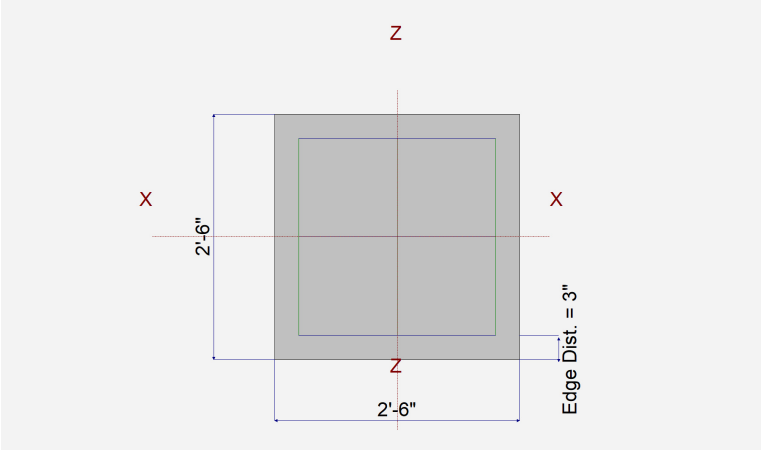
Width parallel to X-X Axis	=	2.50 ft
Length parallel to Z-Z Axis	=	2.50 ft
Footing Thickness	=	10.0 in

Pedestal dimensions...

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

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in

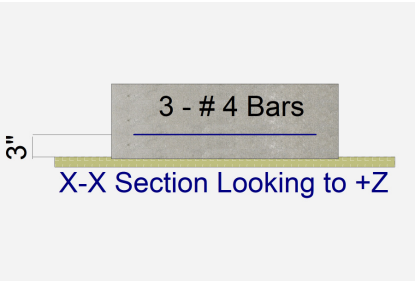


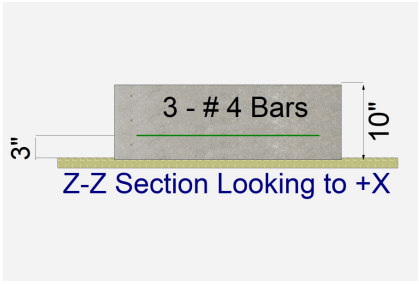
Reinforcing

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

Bandwidth Distribution Check (ACI 15.4.4.2)

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





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	4.30			7.160				k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: FTNG#4

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6513	Soil Bearing	1.954 ksf	3.0 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	0.4235	Z Flexure (+X)	2.077 k-ft/ft	4.904 k-ft/ft	+1.20D+1.60S
PASS	0.4235	Z Flexure (-X)	2.077 k-ft/ft	4.904 k-ft/ft	+1.20D+1.60S
PASS	0.4235	X Flexure (+Z)	2.077 k-ft/ft	4.904 k-ft/ft	+1.20D+1.60S
PASS	0.4235	X Flexure (-Z)	2.077 k-ft/ft	4.904 k-ft/ft	+1.20D+1.60S
PASS	0.2848	1-way Shear (+X)	21.363 psi	75.0 psi	+1.20D+1.60S
PASS	0.2848	1-way Shear (-X)	21.363 psi	75.0 psi	+1.20D+1.60S
PASS	0.2848	1-way Shear (+Z)	21.363 psi	75.0 psi	+1.20D+1.60S
PASS	0.2848	1-way Shear (-Z)	21.363 psi	75.0 psi	+1.20D+1.60S
PASS	0.5326	2-way Punching	79.892 psi	150.0 psi	+1.20D+1.60S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	3.0	n/a	0.0	0.8088	0.8088	n/a	n/a	0.270
X-X, +D+S	3.0	n/a	0.0	1.954	1.954	n/a	n/a	0.651
X-X, +D+0.750S	3.0	n/a	0.0	1.668	1.668	n/a	n/a	0.556
X-X, +0.60D	3.0	n/a	0.0	0.4853	0.4853	n/a	n/a	0.162
Z-Z, D Only	3.0	0.0	n/a	n/a	n/a	0.8088	0.8088	0.270
Z-Z, +D+S	3.0	0.0	n/a	n/a	n/a	1.954	1.954	0.651
Z-Z, +D+0.750S	3.0	0.0	n/a	n/a	n/a	1.668	1.668	0.556
Z-Z, +0.60D	3.0	0.0	n/a	n/a	n/a	0.4853	0.4853	0.162

Overturning Stability

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

Sliding Stability

All units k

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

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.7525	+Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.40D	0.7525	-Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.20D	0.6450	+Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.20D	0.6450	-Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.20D+0.50S	1.093	+Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.20D+0.50S	1.093	-Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.20D+1.60S	2.077	+Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.20D+1.60S	2.077	-Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.20D+0.70S	1.272	+Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +1.20D+0.70S	1.272	-Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +0.90D	0.4838	+Z	Bottom	0.2160	AsMin	0.240	4.904	OK
X-X, +0.90D	0.4838	-Z	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.40D	0.7525	-X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.40D	0.7525	+X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.20D	0.6450	-X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.20D	0.6450	+X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.20D+0.50S	1.093	-X	Bottom	0.2160	AsMin	0.240	4.904	OK

Project Title:
Engineer:
Project ID:
Project Descr:

General Footing

Project File: 22-021.ec6

DESCRIPTION: FTNG#4

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D+0.50S	1.093	+X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.20D+1.60S	2.077	-X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.20D+1.60S	2.077	+X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.20D+0.70S	1.272	-X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +1.20D+0.70S	1.272	+X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +0.90D	0.4838	-X	Bottom	0.2160	AsMin	0.240	4.904	OK
Z-Z, +0.90D	0.4838	+X	Bottom	0.2160	AsMin	0.240	4.904	OK

One Way Shear

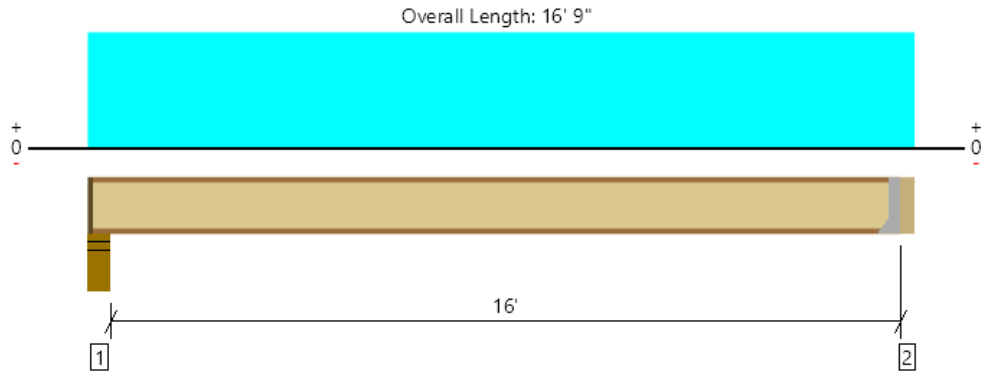
Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	7.74 psi	7.74 psi	7.74 psi	7.74 psi	7.74 psi	75.00 psi	0.10	OK
+1.20D	6.63 psi	6.63 psi	6.63 psi	6.63 psi	6.63 psi	75.00 psi	0.09	OK
+1.20D+0.50S	11.24 psi	11.24 psi	11.24 psi	11.24 psi	11.24 psi	75.00 psi	0.15	OK
+1.20D+1.60S	21.36 psi	21.36 psi	21.36 psi	21.36 psi	21.36 psi	75.00 psi	0.28	OK
+1.20D+0.70S	13.08 psi	13.08 psi	13.08 psi	13.08 psi	13.08 psi	75.00 psi	0.17	OK
+0.90D	4.98 psi	4.98 psi	4.98 psi	4.98 psi	4.98 psi	75.00 psi	0.07	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	28.95 psi	150.00 psi	0.193	OK
+1.20D	24.81 psi	150.00 psi	0.1654	OK
+1.20D+0.50S	42.02 psi	150.00 psi	0.2802	OK
+1.20D+1.60S	79.89 psi	150.00 psi	0.5326	OK
+1.20D+0.70S	48.91 psi	150.00 psi	0.3261	OK
+0.90D	18.61 psi	150.00 psi	0.1241	OK

Level, Upper floor joist
1 piece(s) 11 7/8" TJI® 210 @ 16" OC



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	603 @ 16' 5 1/2"	1005 (1.75")	Passed (60%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	603 @ 16' 5 1/2"	1655	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2425 @ 8' 5"	3795	Passed (64%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.268 @ 8' 5"	0.402	Passed (L/720)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.335 @ 8' 5"	0.804	Passed (L/576)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	47	45	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	4.25"	1.75"	126	505	631	1 1/4" Rim Board
2 - Hanger on 11 7/8" SPF beam	3.50"	Hanger[1]	1.75" / - [2]	125	500	625	See note [1]

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 8" o/c	
Bottom Edge (Lu)	16' 4" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PLF)	0 to 16' 9"	N/A	15.0	60.0	

Member Notes
Upper floor joist

ForteWEB Software Operator	Job Notes
Pasko Kesovija CK Engineering LLC (206) 660-5189 pasko@ckengineeringllc.net	

Weyerhaeuser

Weyerhaeuser Notes

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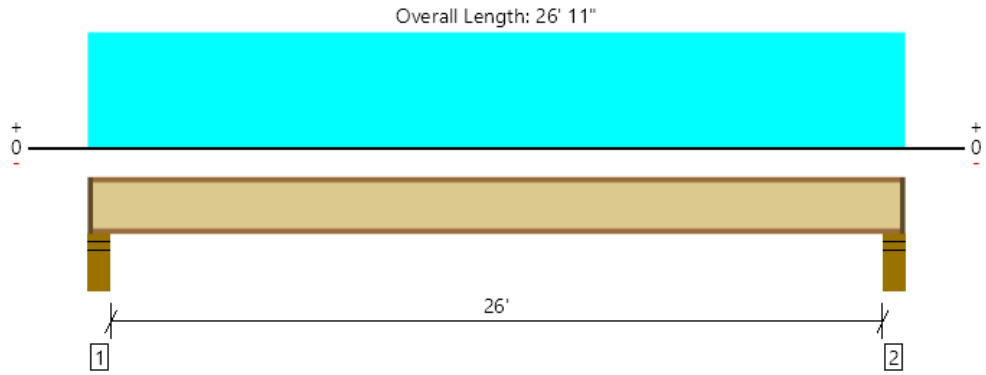
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

FORTE WEB

MEMBER REPORT

PASSED

Level, Main floor joist
1 piece(s) 16" TJI® 560 @ 12" OC



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	734 @ 4 1/2"	1725 (3.50")	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	715 @ 5 1/2"	2710	Passed (26%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4707 @ 13' 5 1/2"	12925	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.347 @ 13' 5 1/2"	0.654	Passed (L/906)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.477 @ 13' 5 1/2"	1.308	Passed (L/659)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	44	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge Gold™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	4.25"	1.75"	202	538	740	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.75"	202	538	740	1 1/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 8" o/c	
Bottom Edge (Lu)	26' 9" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 26' 11"	12"	15.0	40.0	Default Load

Member Notes

Main floor joist

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Pasko Kesovija CK Engineering LLC (206) 660-5189 pasko@ckengineeringllc.net	

Weyerhaeuser

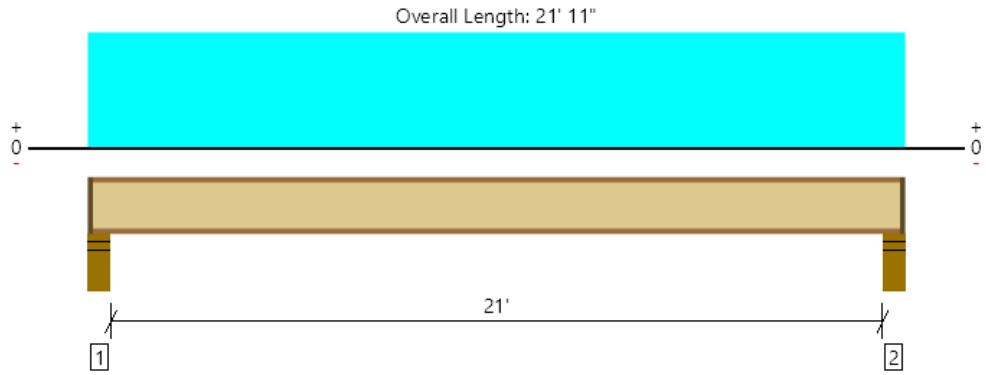
4/16/2022 7:25:03 PM UTC
ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16
File Name: floor joist

FORTE WEB

MEMBER REPORT

PASSED

Level, Main floor joist
1 piece(s) 14" TJI® 360 @ 16" OC



All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	796 @ 4 1/2"	1505 (3.50")	Passed (53%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	770 @ 5 1/2"	1955	Passed (39%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4107 @ 10' 11 1/2"	7335	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.380 @ 10' 11 1/2"	0.529	Passed (L/668)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.523 @ 10' 11 1/2"	1.058	Passed (L/486)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	44	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge Gold™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - SPF	5.50"	4.25"	1.75"	219	584	803	1 1/4" Rim Board
2 - Stud wall - SPF	5.50"	4.25"	1.75"	219	584	803	1 1/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 1" o/c	
Bottom Edge (Lu)	21' 9" o/c	

•TJI joists are only analyzed using Maximum Allowable bracing solutions.
•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 21' 11"	16"	15.0	40.0	Default Load

Member Notes

Main floor joist

Weyerhaeuser Notes

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Pasko Kesovija CK Engineering LLC (206) 660-5189 pasko@ckengineeringllc.net	

Weyerhaeuser

4/16/2022 7:07:42 PM UTC
ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16
File Name: floor joist

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 4ft wall

Code Reference

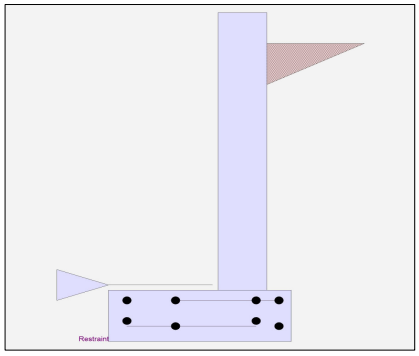
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

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

Soil Data

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



Surcharge Loads

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	14.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	67.667
Total Seismic Force	=	327.056

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 4ft wall

Design Summary

Wall Stability Ratios

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

Sliding Calcs

Lateral Sliding Force	=	637.8 lbs

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

Load Factors

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

Stem Construction

		Bottom				
		Stem OK				
Design Height Above Ftg	ft =	0.00				
Wall Material Above "Ht"	=	Concrete				
Design Method	=	SD	SD	SD	SD	SD
Thickness	=	8.00				
Rebar Size	=	# 4				
Rebar Spacing	=	12.00				
Rebar Placed at	=	Edge				
Design Data						
fb/FB + fa/Fa	=	**0.311**				
Total Force @ Section						
Service Level	lbs =					
Strength Level	lbs =	718.7				
Moment....Actual						
Service Level	ft-# =					
Strength Level	ft-# =	1,138.7				
Moment.....Allowable	=	3,655.6				
Shear.....Actual						
Service Level	psi =					
Strength Level	psi =	9.6				
Shear.....Allowable	psi =	75.0				
Anet (Masonry)	in2 =					
Wall Weight	psf =	100.0				
Rebar Depth 'd'	in =	6.25				

Masonry Data

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

Concrete Data

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 4ft wall

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.064 in2/ft		
(4/3) * As :	0.0853 in2/ft	Min Stem T&S Reinf Area 0.864 in2	
200bd/fy : 200(12)(6.25)/40000 :	0.375 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.192 in2/ft	
0.0018bh : 0.0018(12)(8) :	0.1728 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1728 in2/ft	#4@ 12.50 in	#4@ 25.00 in
Provided Area :	0.2 in2/ft	#5@ 19.38 in	#5@ 38.75 in
Maximum Area :	1.27 in2/ft	#6@ 27.50 in	#6@ 55.00 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	1.00
Total Footing Width	=	2.50
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

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

Footing Design Results

		Toe	Heel	
Factored Pressure	=	2,230	0	psf
Mu' : Upward	=	1,425	0	ft-#
Mu' : Downward	=	169	38	ft-#
Mu: Design	=	1,256	38	ft-#
phiMn	=	4,264	4,912	ft-#
Actual 1-Way Shear	=	14.06	2.51	psi
Allow 1-Way Shear	=	75.00	75.00	psi

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

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

Other Acceptable Sizes & Spacings

Toe:
Heel:
Key:

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

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 4ft wall

Summary of Overturning & Resisting Forces & Moments

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

Resisting/Overturning Ratio = **1.29**

Vertical Loads used for Soil Pressure = 909.2 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

DESCRIPTION: 4ft wall

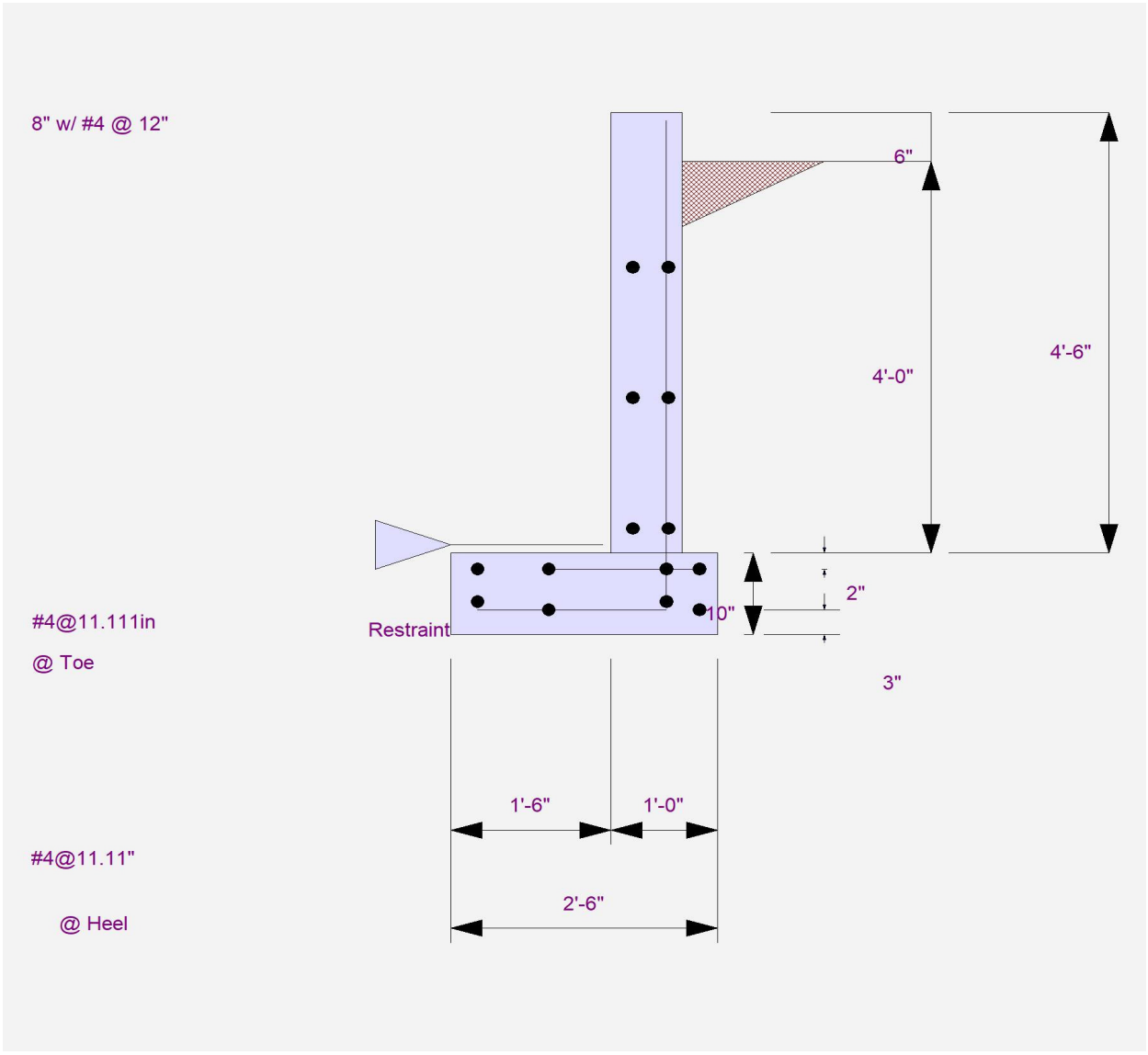
Rebar Lap & Embedment Lengths Information

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

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

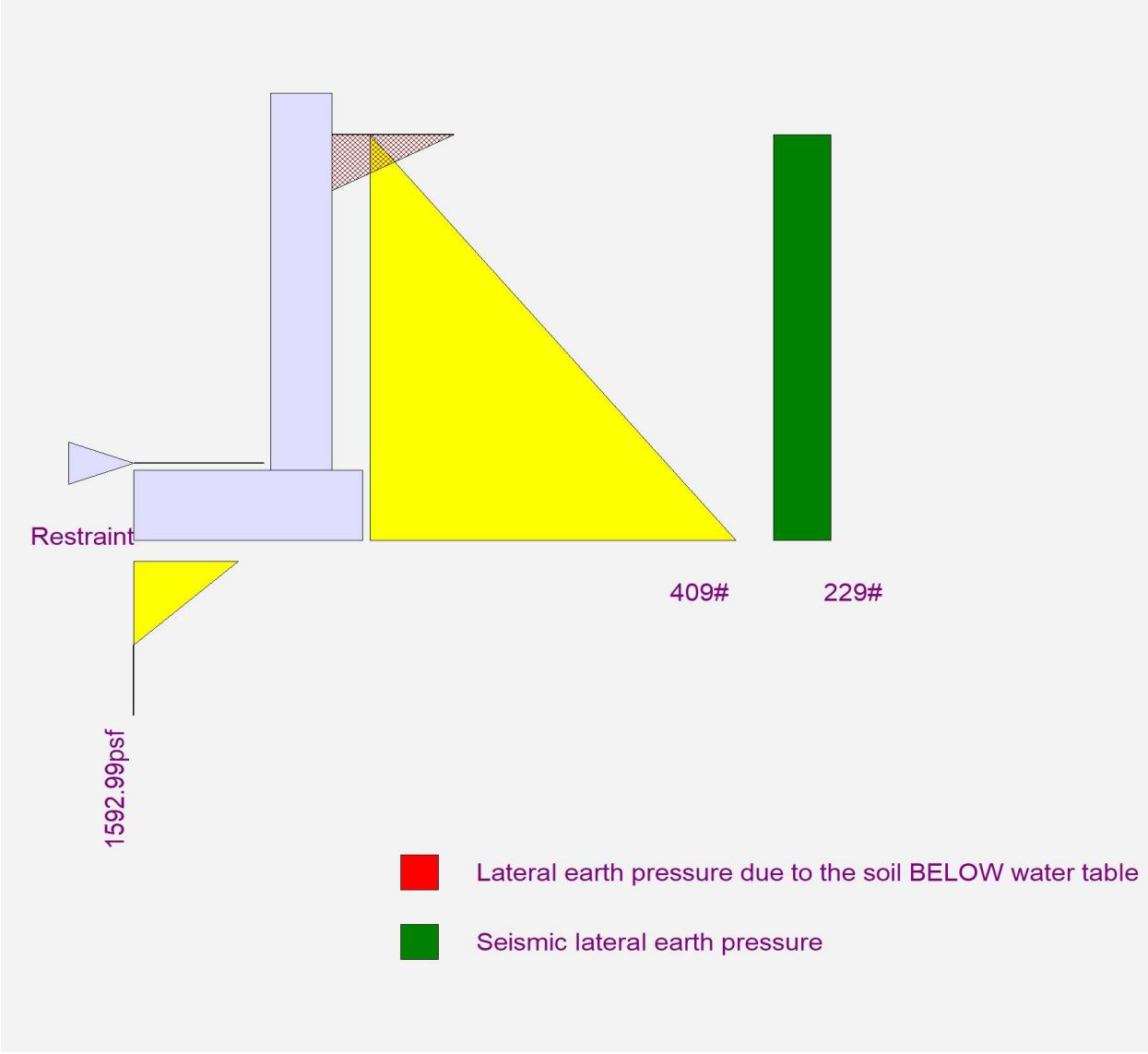
Cantilevered Retaining Wall

DESCRIPTION: 4ft wall



Cantilevered Retaining Wall

DESCRIPTION: 4ft wall



Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 6ft wall

Code Reference

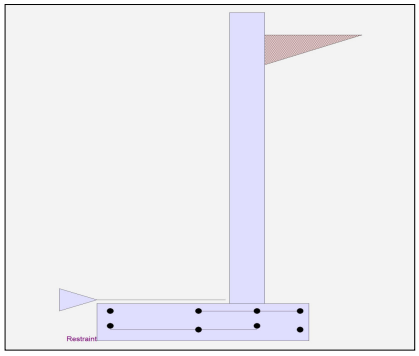
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

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

Soil Data

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



Surcharge Loads

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	14.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	95.667
Total Seismic Force	=	653.722

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 6ft wall

Design Summary

Wall Stability Ratios

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

Sliding Calcs

Lateral Sliding Force	=	1,274.8 lbs

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

Load Factors

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

Stem Construction

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

Design Data

fb/FB + fa/Fa	=	**0.690**
Total Force @ Section		
Service Level	lbs =	
Strength Level	lbs =	1,582.0
Moment....Actual		
Service Level	ft-# =	
Strength Level	ft-# =	3,738.0
Moment.....Allowable	=	5,412.6
Shear.....Actual		
Service Level	psi =	
Strength Level	psi =	21.1
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Wall Weight	psf =	100.0
Rebar Depth 'd'	in =	6.25

Masonry Data

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

Concrete Data

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 6ft wall

Concrete Stem Rebar Area Details

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

Footing Data

Toe Width	=	2.50 ft
Heel Width	=	1.50
Total Footing Width	=	4.00
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

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

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,944	0	psf
Mu' : Upward	=	4,007	0	ft-#
Mu' : Downward	=	469	327	ft-#
Mu: Design	=	3,538	327	ft-#
phiMn	=	4,999	4,912	ft-#
Actual 1-Way Shear	=	25.52	8.72	psi
Allow 1-Way Shear	=	75.00	75.00	psi

Toe Reinforcing = # 4 @ 9.43 in
Heel Reinforcing = # 4 @ 11.11 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
Heel:
Key:

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

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 6ft wall

Summary of Overturning & Resisting Forces & Moments

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

Resisting/Overturning Ratio = **1.41**

Vertical Loads used for Soil Pressure = 1,700.0 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

DESCRIPTION: 6ft wall

Rebar Lap & Embedment Lengths Information

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

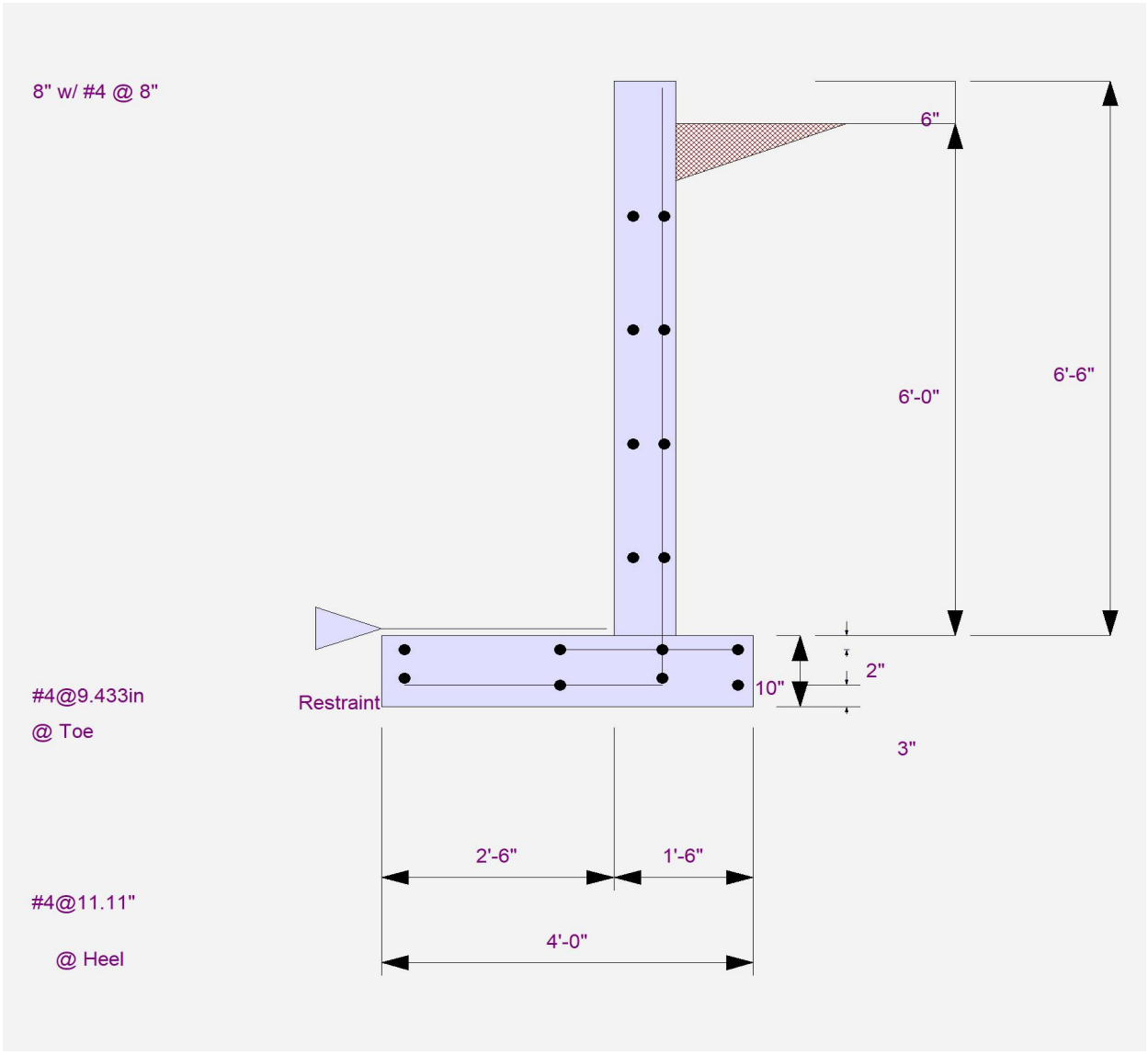
Lap Splice length for #4 bar specified in this stem design segment =	15.60 in
Development length for #4 bar specified in this stem design segment =	12.00 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.00 in
As Provided =	0.3000 in2/ft
As Required =	0.2801 in2/ft

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 6ft wall



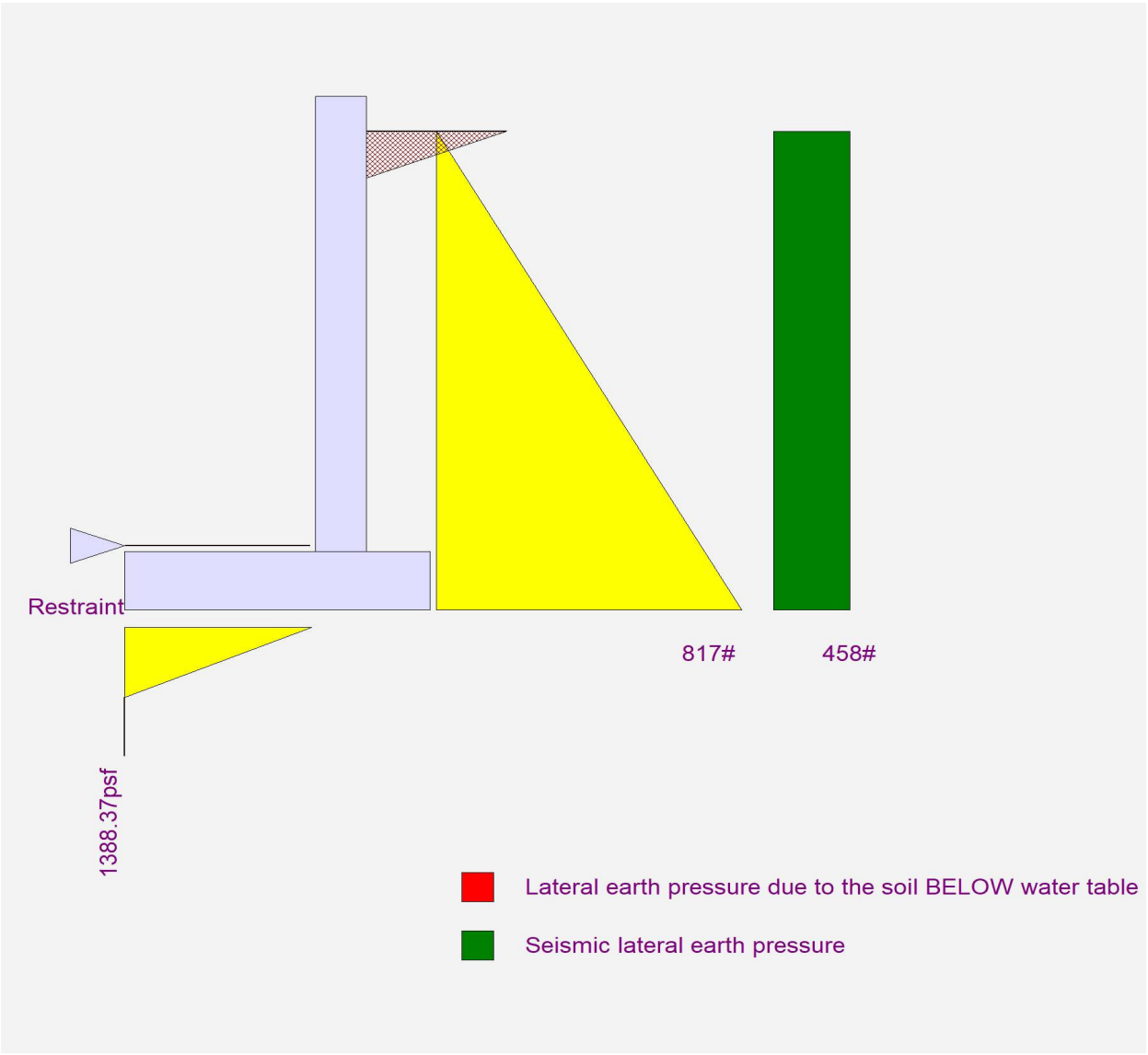
Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

LIC# : KW-06016495, Build:20.22.3.31 CK Engineering LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: 6ft wall



Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 8ft wall

Code Reference

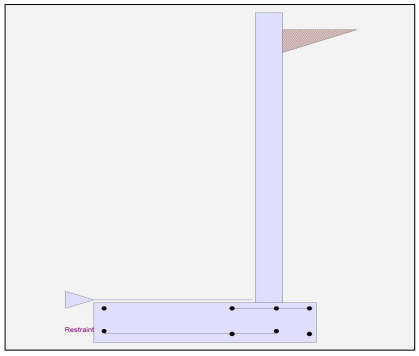
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

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

Soil Data

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



Surcharge Loads

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	14.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	128.333
Total Seismic Force	=	1,176.389

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 8ft wall

Design Summary

Wall Stability Ratios

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

Sliding Calcs

Lateral Sliding Force	=	2,294.0 lbs

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

Load Factors

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

Stem Construction

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

Design Data

fb/FB + fa/Fa	=	**0.923**
Total Force @ Section		
Service Level	lbs =	
Strength Level	lbs =	2,818.7
Moment....Actual		
Service Level	ft-# =	
Strength Level	ft-# =	8,885.3
Moment.....Allowable	=	9,623.1
Shear.....Actual		
Service Level	psi =	
Strength Level	psi =	38.0
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Wall Weight	psf =	100.0
Rebar Depth 'd'	in =	6.19

Masonry Data

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

Concrete Data

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

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 8ft wall

Concrete Stem Rebar Area Details

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

Footing Data

Toe Width	=	4.00 ft
Heel Width	=	1.50
Total Footing Width	=	5.50
Footing Thickness	=	14.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

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

Footing Design Results

		Toe	Heel	
Factored Pressure	=	3,378	0	psf
Mu' : Upward	=	11,750	0	ft-#
Mu' : Downward	=	1,680	440	ft-#
Mu: Design	=	10,070	440	ft-#
phiMn	=	14,059	15,420	ft-#
Actual 1-Way Shear	=	23.08	7.64	psi
Allow 1-Way Shear	=	75.00	75.00	psi

Toe Reinforcing = # 5 @ 12.30 in
Heel Reinforcing = # 5 @ 12.30 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
Heel:
Key:

Min footing T&S reinf Area 1.66 in2
Min footing T&S reinf Area per foot 0.30 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 7.94 in	#4@ 15.87 in
#5@ 12.30 in	#5@ 24.60 in
#6@ 17.46 in	#6@ 34.92 in

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 8ft wall

Summary of Overturning & Resisting Forces & Moments

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

Resisting/Overturning Ratio = **1.22**

Vertical Loads used for Soil Pressure = 2,545.8 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

DESCRIPTION: 8ft wall

Rebar Lap & Embedment Lengths Information

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

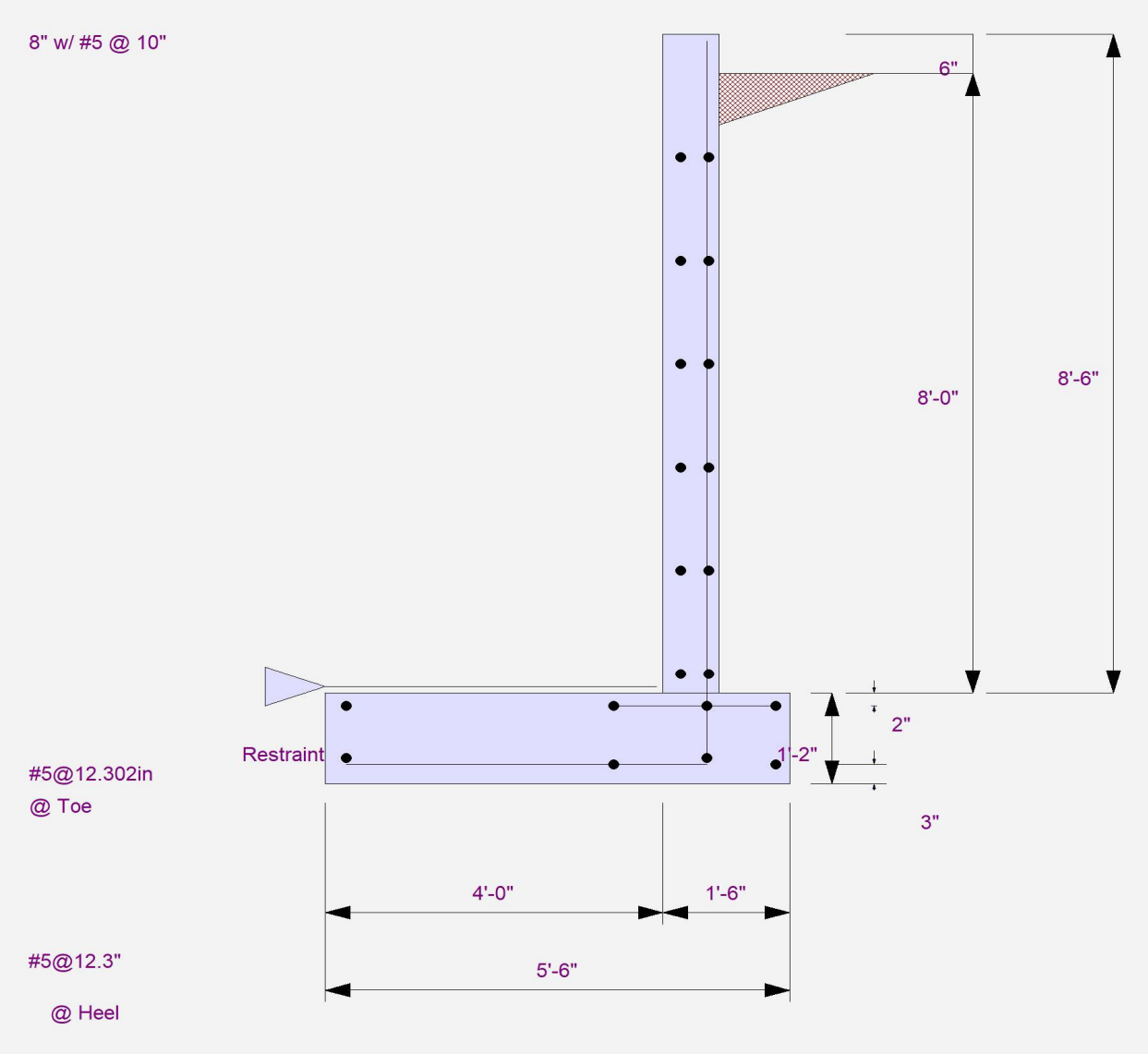
Lap Splice length for #5 bar specified in this stem design segment =	23.40 in
Development length for #5 bar specified in this stem design segment =	18.00 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	9.50 in
As Provided =	0.3720 in2/ft
As Required =	0.3364 in2/ft

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 8ft wall

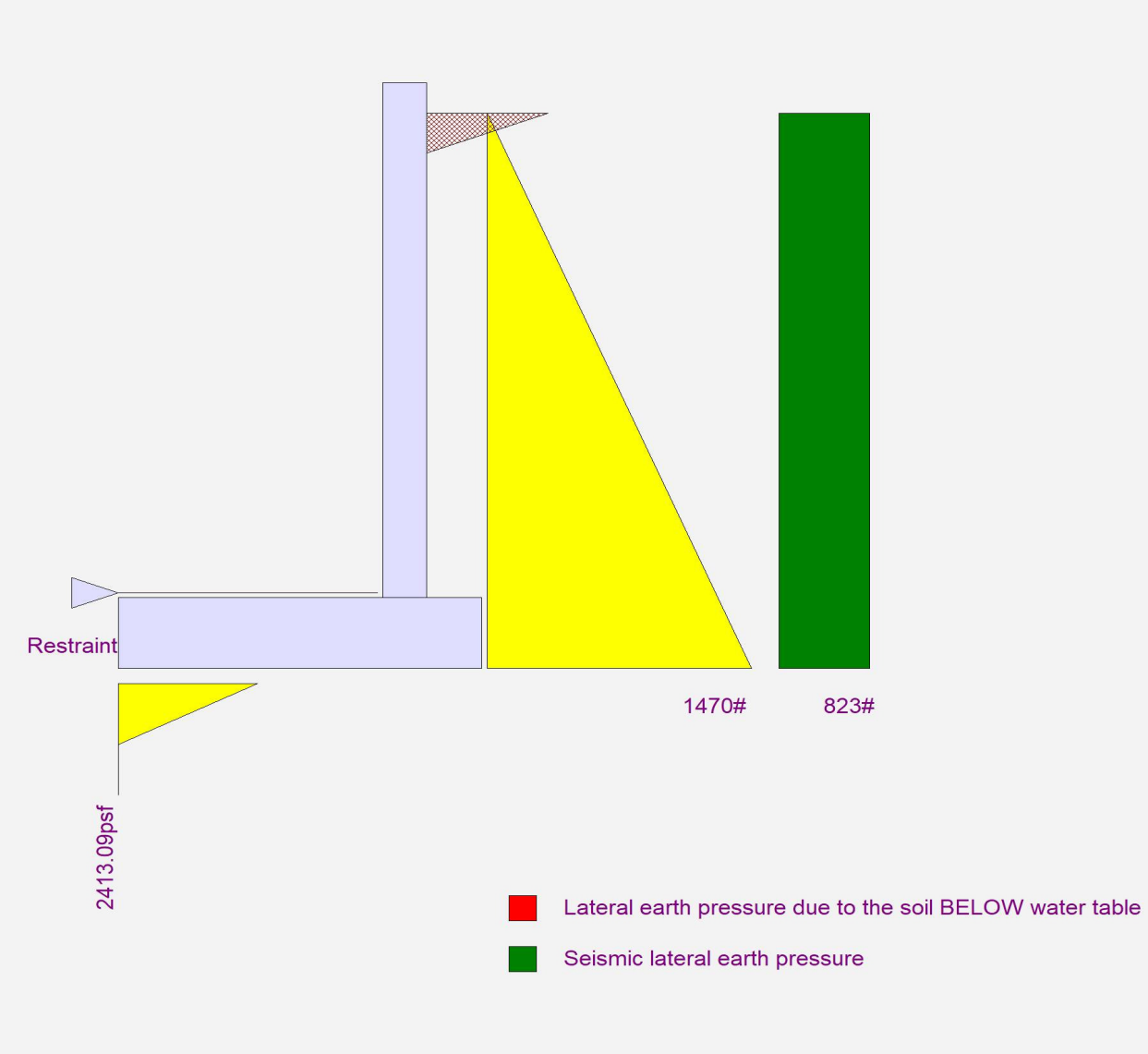


Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 8ft wall



Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 10ft wall

Code Reference

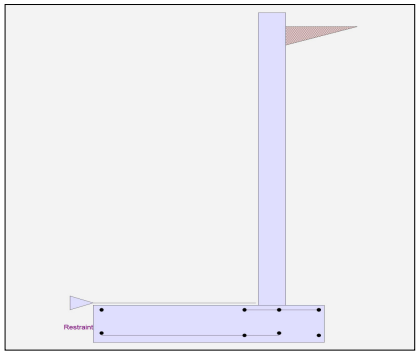
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

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

Soil Data

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



Surcharge Loads

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

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	14.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	158.667
Total Seismic Force	=	1,798.222

Project Title:
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 10ft wall

Design Summary

Wall Stability Ratios

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

Sliding Calcs

Lateral Sliding Force	=	3,506.5 lbs

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

Load Factors

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

Stem Construction

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

Design Data

fb/FB + fa/Fa	=	**0.943**
Total Force @ Section		
Service Level	lbs =	
Strength Level	lbs =	4,386.7
Moment....Actual		
Service Level	ft-# =	
Strength Level	ft-# =	17,266.7
Moment.....Allowable	=	18,302.4
Shear.....Actual		
Service Level	psi =	
Strength Level	psi =	47.9
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Wall Weight	psf =	125.0
Rebar Depth 'd'	in =	7.63

Masonry Data

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

Concrete Data

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

Project Title:
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Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 10ft wall

Concrete Stem Rebar Area Details

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

Footing Data

Toe Width	=	5.00 ft
Heel Width	=	2.00
Total Footing Width	=	7.00
Footing Thickness	=	16.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

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

Footing Design Results

		Toe	Heel	
Factored Pressure	=	3,226	0	psf
Mu' : Upward	=	21,503	0	ft-#
Mu' : Downward	=	3,000	1,062	ft-#
Mu: Design	=	18,503	1,062	ft-#
phiMn	=	28,521	22,180	ft-#
Actual 1-Way Shear	=	30.96	11.23	psi
Allow 1-Way Shear	=	75.00	75.00	psi

Toe Reinforcing = # 6 @ 10.00 in
Heel Reinforcing = # 5 @ 10.00 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe:
Heel:
Key:

Min footing T&S reinf Area 2.42 in2
Min footing T&S reinf Area per foot 0.35 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 6.94 in	#4@ 13.89 in
#5@ 10.76 in	#5@ 21.53 in
#6@ 15.28 in	#6@ 30.56 in

Project Title:
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Cantilevered Retaining Wall

Project File: 3000psf.ec6

DESCRIPTION: 10ft wall

Summary of Overturning & Resisting Forces & Moments

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

Resisting/Overturning Ratio = **1.30**

Vertical Loads used for Soil Pressure = 3,995.8 lbs

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

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

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

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

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

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

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

Cantilevered Retaining Wall

DESCRIPTION: 10ft wall

Rebar Lap & Embedment Lengths Information

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Stem Design Height: 0.00 ft above top of footing

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Development length for #6 bar specified in this stem design segment =	21.60 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =	11.28 in
As Provided =	0.5867 in2/ft
As Required =	0.5252 in2/ft

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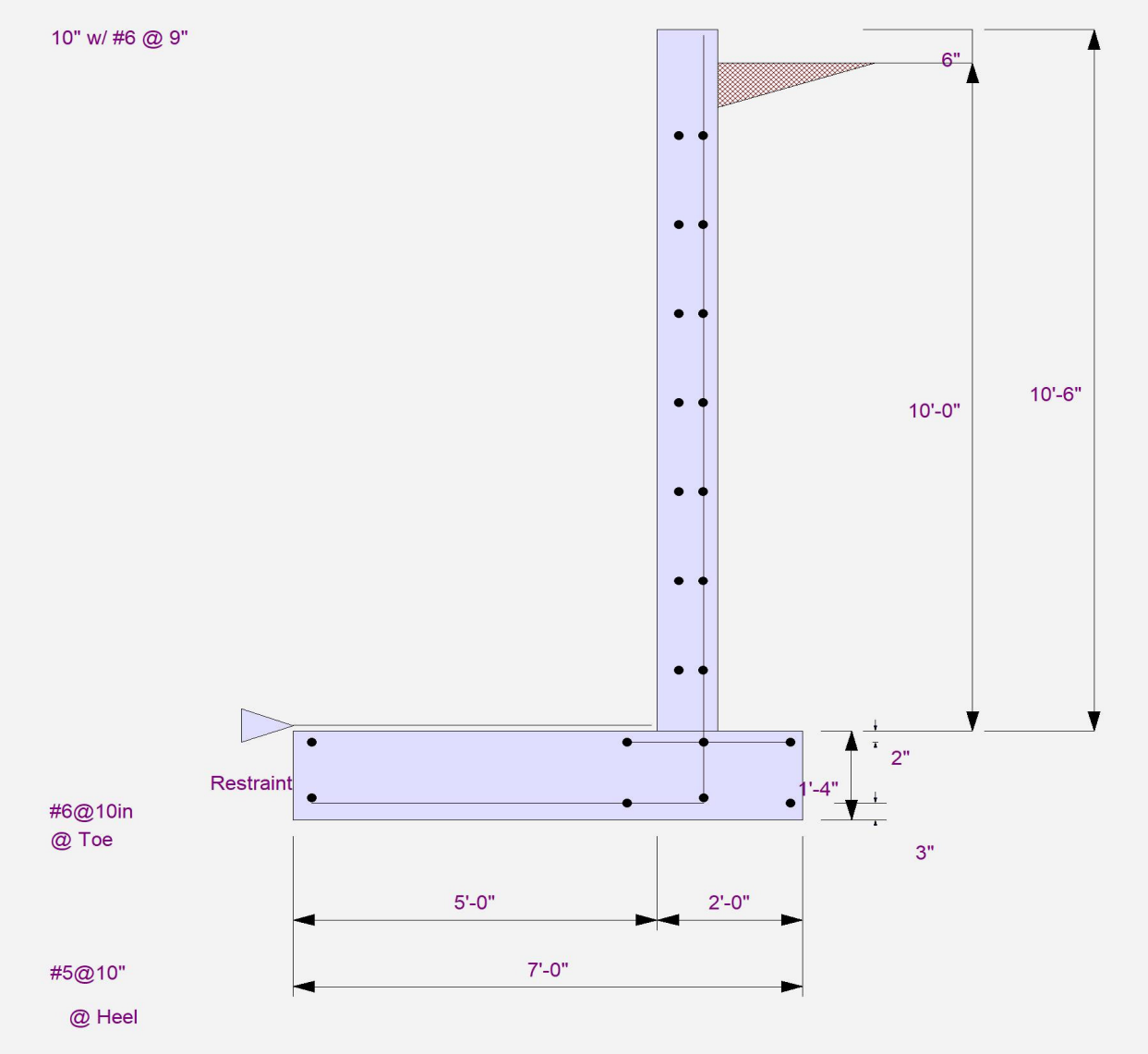

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DESCRIPTION: 10ft wall